Intergovernmental Oceanographic Commission Technical Series



27 February 2010 Chile Earthquake and Tsunami Event

Post-Event Assessment of PTWS Performance

UNESCO

27 February 2010 Chile Earthquake and Tsunami Event

Post-Event Assessment of PTWS Performance

Pacific Tsunami Warning and Mitigation System (PTWS)

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Executive Summary

A series of severe earthquakes hit Central Chile on Saturday, 27th February 2010. The main shock off Concepcion at 06:34 UTC (3:34 AM local time) had a magnitude of 8.8 Mw. The Pacific Tsunami Warning Center PTWC in Hawaii, USA issued a regional warning at 06:46 UTC (12 minutes after the event). This was the first ocean wide test of a system that was put in place nearly 45 years ago by UNESCO's Member States through its Intergovernmental Oceanographic Commission (IOC), after a 9.5 magnitude earthquake on 22 May 22 1960 off Chile triggered a wide ocean tsunami that caused 61 fatalities in Hawaii and 142 fatalities in Japan, several hours after the earthquake.

As indicated above, 12 minutes after the 27th February 2010 earthquake the Pacific Ocean Tsunami Warning System (PTWS) went into action, with timely and adequate information produced and disseminated across the Pacific Ocean. There were no fatalities reported far from the epicenter, however, near the epicenter off the Chilean coast, official accounts indicate over 156 fatalities due to the tsunami. Preliminary measures of a Rapid Survey Team deployed the week after the event by UNESCO showed run up measurements as high as 30 meters with most common measurements between 6 and 10 meters in the most affected area of the Chilean coast.

This earthquake and tsunami event presented an ideal opportunity to assess the performance of the PTWS. To that end the UNESCO/IOC Secretariat for the PTWS sent out a post-event survey questionnaire to the Tsunami Warning Focal Points (TWFPs) and Tsunami National Contacts (TNCs) from its 32 Member States and territories. This report has been prepared by the Secretariat based on the responses received from 19 TWFPs and TNCs. Factual details of the earthquake event and the tsunami are presented and the results of the survey are listed in tables and displayed as timelines and maps.

We underscore that all TWFPs received the first PTWC bulletin. In addition, most of the countries reported PTWC as source of awareness of the earthquake. Fourteen countries issued a tsunami warning and in 9 Member States coastal zones were evacuated. It would be pertinent that each Member State analyze if an evacuation would have been necessary in zones where no evacuation was made. In four countries, some areas were evacuated preventively (self-evacuation). Moreover, it was observed that sea level was monitored by most of the countries. In addition, some countries used results from numerical modelling and calculated earthquake parameters.

Based on data and information collected from Member States the PTWS acted promptly and efficiently throughout the Pacific. However, and at the same time, this event demonstrated the need to reinforce the work of PTWS for near field events, particularly with denser sea level real time networks close to active subduction areas. Indeed, as it has been demonstrated by the case of the sea level station located in Talcahuano, Chile, sea level stations close to the epicenter may be partially or totally destroyed by the impact of an earthquake and/or a tsunami. Given the critical role sea level readings have in all tsunami warning systems, the sea level monitoring networks should be densified close to active subduction areas and redundancy of sensors and transmission paths be strongly considered.

Most of the issues revealed by the survey can be addressed both by the PTWS and at the national level through increased regional cooperation and training where needed. Post-event assessments assist in this process by highlighting the strengths and weaknesses of the PTWS at regional, national and local levels and by raising the awareness of how Member States responded, both individually and collectively. The true value of such assessments is that it allows Member States to share information and experiences for the mutual benefit of improving the PTWS performance for all members.

Résumé exécutif

Une série de violents séismes a frappé le centre du Chili le samedi 27 février 2010. Le plus important, d'une magnitude de 8.8 Mw, a eu lieu au large de Concepción à 6 h 34 TUC (3 h 34 heure locale). Le Centre d'alerte aux tsunamis dans le Pacifique (PTWC) basé à Hawaii (États-Unis) a émis une alerte régionale à 6 h 46 TUC (soit 12 minutes plus tard). C'est la première fois qu'était expérimenté à l'échelle de tout le basin océanique un système mis en place près de 45 ans plus tôt par les États membres de l'UNESCO, par l'intermédiaire de la Commission océanographique intergouvernementale (COI), après un séisme de magnitude 9.5, survenu le 22 mai 1960 au large du Chili ; ce dernier avait alors déclenché un important tsunami responsable de la mort de 61 personnes à Hawaii et de 142 autres au Japon, plusieurs heures plus tard.

Comme indiqué ci-dessus, douze minutes après le séisme du 27 février 2010, le Système d'alerte aux tsunamis et de mitigation dans le Pacifique (PTWS) est entré en action, produisant et diffusant en temps voulu des informations appropriées à travers tout l'océan Pacifique. Aucune victime n'a été à déplorer à distance de l'épicentre ; en revanche, à proximité de l'épicentre qui se trouvait au large des côtes chiliennes, les rapports officiels font état de 156 victimes suite au tsunami. Les premières mesures effectuées par une équipe d'enquête rapide déployée par l'UNESCO la semaine qui a suivi l'événement ont montré que la hauteur de déferlement des vagues, comprise le plus souvent entre 6 et 10 mètres avait atteint 30 mètres dans la zone la plus touchée du littoral chilien.

Ce séisme accompagné d'un tsunami a constitué une occasion idéale d'évaluer l'efficacité du PTWS. À cette fin, le Secrétariat de l'UNESCO/COI pour le PTWS a adressé, après l'événement, un questionnaire aux points focaux pour l'alerte aux tsunamis (TWFP) et aux contacts nationaux pour les tsunamis (TNC) des 32 États membres et territoires du Système. Le présent rapport a été élaboré par le Secrétariat à partir des réponses reçues de 19 TWFP et TNC. Il contient des détails factuels concernant le séisme et le tsunami et présente les résultats de l'enquête sous forme de tableaux, de graphiques chronologiques et de cartes.

Nous insistons sur le fait que tous les TWFP ont reçu le premier bulletin du PTWC. En outre, la plupart des pays ont indiqué qu'ils avaient eu connaissance du séisme grâce au PTWC. Quatorze pays ont lancé une alerte au tsunami et dans neuf États membres, les zones côtières ont été évacuées. Il serait intéressant que chaque État membre étudie la question de savoir si une évacuation aurait été nécessaire dans les zones où il n'y en a pas eu. Dans quatre pays, certaines zones ont été évacuées préventivement (auto-évacuation). Par ailleurs, il a été observé que le niveau de la mer avait été surveillé par la plupart des pays, certains d'entre eux ayant même utilisé des modèles numériques et calculé les paramètres relatifs aux séismes.

Grâce aux données et aux informations recueillies auprès des États membres, le PTWS est intervenu rapidement et efficacement dans tout le Pacifique. Cependant, cet événement a aussi révélé la nécessité de renforcer l'action du PTWS pour les phénomènes en champ proche, en particulier au moyen de réseaux de surveillance temps réel du niveau de la mer plus denses à proximité des zones de subduction active. En effet, comme l'a démontré l'exemple de la station d'observation du niveau de la mer située à Talcahuano (Chili), les stations d'observation proches de l'épicentre risquent d'être partiellement ou totalement détruites par un tsunami. Compte tenu du rôle essentiel des mesures du niveau de la mer dans tous les systèmes d'alerte aux tsunamis, il faudrait augmenter la densité des réseaux de surveillance du niveau de la mer à proximité des zones de subduction active et se pencher sérieusement sur la question des capteurs et des voies de transmission redondantes. La plupart des difficultés révélées par l'enquête peuvent être résolues tant par le PTWS qu'au niveau national si l'on développe la coopération régionale et, au besoin, la formation. Les évaluations a posteriori facilitent ce processus en faisant ressortir les points forts et les points faibles du PTWS aux niveaux régional, national et local et en montrant comment les États membres ont répondu, tant individuellement que collectivement. Le véritable avantage de ces évaluations est qu'elles permettent aux États membres de partager des informations et des expériences, ce qui a pour effet d'améliorer l'efficacité du PTWS dans l'intérêt de tous les membres.

Resumen ejecutivo

El sábado 27 de febrero de 2010 una serie de graves terremotos sacudió el centro de Chile. El que se produjo frente a la costa de Concepción a las 6.34 UTC (3.34 hora local) fue el de más intensidad y alcanzó una magnitud de 8,8 Mw. El Centro de Alerta contra los Tsunamis en el Pacífico (PTWC) de Hawai (Estados Unidos) emitió una alerta regional a las 6.46 UTC (12 minutos después de que se produjera el fenómeno). Era la primera vez que se sometía a prueba en todo el océano un sistema establecido hace casi 45 años por los Estados Miembros de la UNESCO por conducto de su Comisión Oceanográfica Intergubernamental (COI), después de que se produjera un terremoto de magnitud 9,5 el 22 de mayo de 1960 frente a la costa de Chile, provocando un enorme tsunami en todo el océano, que se saldó con 61 muertos en Hawai y 142 en el Japón varias horas después del seísmo.

Como se ha indicado, 12 minutos después del terremoto del 27 de febrero de 2010, entró en juego el Centro de Alerta contra los Tsunamis en el Pacífico (PTWC), que elaboró y difundió información actualizada y adecuada en todo el Océano Pacífico. A pesar de que no se registraron víctimas lejos del epicentro, cerca del mismo y frente a la costa chilena las cifras oficiales indican que el tsunami se cobró la vida de 156 personas. Un equipo de reconocimiento rápido enviado por la UNESCO la semana después del fenómeno realizó mediciones preliminares de crecidas de hasta 30 metros, oscilando entre 6 y 10 metros las mediciones más corrientes en la zona más afectada de la costa chilena.

El terremoto y el tsunami constituyeron una oportunidad ideal para evaluar el funcionamiento del PTWS. Con ese fin, la Secretaría de la COI de la UNESCO para el PTWS envió una encuesta posterior al fenómeno a los puntos focales de alerta contra los tsunamis (TWFP) y a los contactos nacionales sobre tsunamis (TNC) de sus 32 Estados Miembros y territorios. La Secretaría ha preparado este informe basándose en las respuestas recibidas de 19 TWFP y TNC. Se presentan detalles concretos del terremoto y el tsunami, y los resultados de la encuesta figuran en cuadros y se ilustran con cronologías y mapas.

Cabe destacar que todos los TWFP recibieron el primer boletín del PTWC. Además, la mayoría de los países informaron de que gracias al PTWC habían tenido conocimiento del terremoto. Un total de 14 países emitieron una alerta de tsunami y en nueve Estados Miembros se evacuaron zonas costeras. Convendría que cada Estado Miembro analice si habría sido necesario evacuar zonas que no se evacuaron. En cuatro países, se evacuaron algunas zonas de modo preventivo (autoevacuación). Además, se observó que en la mayoría de los países se vigiló el nivel del mar. Por otra parte, algunos países utilizaron los resultados procedentes de modelos numéricos y calcularon los parámetros del terremoto.

Sobre la base de los datos e informaciones obtenidos de los Estados Miembros, el PTWS actuó inmediata y eficazmente en todo el Pacífico. No obstante, al mismo tiempo, el fenómeno puso de manifiesto la necesidad de fortalecer la labor del PTWS para los fenómenos que se produjeran en regiones cercanas a la fuente, especialmente estableciendo muchas más redes de vigilancia del nivel del mar en tiempo real cerca de las zonas de subducción activas. De hecho, el caso de la estación de medición del nivel del mar situada en Talcahuano (Chile) ha demostrado que tanto el terremoto como el tsunami pueden destruir total o parcialmente las estaciones situadas cerca del epicentro. Dada la función capital que las lecturas del nivel del mar desempeñan en todos los sistemas de alerta contra los tsunamis, se deberían establecer más estaciones de observación del nivel del mar cerca de las zonas de subducción activas y habría que contemplar seriamente el uso de sensores y medios de transmisión redundantes.

El PTWS y las instancias nacionales pueden resolver la mayoría de los problemas que se pusieron de manifiesto en la encuesta mediante la intensificación de la cooperación regional y el suministro de formación cuando sea necesario. Las evaluaciones posteriores a los fenómenos contribuyen a ese proceso al mostrar los puntos fuertes y débiles del PTWS en los ámbitos regional, nacional y local y dar a conocer mejor la manera en que los Estados Miembros respondieron individual y colectivamente. Esas evaluaciones son realmente valiosas porque permiten a los Estados Miembros intercambiar información y experiencias en beneficio mutuo a fin de mejorar el funcionamiento del PTWS para todos los miembros.

Рабочее резюме

В субботу 27 февраля 2010 г. в центральной части Чили произошла серия сильных землетрясений. Самое крупное из них в море в районе города Консепсьон произошло в 06:34 по Всемирному координированному времени (ВКВ) (3:34 – местное время) и имело магнитуду 8,8 балла. Центр предупреждения о цунами в Тихом океане (ПТВЦ) на Гавайях (США) разослал региональное предупреждение в 06:46 ВКВ (через 12 минут после землетрясения). Это было первое проведенное в масштабах всего океана тестирование системы, созданной почти 45 лет тому назад государствами – членами ЮНЕСКО с помощью ее Межправительственной океанографической комиссии (МОК) после того, как 22 мая 1960 г. землетрясение магнитудой 9,5 балла у побережья Чили вызвало океанское цунами, в результате которого через несколько часов после землетрясения погибли 61 человек на Гавайях и 142 в Японии.

Как указывалось выше, через 12 минут после землетрясения, произошедшего 27 февраля 2010 г., вступила в действие Система предупреждения о цунами в Тихом океане (СПЦТО), при этом была подготовлена и своевременно распространена во всем регионе Тихого океана надлежащая информация. Вдали от эпицентра не отмечалось смертельных случаев, однако вблизи от эпицентра у побережья Чили, согласно официальным сводкам, от этого цунами погибло более 156 человек. замеры, проведенные группой быстрого Предварительные обследования, направленной в этот район ЮНЕСКО через неделю после землетрясения, показали, что в наиболее сильно пострадавших районах чилийского побережья высота нагонной волны достигала 30 метров, а на большинстве участков составляла от 6 до 10 метров.

Это землетрясение и цунами представляют идеальную возможность для оценки эффективности СПТЦО. С этой целью Секретариат МОК ЮНЕСКО для СПЦТО подготовил вопросник по обследованию последствий стихийного бедствия, который был направлен координаторам предупреждения о цунами (КПЦ) и национальным контактам по цунами (НКЦ) 32 государств-членов и территорий, входящих в эту систему. Этот доклад был подготовлен Секретариатом на основе ответов, полученных от 19 КПЦ и НКЦ. Представлены подробные фактические данные о землетрясении и цунами, а результаты обследования указаны в таблицах и отражены на графиках и картах.

Мы подчеркиваем, что первый бюллетень ПТВЦ получили все КПЦ. Кроме того, большинство стран указали ПТВЦ в качестве источника информации о землетрясении. 14 стран выпустили предупреждение о цунами, а в девяти государствах-членах была проведена эвакуация населения в прибрежных зонах. Было бы целесообразным, чтобы каждое государство-член проанализировало необходимость эвакуации в тех зонах, где она не проводилась. В четырех странах население нескольких районов было эвакуировано в превентивном порядке (самостоятельная эвакуация). Кроме того, отмечалось, что большинство стран проводили мониторинг уровня моря. Наряду с этим некоторые страны использовали результаты цифрового моделирования и расчеты параметров землетрясения.

На основе данных и информации, собранных от государств-членов, СПЦТО предприняла быстрые и эффективные меры во всем Тихоокеанском регионе. Однако это событие в то же время продемонстрировало необходимость усиления работы СПЦТО в отношении событий, происходящих на небольшом удалении, особенно потребность в создании более плотных сетей мониторинга уровня моря в реальном времени вблизи активных районов субдукции. Действительно, как было отмечено в случае станции наблюдения за уровнем моря, расположенной в Талкахуано (Чили),

такие станции, находящиеся вблизи эпицентра, могут быть частично или полностью уничтожены в результате воздействия цунами или землетрясения. Учитывая важнейшую роль, которую данные наблюдения за уровнем моря играют во всех системах предупреждения о цунами, необходимо внимательно изучить вопрос о повышении плотности сетей мониторинга уровня моря вблизи активных районов субдукции, а также повысить устойчивость датчиков и каналов передачи данных.

Большинство вопросов, выявленных в результате обследования, может быть решено как в рамках СПЦТО, так и на национальном уровне посредством более активного регионального сотрудничества и подготовки кадров, где это необходимо. Оценки, проводимые после событий, содействуют этому процессу, показывая сильные и слабые стороны СПЦТО на региональном, национальном и местном уровнях и повышая информированность о том, как государства-члены реагировали индивидуально и коллективно. Подлинная ценность таких оценок заключается в том, что они позволяют государствам-членам осуществлять взаимовыгодный обмен информацией и опытом в целях повышения эффективности СПЦТО для всех членов.

1. INTRODUCTION

1.1 BACKGROUND

The earthquake with Mw 8.8 on 27 February, 2010 was the largest earthquake in the Pacific rim since the 1960 Chilean earthquake of 50 years ago in the region.

The 1960 Chilean earthquake with Mw 9.5 occurred off the coast of South-Central Chile at 19:11 (UTC) on May 22, 1960. This was the largest earthquake in recorded history and generated a devastating tsunami that crossed the entire Pacific. The tsunami hit Chile about 15-20 minutes after the earthquake and the Hawaiian Islands about 15 hours after, and the Pacific coasts of Japan and Philippines almost 24 hours after the occurrence. The maximum run-up height was 25 m in Mocha Island, Chile. Altogether the earthquake and tsunami killed about 1,655 people, injured 3,000 and 2,000,000 were displaced in southern Chile. The tsunami caused 61 deaths in Hawaii, 142 deaths in Japan and 32 dead or missing in the Philippines.

In 1965, under the umbrella of UNESCO-IOC, the Tsunami Warning System in the Pacific was started, and it remained the only working system in the world until 2005.

The 26 December 2004 Indian Ocean Tsunami killed over 230,000 people, displaced more than 1 million people and left a trail of destruction around the coasts of the entire Indian Ocean. Although the tsunami took over 2 hours to cross the Bay of Bengal, more than 50,000 in Malaysia, Thailand, India, Sri Lanka, Maldives and East Africa lost their lives. An early warning system would have saved many thousands of lives, but none was in place at that time.

Recognizing the need for an early warning system, the coastal nations of the Indian Ocean responded quickly. Following two intergovernmental meetings in Paris and Mauritius, the Intergovernmental Oceanographic Commission (IOC) of UNESCO was given the mandate to help all UNESCO Member States of the Indian Ocean rim to establish their own Indian Ocean Tsunami Early Warning and Mitigation System (IOTWS), and an Intergovernmental Coordination Group (ICG) for the IOTWS was formally established at the IOC Assembly in Paris, in June 2005. ICGs for North-Easthern Atlantic and Mediterranean (NEAMTWS) and the Caribbean (CARIBE-EWS) were formally established at the same time.

1.2 STATUS OF PTWS

The ICG/PTWS was established by IOC Resolution IV-6 in 1965 as a subsidiary body of the IOC, and has met every two years since 1968. Each Member State is represented by a Tsunami National Contact (TNC) who serves as the intergovernmental contact person for the coordination of international tsunami warning and mitigation activities. Within each country, a Tsunami Warning Focal Point (TWFP) is either the emergency authority (civil defense or other designated agency responsible for public safety), or has the responsibility of notifying the emergency authority of the event characteristics (earthquake and/or tsunami), in accordance with national standard operating procedures. TNC and TWFP designation shall follow formal official procedures.

The IOC Tsunami Unit (TSU) provides global coordination of tsunami warning and mitigation systems, including those in the Pacific and Indian Oceans, Caribbean, and NE Atlantic and Mediterranean Sea. The TSU is based at IOC headquarters in Paris, France, and is composed of the Unit Head, the Secretariats of the ICGs, the ITIC, and technical and professional staff.

The IOC International Tsunami Information Centre (ITIC) is located in Honolulu, Hawaii. The ITIC was established in 1965 by the IOC Resolution IOC/IV.6. ITIC is hosted by the United States of America Department of Commerce, National Oceanic and Atmospheric Administration National Weather Service (US NOAA NWS) Pacific region, which provides its Director and staff. The ITIC works to strengthen national and regional capacities and assists countries in establishing tsunami warning and mitigation system.

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The Pacific Tsunami Warning Centre (PTWC), the West Coast/Alaska Tsunami Warning Centre (WC/ATWC), and the Japan Meteorological Agency Northwest Pacific Tsunami Advisory Centre (JMA NWPTAC) are the operational tsunami warning centres providing international services for the PTWS.

Pacific Tsunami Warning Centre (PTWC)

The PTWC started in 1949 following an unwarned tsunami from Alaska in 1946 that killed 159 people in Hawaii. It is administratively part of the NOAA NWS Pacific region. Its mission responsibilities include serving as the:

- International Tsunami Warning Center for the PTWS, and headquarters and coordinator of warning centre activities in the Pacific,
- Tsunami Warning Centre for all US national interests in the Pacific outside of Alaska and the US and Canada West Coast,
- Hawaii Regional Tsunami Warning Centre,
- Interim Tsunami Watch provider for the Indian Ocean (along with JMA),
- Interim Tsunami Warning Centre for the South China Sea (along with JMA NWPTAC),
- Interim Tsunami Watch provider for the Caribbean and adjacent regions.

West Coast/Alaska Tsunami Warning Center (WC/ATWC)

The WC/ATWC started in 1967 after the 1964 Alaska earthquake as the warning centre for Alaska. It expanded to include the west coast of North America in 1982, and to all coasts on North America in 2005. It is administratively part of NOAA NWS Alaska region. Its mission responsibilities include serving as the:

- US Tsunami Warning Center for all US states except Hawaii,
- US and International Tsunami Warning Centre for Puerto Rico and Virgin Islands,
- International Tsunami Warning Center for Canada.

Japan Meteorological Agency (JMA); Northwest Pacific Tsunami Advisory Center (NWPTAC)

The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) oversees the JMA that operates and administers the tsunami warning programme for Japan. The JMA National Center has mission responsibilities as:

- National Tsunami Warning Center (started in 1952),
- International Tsunami Advisory service for the Northwest Pacific (through the NWPTAC, since 2005),
- Interim Tsunami Watch Provider for the Indian Ocean (with PTWC, since 2005),
- Interim Tsunami Advisory Center for the South China Sea as part of the expanded coverage of the NWPTAC (with PTWC, since 2006).

1.3 27FEBRUARY 2010 CHILE TSUNAMI – AN OPPORTUNITY TO ASSESS PERFORMANCE

A series of severe earthquakes hit Central Chile on Saturday, 27 February 2010. The major one off Concepcion at 06:34 UTC (03:34 a.m. in local time) had a magnitude of 8.8 Mw. The Pacific Tsunami Warning Center (PTWC) in Hawaii issued a regional warning for Chile and Peru, at 06:46

UTC. The tsunami warning system for the Pacific Ocean (PTWS) went into action, and first reports indicate that timely and adequate information was produced and disseminated.

This is the first real ocean wide test of a system that was put in place about 45 years ago by UNESCO's Member States through its Intergovernmental Oceanographic Commission (IOC), when a 9.5 magnitude earthquake occurred on 22 May 1960 off Chile.

The recent event provides the PTWS with an opportunity to evaluate the performance of the system and will enable PTWS and its Member States to identify those components which worked properly and, most importantly, any components which did not work in an appropriate manner and are in need of further attention. A post-event assessment questionnaire was designed to evaluate the performance of the PTWS and to provide a benchmark of the present status of the system. Support and cooperation of Member States to complete the questionnaire was requested.

The questionnaire addressed 4 main areas of an end-to-end warning system, including upstream and downstream components. These are:

- The PTWC/WC/ATWC service,
- National Actions,
- National Response,
- Monitoring and Modelling.

The assessment was meant to be positive and constructive, and not to be in any way critical or judgmental.

2. EVENT CHARACTERISTICS

According to the Chilean authorities (as of January 2011), a total of 156 persons died and 25 people are missing as a consequence of the tsunami, including 25 children under 10 years old. Many campers are included in the fatalities.

2.1 EARTHQUAKE FACTS

At 06:34:14 UTC on 27 February 2010 (local time was 03:34:14 AM) an earthquake of Mw 8.8 occurred 105 km NNE of Conception and 335 km SW of Santiago, Chile (Figure 2.1). The earthquake parameters were as follows (from USGS).

Location: 35.909° S, 72.732° W Depth: 35 km Magnitude (Mw): 8.8



USGS ShakeMap : OFFSHORE MAULE, CHILE Sat Feb 27, 2010 06:34:14 GMT M 8.8 S35.91 W72.73 Depth: 35.0km ID:2010tfan

Map Version 7 Processed Fri Mar 5, 2010 03:00:13 AM MST -- NOT REVIEWED BY HUMAN

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	-	IV	V	VI	VII	VIII	IX	X+

<u>Figure 2.1</u> Location and seismic intensity map of 27 the February 2010 earthquake, 105 km NNE of Conception and 335 km SW of Santiago, Chile. (USGS)

The earthquake was generated at the gently sloping fault that conveys the Nazca plate eastward and downward beneath the South American plate. The two plates are converging at 7 meters per century. The fault rupture, largely offshore, exceeded 100 km in width and extended nearly 500 km parallel to the coast. The rupture began deep beneath the coast and spread westward, northward, and southward. As it spread, the fault slip generated an earthquake shaking. The fault slip also warped the ocean floor, setting off the tsunami along the fault-rupture area. (USGS).



<u>Figure 2.2</u> Cross-section of slip distribution. The strike direction of the fault plane is indicated by the black arrow and the hypocenter location is denoted by the red star. The slip amplitudes are shown in colour. Contours show the rupture initiation time in seconds. (USGS).



<u>Figure 2.3</u> Surface projection of the slip distribution superimposed on GEBCO. Red lines indicate major plate boundaries [Bird, 2003]. Gray circles are aftershock locations, sized by magnitude, up to 2010/03/02 15:30 UTC (USGS)



<u>Figure 2.4</u> Focal areas of the 2010 earthquake (red) and past significant earthquakes (black elipse). The largest elipse shows the focal area of the 1960 Chilean earthquake. The 2010 earthquake took place after about 70 years from the preivious M 8.4 class earthquakes. (Figure is taken from JMA)

2.2 TSUNAMI MODELLING AND SEA LEVEL OBSERVATIONS

2.2.1 Tsunami modelling

The use of numerical modelling to predict tsunami wave heights is gradually increasing. In case of tsunamis which attack within a few minutes, the TWC can use only the seismic data for issuing a tsunami warning before the tsunami arrival. If we could get actual tsunami wave forms generated, we can be able to provide accurate tsunami information including tsunami arrival times and its height.

In case of the tsunami of February 27, 2010 Chile, the tsunami was first recorded at a DART buoy in approximately 3 hours. Forecast results shown in Figure 2.5 were created with the NOAA forecast method using the MOST model with the tsunami source inferred from DART data. The tsunami waves first arrived at Talcahuano tide gauge station, Chile (about 100 km south from epicenter) about 19 minutes after the earthquake. The second arrival was at the Valparaíso tide gauge station, Chile (about 330 km NE from the epicenter) about 34 minutes after the earthquake.

According to the WC/ATWC, the first tsunami arrival in Hawaii was at 21:29; 14:55 hours after the earthquake and was recorded in Japan at 04:43 on 28 February; 22:09 hours after the earthquake.



<u>Figure 2.5</u> Energy propagation pattern of the 27 February 2010 tsunami calculated with MOST forecast model. Filled colors show maximum computed tsunami amplitude in cm during 24 hours of wave propagation. Black contours show computed tsunami arrival time. (NOAA/PMEL/Centre for Tsunami Research)

The PMEL also calculated the Model amplitudes for the 1960 Chile tsunami, shown in Figure 2.6.



1960 Chile tsunami (earthquake magnitude Mw 9.5) Maximum amplitude plot -- for comparison with Feb 27, 2010 Chile tsunami event

<u>Figure 2.6</u> Model amplitudes of the historical 1960 Chilean tsunami from the M 9.5 earthquake calculated with the MOST forecast model. Filled colors show maximum computed tsunami amplitude in cm during 24 hours of wave propagation. Black contours show computed tsunami arrival time. The source parameters of the earthquake (Mw 9.5) are taken from Kanamori and Ciper [1974]. (NOAA/PMEL/Centre for Tsunami Research)

2.2.2 Tsunami Travel Time Modelling

Another model package that has proved to be useful for predicting tsunami propagation is the Tsunami Travel time (TTT) software developed by Paul Wessel, GeowareTravel and distributed by World Data Centre (NGDC) in Boulder, Colorado, USA in cooperation with the International Tsunami Information Center (ITIC) and UNESCO IOC.TTT maps are used for Figures 5.1, 5.2, 5.3.

2.2.3 Sea Level Observation

The Pacific Ocean sea level network collected a significant amount of tsunami sea level readings for the 2010 Chile tsunami. Here, some tsunami records are shown in Figure 2.7 to Figure 2.19. All figures show 1 day data with the same amplitude scale; one grid of each figure corresponds to 1 meter. All figures are absolute sea level data; tide components are not removed. All data are taken from the WC/ATWC data archive.



<u>Figure 2.7</u> Southern Chile sea level stations: San Pedro, Ancud, Corral, Talcahuano, Juan Fernández and Valparaíso

This figure shows the Chilean sea level stations from South (bottom) to North (top). Significant tsunamis waves were recorded at these Chilean sea level stations. The data samplings are every 2 minutes. The first tsunami wave, fortunately, arrived at the time of low tide in the early morning. The high tide time is about 6 hours later from the first tsunami arrival. The highest sea level at Corral was around 14:00 UTC; 8 hours after the earthquake occurence. In the case of Valparaíso, the highest sea level height was recorded around 9:00 UTC; 3 hours after the earthquake.

The data transmission at Talcahuano and Juan Fernández were terminated shortly after the earthquake (see Box on Sea level readings for near field events, next page).

Sea level network readings for near field events

Photo 1 shows the tsunami damaged sea level station at Talcahuano, Chile. Top 2 elements are GOES antenna (flat) and protected air temperature sensor (cylinder). GOES antenna is used to send sea level data through satellite. A UHF antenna which use is to send sea level data to the local maritime authority is placed immediately below the temperature sensor. Two flat panels below are solar panels to charge batteries to the power system in case the commercial power system fails. Some seaweed is attached to a solar panel and the antenna pole and the pole is slightly inclined. As it is reported, the tsunami run-up height in the region was around 6 meters. A broken low wall down the picture is reported as causing the pole inclination and the sea level station broken down.



Photo 1. Damaged sea level station the day after the 27 February 2010 tsunami, Talcahuano, Chile Photo by Rodrigo Núñez Gundlach

As the data transmission interval for this station was every 60 minutes, 29 minutes after the hour, the sea level readings from this station were first available 54 minutes after the earthquake, at 07:29 UTC and afterwards at 08:29 UTC. Then this level station stopped working sometime between 08:29 UTC and 09:29 UTC.

As demonstrated by the case of the sea level station in Talcahuano, Chile, sea level stations close to the epicenter may be partially or totally destroyed by the earthquake or by the impact of a tsunami. Given the critical role sea level readings have in tsunami warning systems, monitoring sea level networks should be dense close to active subduction areas.



Figure 2.8 Expanded records for Chile sea level stations: Juan Fernández, Talcahuano and Valparaíso

Three expanded records; vertical and horizontal axises as in Figure 2.8, show the records at Talcahuano, Valparaíso and Juan Fernández for 2 hours (06:00 – 08:00 UTC) and vertical scale is

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also expanded; one grid is a half meter. Each record shows some changes are initiated just after the earthquake at 06:34 UTC. The cause of these fluctuations may be different from station to station. Sea level records at Valparaíso show co-seismic rises of about 10 cm that continue for about a half hour without oscillation, and then a sudden increase starts. It is not clear at the moment but this may reflect the subsidence of sea level station. On the other hand, the record at Talcahuano shows a gradual sea level decrease initiated immediately after the earthquake occurrence, and a sudden increase starting after about a half hour. Juan Fernández station is located in Robinson Crusoe Island which lies some 700 km from Chilean mainland. The sea level record also shows a small periodic oscillation; about 10 cm (peak to trough), has started just after the earthquake. As the station is some distance from the earthquake source area, the oscillation is not the tsunami arrival but the seiche generated by the seismic wave of the earthquake. Although the tsunami height could not observed by the sea level station due to the malfunction of the system, the run-up height of the Island was over 8 meters, and 16 lives were lost in the island.



Figure 2.9 shows the 1960 tsunami record at Talcahuano as a reference



Figure 2.10 Northern Chile and Peru sea level stations:Coquimbo, Caldera, San Felix, Antofagasta, Iquique and Arica (Chile) and Callao La Punta (Peru).

Figure 2.10 shows tsunami heights recorded by sea level stations from Central Chile (bottom) to Peru (top). The initial motion of all stations in this figure starts with a clear push wave. The maximum tsunami amplitude was about 1.3 meter at Coquimbo, Chile. Other stations were around 0.3 to 0.7 meter. Tsunami records continue for a long time without a rapid decay. The highest sea level was observed at the time of the high tide at each station.



Figure 2.11 Central America sea level stations: Santa Cruz, Galápagos and Baltra (Ecuador), Quepos (Costa Rica), Acapulco, Manzanillo, Cabo San Lucas (México).

Figure 2.11 shows sea level data from tide gauges located in Central America. Epicentral distances are about 4,300 km (bottom) to 7,600 km (top). The maximum amplitude at Santa Cruz, Galápagos, Ecuador was about 1.1 m. Other stations in the figure were 0.2 – 0.4 m.

The common features of these stations are:

- A clear push wave onset of the first arrival wave,
- Tsunami amplitudes continue with same height without decaying,
- The predominant periods are constant at each station (harbour).



Figure 2.12 Sea level stations along California coast (USA):San Diego, Santa Barbara and Crescent City

Figure 2.12 shows sea level data from stations located in California, USA. Epicentral distances are about 9,000 km to 10,000 km. The maximum amplitudes at these three stations were 0.4 - 0.6 m. Both records at Santa Barbara and San Diego show short period oscillations and a long duration

with same amplitude; about 40 cm. This implies that strong currents continued for a long time in each harbour.

The common features of these stations are:

- Onset of the first arrival wave is not clear at each station,
- Tsunami amplitude continues with same height without decaying,
- The predominant periods are constant at each station (harbour).



Figure 2.13 Sea level stations along Alaska, USA Sand Point, King Cove, St Paul Island and Adak

Figure 2.13 shows the sea level data for locations in Alaska, USA. Epicentral distances are about 13,000 km to 14,000 km. The maximum amplitudes at these three stations were 0.2 - 0.6 m. The predominant periods of tsunami are quite different station by station.



<u>Figure 2.14</u> Sea level stations in Hawaii and Johnston Island: Kawaihae, Kahului, Maui, Nawiliwili, Kauai and Johnston Island (USA)

Figure 2.14 shows the sea level data from locations in Hawaii (3 stations) and Johnston Island, USA. Epicentral distances are around 11,000 km. The maximum amplitudes at these three stations were 0.4 - 1 m. All records start with clear push waves and have a similar wave form with long time oscillation at the Hawaiian stations. However, Johnston Island is a small coral reef island about 1,400 km west of Hawaii, and the tsunami waveform is quite simple. The maximum amplitude was about 0.2 m in the part of the first few oscillations and attenuated rapidly.



Figure 2.15 Sea level stations in the Western Pacific Ocean Midway Island and Wake Island (USA) and Manus (Papua New Guinea).

Both Midway Island and Wake Island (Figure 2.15) are small coral reef islands in the North-West Pacific Ocean. Epicentral distances are about 13,000 km to 14,000 km. The maximum amplitude waves arrived within a few hours of tsunami arrival and attenuated rapidly. Manus sea level station is installed in Manus Island in northern Papua New Guinea. Maximum amplitude of 0.7 m appears a half day after the tsunami generation.



<u>Figure 2.16</u> Sea level stations in the Southern Pacific Ocean: Papeete (Fr. Polynesia), Rarotonga (New Zealand), Pago Pago (American Samoa) and Apia (Samoa).

Papeete is the capital of French Polynesia in Tahiti Island. Rarotonga station is located in Cook Island. Apia station is located in northern coast of Upolu Island of Samoa. Epicentral distances are about 7,700 km to 9,900 km. Maximum amplitudes are 0.2 - 0.4 m.



Figure 2.17 Sea level stations in New Zealand: Raoul Island, Chatham Island and Gisborne (New Zealand)

Raoul Island is located in the northernmost of the main Kermadec islands. Chatham Island is located over 800 km east of New Zealand. Gisborne is located east coast of New Zealand. Epicentral distances are about 8,300 km to 9,400 km. Maximum amplitudes are 0.5 - 1 m. Highest sea level at Gisborne is observed a half day after the tsunami generation. The features of the tsunami wave form are quite different station by station.



<u>Figure 2.18</u> Sea level stations in Japan and Philippines: Hanasaki, Ofunato, Omaezaki and Tosashimizu (Japan) and Currimao (Philippines).

Currimao, Philippines station is located in the coast of South China Sea. All 4 stations in Japan (Figure 2.18) are located along the Pacific Ocean coast. Epicentral distances are about 16,700 km to 17,700 km. The maximum amplitudes at 4 stations in Japan were 0.4 - 0.9 m and 0.2 m at Currimao, Philippines. By comparision, the 1960 Chilean tsunami was recorded at the Hanasaki station with amplitude (peak to peak) of over 3 meters (Figure 2.19).



Figure 2.19 Shows the tsunami record of 1960 Chile tsunami; maximum peak-to-peak amplitude was over 3 meters.



<u>Figure 2.20.</u> Shows the tsunami record of 2010 Chile tsunami at Hiva Oa (Marquesas islands, French Polynesia)

2.3 PTWC, WC/ATWC AND JMA BULLETINS

Following the earthquake, PTWC and WC/ATWC issued several bulletins. The North-West Pacific Tsunami Advisory Center of JMA did not issue international bulletins because the earthquake was out of its area of responsibility. The time line below, however, includes for reference the action taken by JMA as a national tsunami warning centre.

27 Feb 2010 Chile Time Line

(Note: Blue part is new information.)

	Elapse		Action			
27Feb.	-	NEIC	OT: 06:34:14UTC (Local time 03:34AM)			
06:34Z			35.846S, 72.719W, Depth: 35km Mw: 8.8			
2010			Offshore Maule, Chile			
			115km NNE of Conception, Chile			
			325km SW of Santiago, Chile			
06:46	12	PTWC	Warning for Chile, Peru and Watch for Ecuador			
		No. 1	36.1S 72.6W, depth:55km M:8.5			
06:49	15	WCATWC No. 1	Tsunami Information 36.1S 72.6W, depth:55km M:8.5			
07:45	1:11	PTWC	Warning for Chile, Peru. Watch for Ecuador, Colombia, Antarctica,			
		No. 2	Panama, Costa Rica 36.1S 72.6W, depth:55km M:8.6 (<i>M is</i>			
	4.40		revised)			
07:55	1:18	WCATWC No. 2	Tsunami Information 36.1S 72.6W, depth:55km M:8.6 (<i>M is</i>			
00.44	0.10	DTMO	revised)			
08:44	2:10	PTWC	Warning for Chile, Peru. Watch for Ecuador, Colombia, Antarctica,			
		No. 3	Panama, Costa Rica 36.1S 72.6W, depth:55km M:8.8 (<i>M is</i>			
08:57	2:23	WCATWC No. 3	revised)			
00:57	2:23	WUATWU NO. 3	Tsunami Information 36.1S 72.6W, depth:55km M:8.8 (<i>M is revised</i>)			
09:47	3:13	PTWC	Warning for Chile, Peru, Ecuador and Watch for Colombia,			
09.47	5.15	No. 4	Antarctica, Panama, Costa Rica, Nicaragua, Pitcairn, Honduras, El			
		NO. 4	Salvador, Guatemala, Fr. Polynesia			
09:58	3:24	WCATWC No. 4	Tsunami Information 36.1S 72.6W, depth:55km M:8.8			
10:45	4:11	PTWC No. 5	Warning is issued for all Pacific area			
10:45	4:21	WCATWC No. 5	Tsunami Advisory for California and Alaska (from Kodiak to Attu)			
11:47	5:13	PTWC No. 6	Warning for all Pacific area			
11:53	5:19	WCATWC No. 6	Tsunami Advisory for California and Alaska (from Kodiak to Attu)			
12:49	6:15	PTWC No. 7	Warning for all Pacific area			
12:55	6:21	WCATWC No. 7	Tsunami Advisory for California and Alaska (from Kodiak to Attu)			
13:46	7:12	PTWC No. 8	Warning for all Pacific area			
14:03	7:29	WCATWC No. 8	Tsunami Advisory for entire AOR from California/Mexico			
11.00	1.20		border to Attu, Alaska			
14:46	8:12	PTWC No. 9	Warning for all Pacific area			
15:04	8:30	WCATWC No. 9	Tsunami Advisory for entire AOR			
15:45	9:11	PTWC No. 10	Warning for all Pacific area			
16:03	9:29	WCATWC No. 10	Tsunami Advisory for entire AOR			
16:50	10:16	PTWC No. 11	Warning for all Pacific area			
17:04	10:30	WCATWC No.11	Tsunami Advisory for entire AOR			
17:52	11:18	PTWC No. 12	Warning for all Pacific area			
17:58	11:24	WCATWC No. 12	Tsunami Advisory for entire AOR			
18:43	12:09	PTWC No. 13	Warning for all Pacific area			
19:06	12:32	WCATWC No. 13	Tsunami Advisory for entire AOR			
19:34	13:00	PTWC No. 14	Warning for all Pacific area			
20:03	13:29	WCATWC No. 14	Tsunami Advisory for entire AOR			
20:28	13:54	PTWC No. 15	Warning for all Pacific area			
21:05	14:31	WCATWC No. 15	Tsunami Advisory for entire AOR			
21:32	14:58	PTWC No. 16	Warning for all Pacific area			
21:47	15:13	WCATWC No. 16	Tsunami Advisory for entire AOR			
22:41	16:07	PTWC No. 17	Warning for all Pacific area			
22:46	16:12	WCATWC No. 17	Tsunami Advisory for entire AOR			
23:54	17:20	WCATWC No. 18	Tsunami Advisory for entire AOR			
00:12	17:38	PTWC	Cancelled Tsunami Warning for every where except Russia			
28 Feb		No.18	and Japan			

	Elapse		Action
00:33	17:59	JMA	Major Tsunami Warning for 3 forecast zones in Northern Japan,
			Tsunami warning for other all Pacific coastal area, a part of Japan
			sea coast and setonaikai coast, and Tsunami Advisory for some
			non Pacific coastal area.
00:54	18:20	WCATWC	Tsunami Advisory for California, BC and Alaska and Advisory is
		No.19	canceled for Oregon and Washington.
01:35	19:01	PTWC No. 19	Tsunami warning for Russia and Japan
01:57	19:23	WCATWC	Tsunami Advisory for California and areas in Alaska from Sitka to
		No. 20	Attu. Tsunami Advisory is canceled for areas from BC/Washington
	00.04		border to Sitka, Alaska.
02:35	20:01	PTWC No. 20	Tsunami warning for Russia and Japan
03:05	20:31	WCATWC	Tsunami Advisory for California and area in Alaska from Seward to
		No. 21	Attu. Tsunami Advisory is canceled for areas of Alaska from Sitka
	04.40		to Seward.
03:44	21:10	PTWC No. 21	Tsunami warning for Russia and Japan
04:03	21:29	WCATWC	Tsunami Advisory for areas in Alaska from Kodiak to Attu.
		No. 22	Tsunami Advisory is canceled for areas of Alaska from Seward to
			Kodiak and California.
04:47	22:13	Hanasaki/ Japan	Tsunami arrival (push) 0.3m, Max: 1.0m at 09:23
04:49	22:15	PTWC No. 22	Tsunami warning for Russia and Japan
05:01	22:27	WCATWC	Tsunami Advisory for areas in Alaska from Sand Point to Attu.
		No. 23	Tsunami Advisory is canceled for areas of Alaska from Kodiak to
05.50	00.00		Sand Point.
05:56	23:22	PTWC No. 23	Tsunami warning for Russia and Japan
06:02	23:28	WCATWC No. 24	Tsunami Advisory for areas in Alaska from Sand Point to Attu.
07:00	24:26	PTWC No. 24	Tsunami warning for Russia and Japan
07:13	24:39	WCATWC No. 25	Tsunami Advisory is canceled for all areas in Alaska
07:57	25:23	PTWC No. 25	Tsunami warning for Japan and Cancelled for Russia
08:59	26:25	PTWC No. 26	Tsunami warning for Japan
09:40	27:06	PTWC No. 27	Tsunami Cancellation and this will be the final bulletin.
10:01	27:27	JMA	Major Tsunami Warning for 3 forecast zones were down
			graded to Tsunami Warning and Other Tsunami Warning and
10.10	00.00	18.4.6	Advisory are remained.
12:13	29:39	JMA	Some Tsunami warnings are downgraded to Advisories and
14.00	20.00	18.4.6	some Advisories are cancelled.
14:36	32:02	JMA	Many Tsunami Warning areas are downgraded to Tsunami
10.07	22.00	18.4.4	advisory and some Warnings and Advisories are cancelled.
16:07	33:33	JMA	Many Tsunami Warning areas are downgraded to Tsunami
10.00	24.20	18.4.0	advisory. All Tsunami Warnings are downgraded to Tsunami Advisory
18:06	34:32	JMA	and some Advisories are cancelled.
22.40	40.00	18.4.0	
23:40	40:06	JMA	Some Advisories are cancelled.
01:15	41:41	JMA	All Advisories are cancelled.
1 Mar			

3. SURVEY QUESTIONNAIRE

The ICG/PTWS designed a questionnaire to obtain information from Member States covering 4 main areas of interest:

- <u>The PTWC and WC/ATWC Service</u> The purpose of this section was to confirm how and when the NTWCs had received the first and subsequent bulletins from PTWC and WC/ATWC, and if they had also received bulletins from other sources.
- National Actions

The purpose of this section is to find out what actions were taken by National Warning Centres, including an independent analysis of the event, notification of relevant organizations, issuing and cancellation of warnings.

National Response

The purpose of this section is to find out what the national and local response was to the event after the tsunami warning had been issued by the National Warning Centre.

• <u>Monitoring and Modelling</u> This section was intended to ascertain which Member States used numerical model scenarios and real time sea level monitoring procedures in their decision making.

The questionnaire is included in Annex II together with the covering letter sent out to Member States.

Currently the ICG/PTWS comprises 32 Member States.

4. COUNTRY REPORTS

The following sections provide details of the response of individual countries, based on information provided in the questionnaires. Note that questionnaires were not returned by Canada, Cook Islands, Costa Rica, Democratic People's Republic of Korea, Fiji, Guatemala, Indonesia, Malaysia, Mexico, Papua New Guinea, Republic of the Philippines, Republic of Korea, Samoa, Vietnam.

The country reports are given in the form of a response timeline followed by a commentary based on information provided by the participating countries. Figure 4.1 shows the timeline legend.



Figure 4.1 Advisory service and country response timeline legend

The left side of the timeline lists the times at which bulletins were issued by the Advisory Service (WC/ATWC and PTWC) and is the same for each timeline. Also shown on the left side is sea level information (sea level, gauge location and time of observation) issued in the WC/ATWC and PTWC bulletins. The information on the right side is provided by individual countries and lists the times at which the various bulletins were received from the Advisory Service and the times at which country actions were taken, highlighted in red.

Note that all times in this report are in Coordinated Universal Time (UTC).

4.1 AUSTRALIA – BUREAU OF METEOROLOGY

Earthquake occurred	ı		
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km	06:34		
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:41		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador ——	—06:44 \ — 06:46 =	<	06:47 PTWC Bulletin No.1 received
WC/ATWC No.1 - M=8.5: Tsunami Information	06:49	07:00	06:50 WC/ATWC Bulletin No. 1 received 06:50 Issued JATWC Earthquake Bulletin
PTWC No.2 - M=8.5: Additional watch for Colombia,		-	- 07:21: No Threat Bulletin for Australia
Antarctica, Panama, Costa Rica — WC/ATWC No.2 - M=8.6: Tsunami Information	07:45	08:00	07:46 PTWC Bulletin No. 2 received 07:55 WC/ATWC Bulletin No. 2 received
	07:52	00.00	-
			 08: 44 PTWC Bulletin No. 3 received 08:45 Tsunami Watch 1 for NSW, Queensland, Lord Howe and
PTWC No.3 - M=8.8: (revised)	08:44		Norfolk Islands // Emergency Management Australia advised State
WC/ATWC No.3 - M=8.8: Tsunami Information —	—08:57 _	09:00	 emergency service managers and federal government ministers 08:59 WC/ATWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador.			09:47 PTWC Bulletin No. 4 received
Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia	09:47 _		09:48 Tsunami Warning 1 for: NSW (Marine Threat Broken Bay
WC/ATWC No.4 - M=8.8: Tsunami Information	09:58	10:00	to Point Danger); Queensland (Marine Threat Point Danger toDouble Island Point); Norfolk Island (Marine Threat); for Lord
PTWC No.5 - Warning for all Pacific area	10:45		Howe Island (Marine Treath). 09:59 WC/ATWC Bulletin No. 4 received
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	_ 10.40		10:00 State emergency services alerted coastal units
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	—10:55 _	11:00	10: 45 PTWC Bulletin No. 5 received 10:56 WC/ATWC Bulletin No. 5 received
Columbia and Alaska (from Oregon-California border to Kodiak)			_ 10.56 WC/ATWC Builetin No. 5 Teceived
PTWC No.6 - Warning for all Pacific area ——	— 11:47 _		_ 11:48 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	11:53 _	12:00	— 11:56 WC/ATWC Bulletin No. 6 received
Tsunami Information for: Oregon Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			_
PTWC No.7 - Warning for all Pacific area	— 12:49		12:50 PTWC Bulletin No. 7 received
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —	12:55	13:00	12:56 WC/ATWC Bulletin No. 7 received
(from Kodiak to Attu)			
PTWC No.8 - Warning for all Pacific area	— 13:46 —	14:00	13:47 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from	- 14:03 -		- 14:04 WC/ATWC Bulletin No. 8 received
California to Attu, Alaska.			
PTWC No.9 - Warning for all Pacific area—	14:46 _	15.00	14:47 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from —	15:04 _	15:00	- 15:06 WC/ATWC Bulletin No. 9 received
California to Attu, Alaska			
PTWC No.10 - Warning for all Pacific area	—15:45 _		_ 15: 46 PTWC Bulletin No. 10 received
-	16:03 _	16:00	- - 16:05 WC/ATWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska			
PTWC No.11 - Warning for all Pacific area—	40.50		16:50 PTWC Bulletin No. 11 received 16:57 Tsumami Warnings (Marine Threat) were extedended to
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	16:50 17:04	17:00	central and southern Qld, all NSW, eastern Victorian and
California to Attu, Alaska			Tasmania Coasts 17:05 WC/ATWC Bulletin No. 11 received
PTWC No.12 - Warning for all Pacific area—	— 17:52 _		- 17:52 PTWC Bulletin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	— 17:58 _	18:00	- 17:59 WC/ATWC Bulletin No. 12 received
California to Attu, Alaska			
PTWC No.13 - Warning for all Pacific area	18:43		
		19:00	18:44 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska			19:07 WC/ATWC Bulletin No. 13 received
	_		_
PTWC No.14 - Warning for all Pacific area —	19:34	20:00	19:35 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR	20:03		20:05 WC/ATWC Bulletin No. 14 received
from California to Attu, Alaska PTWC No.15 - Warning for all Pacific area —			
	20.20 _		⁻ 20:29 PTWC Bulletin No. 15 received
		21:00	

AUSTRALIA – BUREAU OF METEOROLOGY



Country comments

Other sources of information: INCOIS

"Sea-level observations at southern NSW and Norfolk Island achieved the Marine Threat warning threshold. Media response to warnings was mixed but improved upon the last warning event (15 July 2009, southern New Zealand tsunami). The lower level of threat implied in Marine Warnings was generally well understood. Media reports focused on the number of members of the public

who ignored warnings or actively went to beaches to watch the tsunami. Arrival time on Australian coasts of significant waves was several hours after predicted first arrival, causing some doubt about warning accuracy".

4.2 COLOMBIA – OSSO CORPORATION Communication with PTWC and WC/ATWC only by email

Forthqueke occurred			
Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	-06:34		
	- 06:41 -06:44	M	06:47 PTWC Bulletin No.1 received
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador	06:44	~~	06:48 Revision of earthquake parameters
WC/ATWC No.1 - M=8.5: Tsunami Information	06:49 -	07:00	06:56 Internal communication at OSSO Corporation 07:04 WC/ATWC Bulletin No. 1 received
			07:37 SMS to the Colombian Oceanographic Commission (CCO)
PTWC No.2 - M=8.5: Additional watch for Colombia,			Colombia to inform that the event did not represent any danger for
Antarctica, Panama, Costa Rica —	_07:45 _	-	- Colombian coasts
WC/ATWC No.2 - M=8.6: Tsunami Information	-07:52	08:00	07:45 PTWC Bulletin No. 2 received 08:08 WC/ATWC Bulletin No. 2 received
			08: 23 OSSO Corporation Bulletin 1 sent to the National Direction of
			Risk Management (per email), to inform that the event did not
PTWC No.3 - M=8.8: (revised)	08:44 _		represent any danger for Colombian coasts
WC/ATWC No.3 - M=8.8: Tsunami Information ——	—08:57 _	09:00	08: 44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador.			_ 09:13 WC/ATWC Bulletin No. 3 received
Additional watch for Nicaragua, Pitcairn Islands, Honduras,	_09:47 _		09:15 Revised information on websites of NTWCs in Ecuador, Peru and Chile
El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information	-09:58 -	10:00	09:47 PTWC Bulletin No. 4 received
	09.50	10.00	10:12 WC/ATWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area	- 10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)			10: 45 DTWO Dulletin No. 5 received
Tsunami Information for: Oregon- Washington- British	-10:55	11:00	10: 45 PTWC Bulletin No. 5 received
Columbia and Alaska (from Oregon-California border to Kodiak)			
			_ 11:13 WC/ATWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area	11:47		11:48 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska	_11:53	12:00	
(from Kodiak to Attu)			12:13 WC/ATWC Bulletin No. 6 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			12:25 OSSO Corporation Bulletin 2 sent to the National Direction of Risk Management (per email) to reiterate the absence of danger for
PTWC No.7 - Warning for all Pacific area	12:49		Colombia coasts
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska ——	-12:55	13:00	12:50 PTWC Bulletin No. 7 received
(from Kodiak to Attu)			13: 13 WC/ATWC Bulletin No. 7 received
PTWC No.8 - Warning for all Pacific area	13:46 -	14:00	13:47 PTWC Bulletin No. 8 received 13:50 communication per phone with experts on the coast to obtain
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska.	14:03 -		information about sea level
····, ···,			 14:21 WC/ATWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area	14:46 _	45.00	
WC/ATMC No.0 Toursomy Advisory for optics AOP from	15:04 -	15:00	14:47 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from —— California to Attu, Alaska			15:22 WC/ATWC Bulletin No. 9 received
PTWC No.10 - Warning for all Pacific area	-15:45 _	16:00	_ 15: 46 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from	16:03 _		
California to Attu, Alaska			 16:21 WC/ATWC Bulletin No. 10 received
PTWC No.11 - Warning for all Pacific area	- 16:50	47.00	16:50 PTWC Bulletin No. 11 received
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	17:04	17:00	
California to Attu, Alaska			_ 17:23 WC/ATWC Bulletin No. 11 received
PTWC No.12 - Warning for all Pacific area	17:52		
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	17:58 _	18:00	 17:52 PTWC Bulletin No. 12 received
California to Attu, Alaska			
			18:16 WC/ATWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area	_18:43 _		
		19:00	_ 18:44 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	-19:06	1	
	_		19:24 WC/ATWC Bulletin No. 13 received
PTWC No.14 - Warning for all Pacific area —	_19:34	20:00	19:34 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR	20:03	20.00	
from California to Attu, Alaska		†	20:21 WC/ATWC Bulletin No. 14 received
PTWC No.15 - Warning for all Pacific area ——	-20:28 _	ł	20:28 PTWC Bulletin No. 15 received
		21:00	

COLOMBIA – OSSO Corporation

WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00
PTWC No.16 - Warning issued for all Pacific area	21:32 _	21:22 WC/ATWC Bulletin No. 15 received 21:32 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00 22:04 WC/ATWC Bulletin No. 16 received
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46 —	22:41 PTWC Bulletin No.17 received 23:00 23:03 WC/ATWC Bulletin No. 17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	23:54	00:00
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	00:12 _	00:11 WC/ATWC Bulletin No. 18 received 00:13 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 —	00:30 OSSO Corporation Bulletin 3 sent to the National Direction of Risk Management (per email) to clarify confusion and reiterate the abscense of danger
PTWC No.19 - Warning for Russia and Japan ——	-01:35 _	01:12 WC/ATWC Bulletin No. 19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to —	01:57	02:00 01:35 PTWC Bulletin No.19 received
Sitka, Alaska		_ 02:15 WC/ATWC Bulletin No. 20 received
PTWC No.20 - Warning for Russia and Japan	02:35 -	03:00 02:36 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 -	03:23 WC/ATWC Bulletin No. 21 received
PTWC No.21 - Warning issued for Russia and Japan	-03:44 -	04:00 03:44 PTWC Bulletin No.21 received
Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	- 04:03 -	04:22 WC/ATWC Bulletin No. 22 received
PTWC No.22 – Tsunami Warning for Russia and Japan —	-04:49 -	
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska	- 05:01 -	05:00 04:50 PTWC Bulletin No.22 received
from Kodiak to Sand Point		_ 05:20 WC/ATWC Bulletin No. 23 received
PTWC No.23 – Tsunami Warning for Russia and Japan	_ 05:56 _	06:00 05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	- 06:02 -	06:22 WC/ATWC Bulletin No. 23 received
PTWC No.24 – Tsunami Warning for Russia and		07:00
Japan ——— WC/ATWC No 25 – Cancelled for all areas in Alaska ———	07:00 - 07:13 _	07:00 PTWC Bulletin No.24 received
		_ 07:28 WC/ATWC Bulletin No. 25 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 —	08:00 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for	08:59 -	09:00 09:00 PTWC Bulletin No.26 received
Japan PTWC No.27 – Tsunami Warning Cancellation	00.40	
Final bulletin ———	09:40	09:41 PTWC Bulletin No.27 received

<u>Country comments</u> Other sources of information: GDACS

4.3 CHILE- HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE OF THE NAVY

Fortheresis accurred			
Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km06:34			
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and 06:44		M	06:47 PTWC Bulletin No.1 received
Prwc 1 No.1 - M=6.5: Tsunami warning for Chile and00.44 Peru. Watch for Ecuador 06:4			06:51 Issuance of the warning to ONEMI via VHF
WC/ATWC No.1 - M=8.5: Tsunami Information 06:4	19 ⁻ C	07:00	
			 O7:05 Issuance of the warning to the Navy through messages by wired communication and email.
PTWC No.2 - M=8.5: Additional watch for Colombia,			07:07 Issuance of tsunami warning via fax // attempt to communicate via
Antarctica, Panama, Costa Rica ——07:45		08:00	fixed line, mobile and satellital telephone.
WC/ATWC No.2 - M=8.6: Tsunami Information07:52	2	00.00	07:45 PTWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised)08:4	14		
WC/ATWC No.3 - M=8.8: Tsunami Information08:5		09:00	08: 44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,09:47	7		
El Salvador, Guatemala, Fr. Polynesia			
WC/ATWC No.4 - M=8.8: Tsunami Information ——09:58	8 1	10:00	09:47 PTWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area ——— 10:45	5		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	_		
(from Kodiak to Attu)10:55 Tsunami Information for: Oregon- Washington- British		11:00	_ 10: 45 PTWC Bulletin No. 5 received
Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.6 - Warning for all Pacific area —— 11:47	7		11:47 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53	3 1	12:00	
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.7 - Warning for all Pacific area — 12:49	_		
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska ——12:55 (from Kodiak to Attu)	5 1	13:00	
PTWC No.8 - Warning for all Pacific area 13:46	6 – 1	14:00	
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03	-		
California to Attu, Alaska.			
PTWC No.9 - Warning for all Pacific area 14:46	6		
	1	15:00	
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from —— 15:04 California to Attu, Alaska	4 -		
Gaillottila to Altu, Alaska			
PTWC No.10 - Warning for all Pacific area—15:45		16:00	
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03		10.00	
California to Attu, Alaska			
PTWC No.11 - Warning for all Pacific area 16:50	0.	7.00	
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04	_	17:00	
California to Attu, Alaska			
PTWC No.12 - Warning for all Pacific area 17:52	2		
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58	8 _ 1	18:00	
California to Attu, Alaska			
PTWC No.13 - Warning for all Pacific area 18:43	-		
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from	1	19:00	
California to Attu, Alaska 19:06	6		
PTWC No.14 - Warning for all Pacific area ——19:34	4		
-	2	20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska	3 –		
PTWC No.15 - Warning for all Pacific area20:28	8		
		21.00	
	2	21:00	
CHILE – HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE OF THE NAVY

	000		
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _	-	
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00	
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	23:54 00:12 _	_ 00:00	
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 -	01:00	
PTWC No.19 - Warning for Russia and Japan——	-01:35 _	-	
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan	02:35 ⁻ 03:05 -	03:00	
and Alaska from Seward to Attu. Cancelled for areas — in Alaska from Sitka to Seward			
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	
PTWC No.22 – Tsunami Warning for Russia and Japan —			
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	- 05:01 -	05:00	
PTWC No.23 – Tsunami Warning for Russia and Japan ——	_ 05:56	06:00	
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	- 06:02 -		
PTWC No.24 – Tsunami Warning for Russia and Japan ———	07:00 -	07:00	
WC/ATWC No 25 – Cancelled for all areas in Alaska ———	07:13 _	-	
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 –	08:00	
PTWC No.26 – Tsunami Warning for	08:59 -	09:00	
Japan PTWC No.27 – Tsunami Warning Cancellation Final bulletin ———	09:40	_	09:40 PTWC Bulletin No.27 received
		10:00	

Country comments

Other sources of information: USGS/NEIC (USA); CSEM (France).

SHOA issued tsunami warning to ONEMI with tsunami arrival time.

ONEMI did not issue warning to the population.

The warning was cancelled because SHOA did not identify significative sea level variations at the stations monitored (Valparaiso, San Antonio, Talcahuano, Corral, Juan Fernández, Coquimbo, Isla de Pascua, San Felix).

4.4 CHINA – HONG KONG OBSERVATORY Communication with PTWC by GTS, email and fax; and with WC/ATWC by GTS.



CHINA HONG-KONG OBSERVATORY

CHINA HUNG-KUNG UBSERVATURT		
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	:00
PTWC No.16 - Warning issued for all Pacific area	21:32 _	21:34 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 — 2:	2:00
PTWC No.17 - Warning issued for all Pacific area	22:41	22:41 PTWC Bulletin No.17 received
WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	00.40	3:00
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	23:54 _ 00 00:12 _	- 00:13 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	– 00:54 – <mark>01</mark>	:00
PTWC No.19 - Warning for Russia and Japan—	-01:35 _	_ 01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:5702	02:00 02:00 Tsunami warning cancelled
PTWC No.20 - Warning for Russia and Japan		_ 02:37 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	02:57 <mark>03</mark> 03:05 -	<u>5:00</u>
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - ₀₄ — 04:03 -	.:00 - 03:44 PTWC Bulletin No.21 received
PTWC No.22 – Tsunami Warning for Russia and Japan —		
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point		04:51 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan	05:56 06	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	- 06:02 -	
PTWC No.24 – Tsunami Warning for Russia and	07	7:00
Japan ——— WC/ATWC No 25 – Cancelled for all areas in Alaska ———	07:00 - 07:13 _	07:01 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07.57 08	:00 07:57 PTWC Bulletin No 25 received
	07:570	07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	08:59 - 09	09:00 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin ———	09:40	- 09:41 PTWC Bulletin No.27 received

Country comments:

Other sources of information: CISN Display.

"GTS is usually the primary channel for receiving tsunami messages. In this event, many PTWC bulletins were available via email but not on the GTS. This would have significant impact on the reliability of the tsunami communication system".

4.5 ECUADOR – OCEANOGRAPHIC INSTITUTE OF THE NAVY

Communication with PTWC by email and fax.

Communication with FTWC by email and lax.		
Earthquake occurred		
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km		
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km		
06:41	$\backslash \not $	
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and 06:44 Peru. Watch for Ecuador —— 06:4	1 1	
WC/ATWC No.1 - M=8.5: Tsunami Information 06:4		06:56 PTWC Bulletin No.1 received
	,	07:00 called INOCAR director
		07:10 Called Ministry of Risk Management and Harbour
PTWC No.2 - M=8.5: Additional watch for Colombia,		Master
Antarctica, Panama, Costa Rica ——07:45	_	07:20 Bulletins were issued on INOCAR website 07:30 Press bulletins
WC/ATWC No.2 - M=8.6: Tsunami Information07:52	08:00	
		07:55 PTWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised)		
		08: 54 PTWC Bulletin No. 3 received
WC/ATWC No.3 - M=8.8: Tsunami Information ——08:5	<u> </u>	
PTWC No.4 - M=8.8: Additional warning for Ecuador.		
Additional watch for Nicercaus, Bitagirn Jalanda, Hondurga		
El Salvador, Guatemala, Fr. Polynesia	-	
WC/ATWC No.4 - M=8.8: Tsunami Information09:58	10:00	09:57 PTWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area —— 10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska		
(from Kodiak to Attu)10:55		10: 55 PTWC Bulletin No. 5 received
I sunami Information for: Oregon- Washington- British	11:00	
Columbia and Alaska (from Oregon-California border to Kodiak)		
PTWC No.6 - Warning for all Pacific area —— 11:47	_	
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53	12:00	11:57 PTWC Bulletin No. 6 received
(from Kodiak to Attu)		
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)		
PTWC No.7 - Warning for all Pacific area —— 12:49 WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —— 12:55	13:00 - 1	12:59 PTWC Bulletin No. 7 received
(from Kodiak to Attu)	10.00	
PTWC No.8 - Warning for all Pacific area 13:46	_ 14:00 _ 1	13:46 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03	_	
California to Attu, Alaska.		
PTWC No.9 - Warning for all Pacific area 14:46		
	15:00	15:00 Press Conference
	_	
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 California to Attu, Alaska		
PTWC No.10 - Warning for all Pacific area 15:45	16:00	
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03		
California to Attu, Alaska		16:30 Tsunami warning cancellation
	-	10.30 ISulianii wanning cancellation
PTWC No.11 - Warning for all Pacific area 16:50	17:00	
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04		
California to Attu, Alaska		
PTWC No.12 - Warning for all Pacific area 17:52		
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58	18:00	
California to Attu, Alaska		
DTWO No 42 Mercing for all Desifie and 40.42		
PTWC No.13 - Warning for all Pacific area 18:43	-	
	19:00	
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from	-	
California to Attu, Alaska 19:06		
PTWC No.14 - Warning for all Pacific area — 19:34	-	
	20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR 20:03		
from California to Attu, Alaska	-	
PTWC No.15 - Warning for all Pacific area20:28		
20.20	-T	
	21:00	

21:00 WC/ATWC No 15 - Tsunamy Advisory for entire AOR 21:05 from California to Attu, Alaska PTWC No.16 - Warning issued for all Pacific area 21:32 WC/ATWC No 16 - Tsunamy Advisory for entire AOR _ - 21:47 -22:00 from California to Attu. Alaska PTWC No.17 - Warning issued for all Pacific area 22.41 22:46 WC/ATWC No 17 - Tsunamy Advisory for entire AOR 23:00 from California to Attu, Alaska WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 23:54 00:00 PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific 00:12 area WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington 00:54 01:00 PTWC No.19 - Warning for Russia and Japan --01:35 WC/ATWC No 20 - Tsunamy Advisory for California and 01:57 02:00 Alaska. Cancelled for areas from BC/Washington border to , Sitka, Alaska PTWC No.20 - Warning for Russia and Japan _02:57 03:00 WC/ATWC No 21 - Tsunamy Advisory for California 03.02 and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward -03:44 PTWC No.21 - Warning issued for Russia and Japan -04:00 WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in 04:03 Alaska from Seward to Kodiak and California PTWC No.22 – Tsunami Warning for Russia and Japan 04:49 WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska 05:00 05:01 from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point PTWC No.23 – Tsunami Warning for Russia and Japan – _ 05:56 06:00 WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska 06:02 from Sand Point to Attu. PTWC No.24 - Tsunami Warning for Russia and 07:00 Japan 07:00 WC/ATWC No 25 - Cancelled for all areas in Alaska -07:13 PTWC No.25 - Tsunami Warning for Japan. Cancelled for Russia 08:00 07:57 09:00 PTWC No.26 – Tsunami Warning for_ 08:59 Japan PTWC No.27 - Tsunami Warning Cancellation 09:40 Final bulletin 10:00

ECUADOR - OCEANOGRAPHIC INSTITUTE OF THE NAVY

<u>Country comments:</u> Other sources of information: USGS-NEIC.

4.6 EL SALVADOR – NATIONAL SERVICE FOR TERRITORIAL STUDIES Communication with PTWC by email and fax

Earthquake occurred		
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km 06:34		
06:41		
Peru Watch for Ecuador — 06:46	07:00	06:45 PTWC Bulletin No.1 received 06:50 Monitoring of sea level sensors of 3 DARTS
WC/ATWC No.1 - M=8.5: Tsunami Information 06:49	07.00	
PTWC No.2 - M=8.5: Additional watch for Colombia,		
Antarctica, Panama, Costa Rica ——07:45 WC/ATWC No.2 - M=8.6: Tsunami Information07:52	08:00	07:46 PTWC Bulletin No. 2 received
		_ 08:17 Monitoring of 2 sea level sensors in the coastline of Chile and Peru
PTWC No.3 - M=8.8: (revised)		
WC/ATWC No.3 - M=8.8: Tsunami Information	09:00	_ 08: 45 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,		
WC/ATWC No.4 - M=8.8: Tsunami Information	10:00	09:48 PTWC Bulletin No. 4 received 10:00 Informed Civil Protection about earthquake and tsunami
PTWC No.5 - Warning for all Pacific area ——— 10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)10:55	-	10: 46 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	11:00	
PTWC No.6 - Warning for all Pacific area —— 11:47		_ 11:48 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53 . (from Kodiak to Attu)	12:00	
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)		- 12:30 Tsunami Warning issued through press conference
PTWC No.7 - Warning for all Pacific area — 12:49 WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska — 12:55	13:00	 12:50 PTWC Bulletin No. 7 received
(from Kodiak to Attu)		 13:00 Emergency management organizations were contacted (Police, Navy, Civil protection)
PTWC No.8 - Warning for all Pacific area ——— 13:46	14:00	_ 13:47 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03 California to Attu, Alaska.	-	
PTWC No.9 - Warning for all Pacific area 14:46		
14.40	15:00	14:47 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 California to Attu, Alaska	-	
PTWC No.10 - Warning for all Pacific area—15:45	40.00	_ 15: 46 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03	16:00	
California to Attu, Alaska		
PTWC No.11 - Warning for all Pacific area 16:50 WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04	17:00	16:50 PTWC Bulletin No. 11 received
California to Attu, Alaska		
PTWC No.12 - Warning for all Pacific area 17:52 _		 17:52 PTWC Bulletin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 _ California to Attu, Alaska	18:00	
		18:43 PTWC Bulletin No. 13 received
PTWC No.13 - Warning for all Pacific area 18:43	10:00	
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska19:06	19:00	
· · · · · · · · · · · · · · · · · · ·		
, i i i i i i i i i i i i i i i i i i i	20:00	19:47 PTWC Bulletin No. 14 received 20:00Inform about the impacts of the tsunami in el Salvador
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska		
PTWC No.15 - Warning for all Pacific area — 20:28	-	20:29 PTWC Bulletin No. 15 received
	21:00	

EL SALVADOR- NATIONAL SERVICE FOR TERRITORIAL STUDIES

WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	_ 21:32 _		21:33 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	— 22:41 — 22:46 —	23:00	22:42 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 00.54	00.00	
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	— 23:54 _ — 00:12 _	00:00	 00:12 Cancellation announcement sent to local radio station and to T.V. Station 00:13 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington -		01:00	
PTWC No.19 - Warning for Russia and Japan —		-	_ 01:43 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	22:29 Update scroll message sent to T.V. Station
PTWC No.20 - Warning for Russia and Japan	02:57 _	02:00	02:36 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	03:05 –	03:00	
PTWC No.21 - Warning issued for Russia and Japan – WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in	03:44 - 04:03 -	04:00	- 03:45 PTWC Bulletin No.21 received
Alaska from Seward to Kodiak and California			
PTWC No.22 – Tsunami Warning for Russia and Japan – WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	04:49 05:01	05:00	04:51 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan — WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska	05:56	06:00	05:57 PTWC Bulletin No.23 received
from Sand Point to Attu.	06:02 —		
PTWC No.24 – Tsunami Warning for Russia and Japan ——	- 07:00 -	07:00	
WC/ATWC No 25 – Cancelled for all areas in Alaska	- 07:13 _		07:01 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	_ 07:57 _	08:00	– 07:58 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	- 08:59	09:00	
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	09:40		
		10:00	

<u>Country comments</u> Other sources of information: USGS, RANET, IRIS, CISN.

4.7 FRANCE – FRENCH POLYNESIA – TAHITI – CEA/DASE/LABORATOIRE DE GEOPHYSIQUE

Communication with PTWC by email, fax and GTS

	010		
Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	_06:34		06:45 warning by TREMORS system
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and	- 06:41 -06:44	×	06:47 PTWC Bulletin No.1 received
Peru. Watch for Ecuador	- 06:46 - 06:49 -	07:00	
PTWC No.2 - M=8.5: Additional watch for Colombia,			-07:24 Yellow warning level given to Civil Defense
Antarctica, Panama, Costa Rica	07:45 07:52	08:00	07:45 PTWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised) WC/ATWC No.3 - M=8.8: Tsunami Information	08:44 _ 08:57 _	09:00	_ 08:44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador.	00.07 =		-09:26 Red warning level given to Civil Defense
Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia	_09:47 _	10:00	_ 09:47 PTWC Bulletin No. 4 received
WC/ATWC No.4 - M=8.8: Tsunami Information ——— PTWC No.5 - Warning for all Pacific area ———	09:58 10:45	10:00	 10:00 Informed Civil Protection about earthquake and tsunami
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	- 10.45 		10: 45 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	10.00 _	11:00	
PTWC No.6 - Warning for all Pacific area WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	- 11:47 11:53	14 _{2:00}	11:48 PTWC Bulletin No. 6 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			- 12:30 Tsunami Warning issued through press conference
PTWC No.7 - Warning for all Pacific area WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska	- 12:49 —12:55	13:00	 12:49 PTWC Bulletin No. 7 received 13:00 Emergency management organizations were
(from Kodiak to Attu)			contacted (Police, Navy, Civil protection)
PTWC No.8 - Warning for all Pacific area	- 13:46 -	14:00	13:46 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska.	14:03 -		14:00 Sirens and messages broadcasted by radio and TV
PTWC No.9 - Warning for all Pacific area	14:46 _	15:00	_ 14:46 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	15:04		15:00 Evacuation population to evacuation zones (20 m for Marquesas, 10 m other Islands)
PTWC No.10 - Warning for all Pacific area	—15:45 _	16:00	_ 15:42 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 16:03 _		
PTWC No.11 - Warning for all Pacific area WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	_ 16:50 _ 17:04	17:00	⁻ 16:50 PTWC Bulletin No. 11 received
California to Attu, Alaska	-		
PTWC No.12 - Warning for all Pacific area WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 17:52 - 17:58	18:00	- 17:52 PTWC Bulletin No. 12 received
			19:44 DTWC Bullotin No. 12 received
PTWC No.13 - Warning for all Pacific area——	_18:43 _	19:00	18:44 PTWC Bulletin No. 13 received -
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	-19:06	-	
PTWC No.14 - Warning for all Pacific area —	_19:34	20:00	⁻ 19:35 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_20:03 _	-	_20:10 Green (cancellation) for Polynesia except Marquesas
PTWC No.15 - Warning for all Pacific area ——	-20:28 _	21.00	_ 20:29 PTWC Bulletin No. 15 received
		21:00	

FRANCE – FRENCH POLYNESIA- TAHITI -CEA/DASE/LABORATOIRE DE GEOPYSIQUE

GEOPYSIQUE			
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _	-	21:30 Green (cancellation) for Marquesas 21:32 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area	22:41		22:41 PTWC Bulletin No.17 received
WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:46 =	23:00	_
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific	23:54 00:12	00:00	
area WC/ATWC No 19 - Tsunamy Advisory for coastal area in			 — 00:13 PTWC Bulletin No.18 received
California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 -	01:00	
PTWC No.19 - Warning for Russia and Japan—	-01:35 _		_ 01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to — Sitka. Alaska	01:57	02:00	02:00 Tsunami warning cancelled
PTWC No.20 - Warning for Russia and Japan	02:35		02:36 PTWC Bulletin No.20 received
	02.35 _	03:00	
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 -		
PTWC No.21 - Warning issued for Russia and Japan	—03:44 - — 04:03 -	04:00	- 03:44 PTWC Bulletin No.21 received
Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	01.00		
PTWC No.22 – Tsunami Warning for Russia and Japan —			
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01 —	05:00	04:50 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan	_ 05:56	06:00	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.		-	-
PTWC No.24 – Tsunami Warning for Russia and		07:00	
Japan —— WC/ATWC No 25 – Cancelled for all areas in Alaska ——	07:00 - 07:13 _	-	07:00 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan.			
Cancelled for Russia	07:57 _	08:00	– 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for	08:59 -	09:00	- 09:41 PTWC Bulletin No.27 received
Japan PTWC No.27 – Tsunami Warning Cancellation	00.40		
Final bulletin ———	09:40	10:00	— 09:00 PTWC Bulletin No.26 received

Country comments

Other sources of information: USGS, EMSC and CPPT TREMORS System.

*Annex III includes some pictures provided by the CEA/DASE/Laboratoire of Geophysique showing differences in sea level caused by the tsunami in The Marquesas islands.

4.8 FRANCE - NEW CALEDONIA - DIRECTION OF CIVIL SECURITY

PTWC No.2 - M-8.3: distingtion of Colombia with for Colombia with the method of the	Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador WC/ATWC No.1 - M=8.5: Tsunami Information	- 06:34 - 06:41 - 06:44 - 06:46 - 06:49	07:00	_ 06:58 PTWC Bulletin No.1 received
WCATWC No 3 - M=8 : Tsunami Information -0.037 980 09.45 PTWC Bulletin No. 3 received Additional warring for Ecuador. -0.947 09.48 PTWC Bulletin No. 4 received WCATWC No 5 - Marring for all Pacific area -0.947 09.48 PTWC Bulletin No. 4 received WCATWC No 5 - Marring for all Pacific area 10.45 100 WCATWC No 5 - Marring for all Pacific area 10.45 10.47 PTWC Bulletin No. 5 received WCATWC No 5 - Marring for all Pacific area 11.40 10.47 PTWC Bulletin No. 6 received WCATWC No 6 - Marring for all Pacific area 11.40 11.49 PTWC Bulletin No. 6 received WCATWC No 6 - Marring for all Pacific area 11.41 11.49 PTWC Bulletin No. 6 received WCATWC No 7 - Tsunamy Address for Collifornia and Alasta 11.55 1251 PTWC Bulletin No. 7 received WCATWC No 7 - Tsunamy Address for control text for Kodakit 14.43 14.47 PTWC Bulletin No. 8 received WCATWC No 7 - Tsunamy Address for entire AOR from 14.43 14.47 PTWC Bulletin No. 8 received WCATWC No 8 - Tsunamy Address for entire AOR from 14.43 14.47 PTWC Bulletin No. 8 received WCATWC No 10 - Tsunamy Address for entire AOR from 14.43 14.44 PTWC Bulletin No. 10 received WCATWC No 10 - Tsunamy Address for entire AOR from	Antarctica, Panama, Costa Rica	_	08:00	07:47 Authorities were informed – Operational centre started
Additional watch for Nicaragua, Pitcain Islands, Hondurss, El Salvador, Guatemala, P. Yolynesia WC/ATWC No.4 - Mes.8: traunant information 00.47 0.48 PTWC Bulletin No. 4 received VEXATVEC No.5 - Warning for all Pacific area UC/ATWC No.5 - Taunamy Advisory for all Pacific area Traunami Information for: Oregon-California border to Kodiak) 10.45 10.47 PTWC Bulletin No. 5 received VEXATVEC No.5 - Warning for all Pacific area Traunami Information for: Oregon-California border to Kodiak) 10.47 11.49 PTWC Bulletin No. 5 received VEXATVEC No.5 - Warning for all Pacific area Traunami Information for: Oregon-Valaining-Border to Kodiak) 11.49 11.49 PTWC Bulletin No. 6 received VEXATVEC No.7 - Taunamy Advisory for california and Alaska (rom Kodiak to Athu, (rom Kodiak to Athu, assa) 12.49 12.51 PTWC Bulletin No. 7 received VEXATVEC No 7 - Taunamy Advisory for entire AOR from California to Athu, Alaska 13.46 14.47 VEXATVEC No 8 - Taunamy Advisory for entire AOR from California to Athu, Alaska 14.46 14.47 VEXATVEC No 10 - Taunamy Advisory for entire AOR from California to Athu, Alaska 15.04 16.00 VEXATVEC No 11 - Taunamy Advisory for entire AOR from California to Athu, Alaska 17.04 16.00 16.00 VEXATVEC No 11 - Taunamy Advisory for entire AOR from California to Athu, Alaska 17.04 16.00 16.00 16.00 16.00 VEXAT			09:00	_ 08:45 PTWC Bulletin No. 3 received
PTWC No.5 - Warning for all Pacific area (from Kolik to Attu) 10:47 PTWC Bulletin No. 5 received PTWC No.5 - Tsunamy Advisory for: California and Alaska (from Kolik to Attu) 10:47 PTWC Bulletin No. 5 received PTWC No.6 - Warning for all Pacific area (from Kolik to Attu) 11:49 PTWC Bulletin No. 6 received PTWC No.6 - Warning for all Pacific area (from Kolik to Attu) 11:49 PTWC Bulletin No. 6 received PTWC No.7 - Warning for all Pacific area (from Kolik to Attu) 12:50 PTWC No.7 - Warning for all Pacific area (from Kolik to Attu) 12:51 PTWC No.7 - Warning for all Pacific area (from Kolik to Attu) 12:51 PTWC No.8 - Warning for all Pacific area (from Kolik to Attu) 12:51 PTWC No.8 - Warning for all Pacific area (from Kolik to Attu) 13:48 PTWC No.8 - Warning for all Pacific area (from Kolik to Attu) 14:03 PTWC No.8 - Warning for all Pacific area (from Kolik to Attu) 14:03 PTWC No.8 - Warning for all Pacific area (from Kolik to Attu) 14:03 PTWC No.9 - Warning for all Pacific area (from Kolik to Attu) 14:03 PTWC No.10 - Tsunamy Advisory for entite AOR from (California to Attu, Alaska 15:40 PTWC No.11 - Tsunamy Advisory for entite AOR from (California to Attu, Alaska 17:00 PTWC No.12 - Warning for all Pacific area (California to Attu, Alaska 17:00	Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia		10:00	_ 09:48 PTWC Bulletin No. 4 received
Tsunami Information for: Oregon-Washington-British 11.00 PTWC No.5 - Warning for all Pacific area 11.47 (MC/ATWC No 6 - Tsunamy Advisory for: California and Alaska 11.53 Columbia and Alaska (from Oregon-California border to Kodak) 11.00 PTWC No.7 - Tsunamy Advisory for: California and Alaska 11.53 Columbia and Alaska (from Oregon-California border to Kodak) 11.00 PTWC No.7 - Tsunamy Advisory for: California and Alaska 12.56 WC/ATWC No 7 - Tsunamy Advisory for california and Alaska 12.56 WC/ATWC No 8 - Tsunamy Advisory for california and Alaska 12.66 WC/ATWC No 8 - Tsunamy Advisory for california and Alaska 12.66 WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14.40 WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15.40 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 15.40 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16.50 California to Atlu, Alaska 17.50 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 17.50 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 17.50 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 17.50 WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 1	PTWC No.5 - Warning for all Pacific area WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	_10:45		10: 47 PTWC Bulletin No. 5 received
WC/ATWC No 6 - Tsunamy Advisory for California and Alaska (mon Trees and Alaska			11:00	
PWC No.7 - Warning for all Pacific area 12:49 12:51 PTWC Bulletin No. 7 received WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska 12:55 13:00 12:51 PTWC Bulletin No. 7 received PTWC No.8 - Warning for all Pacific area 13:46 14:00 13:48 PTWC Bulletin No. 8 received WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:00 14:47 PTWC Bulletin No. 9 received WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 16:00 14:47 PTWC Bulletin No. 9 received WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 16:00 14:47 PTWC Bulletin No. 9 received WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03 16:04 16:00 16:45 Local Government sent message to town halls and emergency centers 18:40 PTWC Bulletin No. 10 received 18:00 Census of information regarding the distribution of the messages 16:51 PTWC Bulletin No. 11 received WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:58 17:60 18:02 PTWC Bulletin No. 12 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 19:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from 17:58 19:00 18:44 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsuna	WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	_	12:00	_ 11:49 PTWC Bulletin No. 6 received
PTWC No.8 - Warning for all Pacific area 13:46 14:00 WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 14:46 15:00 WC/ATWC No 9 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 15:00 14:47 PTWC Bulletin No. 9 received WC/ATWC No 9 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 15:04 14:47 PTWC Bulletin No. 9 received WC/ATWC No 9 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 15:04 14:47 PTWC Bulletin No. 9 received WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 16:00 16:51 PTWC Bulletin No. 10 received WC/ATWC No 11 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:04 16:51 PTWC Bulletin No. 11 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:52 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:52 18:00 18:04 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 18:44 PTWC Bulletin No. 13 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 19:36 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory	PTWC No.7 - Warning for all Pacific area		13:00	- 12:51 PTWC Bulletin No. 7 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from	WC/ATWC No 8 - Tsunamy Advisory for entire AOR from		14:00	13:48 PTWC Bulletin No. 8 received
WCATWO No 51 Subling You build a california to Attu, Alaska 1004 message by telephone and fax PTWC No.10 - Warning for all Pacific area 15:45 15:45 Local Government sent message to town halls and emergency centers WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:00 15:48 PTWC Bulletin No. 10 received WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:00 16:51 PTWC Bulletin No. 11 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:52 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from 17:58 18:00 18:04 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from 17:58 18:00 18:04 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from 19:00 18:44 PTWC Bulletin No. 14 received 18:44 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR 20:00 19:36 PTWC Bulletin No. 14 received 19:36 PTWC Bulletin No. 14 received	PTWC No.9 - Warning for all Pacific area	14:46 _	15:00	14:47 Information was sent to the Police // Pre-warning
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 16:00 15:48 PTWC Bulletin No. 10 received WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 16:00 17:00 WC/ATWC No 11 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:04 16:51 PTWC Bulletin No. 11 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:52 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:52 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 18:44 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 19:36 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:30 19:36 PTWC Bulletin No. 14 received		15:04		
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:04 16:51 PTWC Bulletin No. 11 received PTWC No.12 - Warning for all Pacific area 17:52 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:58 18:00 18:02 PTWC Bulletin No. 12 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 18:44 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:06 19:36 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 20:00 19:36 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 20:00 19:36 PTWC Bulletin No. 14 received	WC/ATWC No 10 - Tsunamy Advisory for entire AOR from		16:00	15:48 PTWC Bulletin No.10 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 17:58 18:00 18:02 PTWC Bulletin No. 12 received PTWC No.13 - Warning for all Pacific area 18:43 18:44 PTWC Bulletin No. 13 received WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:00 19:00 PTWC No.14 - Warning for all Pacific area 19:34 19:36 PTWC Bulletin No. 14 received WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 20:00 19:36 PTWC Bulletin No. 14 received PTWC No.15 - Warning for all Pacific area 20:03 19:36 PTWC Bulletin No. 14 received	WC/ATWC No 11 - Tsunamy Advisory for entire AOR from		17:00	⁻ 16:51 PTWC Bulletin No. 11 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska19:06 PTWC No.14 - Warning for all Pacific area19:34 WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska20:28 PTWC No.15 - Warning for all Pacific area20:28	WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	_	18:00 [:]	- 18:02 PTWC Bulletin No. 12 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska19:06 PTWC No.14 - Warning for all Pacific area19:34 WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska20:03	PTWC No.13 - Warning for all Pacific area	_18:43 _		18:44 PTWC Bulletin No. 13 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska PTWC No.15 - Warning for all Pacific area20:28		-19:06	19:00	
from California to Attu, Alaska	PTWC No.14 - Warning for all Pacific area —	_19:34	20:00	⁻ 19:36 PTWC Bulletin No. 14 received
	from California to Attu, Alaska	_20:03 _	-	
	PTWC No.15 - Warning for all Pacific area ——	-20:28 _	21:00	

FRANCE-NEW CALEDONIA- DIRECTION OF CIVIL SECURITY

FRANCE-NEW CALEDONIA- DIRECTIO	NOF	
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00
PTWC No.16 - Warning issued for all Pacific area	21:32 _	
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	23:54 00:12	00:00
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54	01:00
PTWC No.19 - Warning for Russia and Japan——	-01:35 _	
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00
PTWC No.20 - Warning for Russia and Japan	02:35 _	03:00
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 –	
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00
PTWC No.22 – Tsunami Warning for Russia and Japan —		
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01	05:00
PTWC No.23 – Tsunami Warning for Russia and Japan	05:56	06:00
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	— 06:02 —	
PTWC No.24 – Tsunami Warning for Russia and Japan ———	07:00 -	07:00
WC/ATWC No 25 – Cancelled for all areas in Alaska ——	07:00	
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 _	08:00
PTWC No.26 – Tsunami Warning for Japan	08:59 -	09:00
PTWC No.27 – Tsunami Warning Cancellation Final bulletin ———	09:40	
		10:00

<u>Country comments</u> Other sources of information: PTWC internet site, television.

4.9 JAPAN – JAPAN METEOROLOGICAL AGENCY

Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km 06:41		06:41 JMA first processing completed
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru Watch for Ecuador	4	06:48 PTWC Bulletin No.1 received
WC/ATWC No.1 - M=8.5: Tsunami Information 06:49	07:00	06:50 WC/ATWC Bulletin No. 1 received 06:52 Starting monitoring sea level station data in the Pacific –region
PTWC No.2 - M=8.5: Additional watch for Colombia,		06:55 Staff concerned assembled 07:00 Issuance of earthquake information and providing it to the national disaster management organizations//.
Antarctica, Panama, Costa Rica ——07:45 WC/ATWC No.2 - M=8.6: Tsunami Information07:52	08:00	07:46 PTWC Bulletin No. 2 received
		07:55 WC/ATWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised)08:44		
WC/ATWC No.3 - M=8.8: Tsunami Information ——08:57 -	09:00	08: 46 PTWC Bulletin No. 3 received 08:59 WC/ATWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,09:47		
El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information	10:00	09:48 PTWC Bulletin No. 4 received 09:59 WC/ATWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area ——— 10:45		10:00 Media briefing
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)10:55	-	10: 45 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	11:00	10:56 WC/ATWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area — 11:47 WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53	12:00	11:48 PTWC Bulletin No. 6 received 11:56 WC/ATWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53 _ (from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	12.00	
Columbia and Alaska (from Oregon-California border to Kodiak) PTWC No.7 - Warning for all Pacific area — 12:49		
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska — 12:55 (from Kodiak to Attu)	13:00	12:50 PTWC Bulletin No. 7 received 12:56 WC/ATWC Bulletin No. 7 received
(ITOTI ROUAR to Altu)		
PTWC No.8 - Warning for all Pacific area ——— 13:46	14:00	13:47 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03 - California to Attu, Alaska.	-	_ _ 14:05 WC/ATWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area 14:46 _	15:00	- 14:48 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from — 15:04 - California to Attu, Alaska		_ 15:06 WC/ATWC Bulletin No. 9 received
PTWC No.10 - Warning for all Pacific area—15:45	16:00	_ 15: 46 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03 -	10.00	16:05 WC/ATWC Bulletin No. 10 received
California to Attu, Alaska		
PTWC No.11 - Warning for all Pacific area 16:50 WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04	17:00	16:51 PTWC Bulletin No. 11 received 17:05 WC/ATWC Bulletin No. 11 received
California to Attu, Alaska		
PTWC No.12 - Warning for all Pacific area 17:52 _ WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 _		 17:52 PTWC Bulletin No. 12 received
California to Attu, Alaska	- 18:00	17:59 WC/ATWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area 18:43		
•	19:00	18:45 PTWC Bulletin No. 13 received 19:08 WC/ATWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska 19:06		
PTWC No.14 - Warning for all Pacific area ——19:34	20:00	[–] 19:35 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03		_ 20:05 WC/ATWC Bulletin No. 14 received
PTWC No.15 - Warning for all Pacific area — 20:28		20:29 PTWC Bulletin No. 15 received
	21:00	

JAPAN – JAPAN METEOROLOGICAL AGENCY

JAPAN – JAPAN WEIEOROLOGICAL	AGEINC		
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 21:05 _	21:00	21:06 WC/ATWC Bulletin No. 15 received
PTWC No.16 - Warning issued for all Pacific area	_ 21:32 _		_
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 21:47 —	22:00	21:33 PTWC Bulletin No.16 received 21:48 WC/ATWC Bulletin No. 16 received
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 22:41 - 22:46 -	23:00	22:43 PTWC Bulletin No.17 received 22:47 WC/ATWC Bulletin No. 17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area WC/ATWC No 19 - Tsunamy Advisory for coastal area in	— 23:54 — 00:12	. 00:00	 23:30 Media Briefing 23:56 WC/ATWC Bulletin No. 18 received 00:15 PTWC Bulletin No.18 received 00:33 Issuance of tsunami warning / advisory/ Establishing a JMA disaster response headquaters
California, BC and Alaska. Cancelled for Oregon and Washington -	<u> </u>	01:00	_00:55 WC/ATWC Bulletin No. 19 received
PTWC No.19 - Warning for Russia and Japan—	<u>01:35</u>	-	01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to [−] Sitka, Alaska	01:57	02:00	_ 01:58 WC/ATWC Bulletin No. 20 received
PTWC No.20 - Warning for Russia and Japan	02:35 _		02:37 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas — in Alaska from Sitka to Seward	03:05 -	03:00	03:06 WC/ATWC Bulletin No. 21 received
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	03:44 - 04:03 -	04:00	03:47 PTWC Bulletin No.21 received 04:05 WC/ATWC Bulletin No. 22 received
PTWC No.22 – Tsunami Warning for Russia and Japan $-$		-	
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01 —	05:00	 04:51 PTWC Bulletin No.22 received 05:02 WC/ATWC Bulletin No. 23 received
PTWC No.23 – Tsunami Warning for Russia and Japan —	05:56	06:00	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	<u> </u>	-	 06:04 WC/ATWC Bulletin No. 24 received
PTWC No.24 – Tsunami Warning for Russia and Japan	- 07:00 -	07:00	07:02 PTWC Bulletin No.24 received
WC/ATWC No 25 – Cancelled for all areas in Alaska	- 07:13 _		07:14 WC/ATWC Bulletin No. 25 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	_ 07:57 —	. 08:00	07:50 Media Briefing 07:59 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	- 08:59 -	. 09:00	-09:01 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin ——	_ 09:40	10:00	_09:42 PTWC Bulletin No.27 received

Country comments

Other sources of information: USGS through its website.

- Media briefing also at 12:45, 01:00.
- Dispatching JMA Mobile Obervation Team to the disaster areas for field survey.

4.10 NEW ZEALAND - MINISTRY OF CIVIL DEFENCE & EMERGENCY MANAGEMENT

Earthquake occurred —— WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km———			C 06:47 PTWC Bulletin No.1 received
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34		
	- 06:41		06:55 MCDEM received a page message from the Fire Service notifying them of the receipt of a PTWC Bulletin (Note: NZFS are contracted by MCDEM to
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador	—06:44 \ — 06:46	<∠	monitor hazard notifications and issue warning messages via the National Warning System)
WC/ATWC No.1 - M=8.5: Tsunami Information	06:49	07:00	06:57 MCDEM confirmed receipt with Fire Service and requested to await further
	_		instruction / MCDEM contacted GNS for scientific assessment
DTMC No. 2. M=9.5. Additional watch for Colombia			07:20 MCDEM Duty Officer, MCDEM Duty Manager and National Controller held
PTWC No.2 - M=8.5: Additional watch for Colombia, Antarctica, Panama, Costa Rica —	07:45	-	a teleconference to decide on action to take following GNS Science assessment
WC/ATWC No.2 - M=8.6: Tsunami Information		08:00	of threat to NZ. // 07:33 Contacted the New Zealand Fire Service, and requested a 'National Advisory: No Threat' message be issued via the National Warning
	01102		
			07:38 'National Advisory: No Threat issued to response agencies and the media
PTWC No.3 - M=8.8: (revised)	08:44		07:45 MCDEM website updated to include warning information.
WC/ATWC No.3 - M=8.8: Tsunami Information —		09:00	07:46 PTWC Bulletin No. 2 received
			08: 44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,			09:00 MCDEM requested to activate the National Crisis Management Centre (NCMC). Relevant agency liaison officers requested to staff the NCMC.
El Salvador, Guatemala, Fr. Polynesia	09:47	-	09:47 PTWC Bulletin No. 4 received
WC/ATWC No.4 - M=8.8: Tsunami Information		10:00	
PTWC No.5 - Warning for all Pacific area WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	40.45		10: 45 PTWC Bulletin No. 5 received
(from Kodiak to Attu)	10:45		11:00 Following PTWC Bulletin 5 and further GNS Science assessment threat to
Tsunami Information for: Oregon- Washington- British	10:55	11:00	NZ' was issued.
Columbia and Alaska (from Oregon-California border to Kodiak)			11:15 Requested the broadcast of an emergency announcement via TV and radio broadcasters every 15 minutes
PTWC No.6 - Warning for all Pacific area ——	— 11:47		11:49 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska		12:00	
(from Kodiak to Attu)			12:10 National Warning Update # 02
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.7 - Warning for all Pacific area	— 12:49		
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —	12:55	13:00	– 12:50 PTWC Bulletin No. 7 received
(from Kodiak to Attu)			13:10 National Warning Update # 03
PTWC No.8 - Warning for all Pacific area	— 13:46 —	14:00	_ 13:47 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska.	- 14:03 -	-	 14:07 National Warning Update # 04
Gaillottila to Attu, Alaska.			
PTWC No.9 - Warning for all Pacific area—	- 14:46		14:47 PTWC Bulletin No. 9 received
		15:00	
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from	_ 15:04 _	-	15:11 National Warning Update # 05
California to Attu, Alaska	_ 10.04		
PTWC No.10 - Warning for all Pacific area—	—15:45 _		_ 15: 46 PTWC Bulletin No. 10 received
	16:03 _	16:00	
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 10.03 _		_ 16:22 National Warning Update # 06
PTWC No.11 - Warning for all Pacific area—	— 16:50 _	17:00	- 16:51 PTWC Bulletin No. 11 received
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	17:04	-	16:51 PTWC Bulletin No. 11 received
California to Attu, Alaska			17:09 National Warning Update # 07
PTWC No.12 - Warning for all Pacific area	— 17:52		- 17-52 DTM/C Pullotin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	— 17:58 <u> </u>	18:00	 17:52 PTWC Bulletin No. 12 received
California to Attu, Alaska			18:18 National Warning Update # 08
			-
PTWC No.13 - Warning for all Pacific area—	18:43		18:44 PTWC Bulletin No. 13 received
	_	19:00 [:]	
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from	<u> </u>	-	19:01 National Warning Update # 09
California to Attu, Alaska	10.00		19:35 PTWC Bulletin No. 14 received
PTWC No.14 - Warning for all Pacific area —	19:34	Ť	– 19:42 National Warning Update # 10
MICIATINIC No. 14 Tourson Advisory for optime ACD	20.02	20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	20:03	-	20:21 National Warning Update # 11
PTWC No.15 - Warning for all Pacific area —			20:29 PTWC Bulletin No. 15 received
•	_0.20 _		
		21:00	

NEW ZEALAND MINISTRY OF CIVIL DEFENCE & EMERGENCY MANAGEMENT

WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	21:12 National Warning Update # 12
PTWC No.16 - Warning issued for all Pacific area	21:32 _		21:33 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	22:17 National Warning Update # 13
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00	22:42 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and	23:54 _	00:00	_ 23:45 National Warning Update # 14
Japan. Cancellation of tsunami warning for other Pacific area	00:12		— 00:13 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	— 00:54 —	01:00	_ 00:52 National Warning Update # 15
PTWC No.19 - Warning for Russia and Japan—	-01:35 _	-	_ 01:36 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	02:00 National Warning Update # 16 downgraded National Warning to National Advisory
PTWC No.20 - Warning for Russia and Japan	02:35		
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	03:05 -	03:00	
PTWC No.21 - Warning issued for Russia and Japan — WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in	—03:44 - — 04:03 -	04:00	O3:44 PTWC Bulletin No.21 received O4:14 National Warning Update # 17; National Advisory to
Alaska from Seward to Kodiak and California PTWC No.22 – Tsunami Warning for Russia and Japan —		-	remain in effect overnight
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01	05:00	04:51 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan	05:56	06:00	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	06:02		
PTWC No.24 – Tsunami Warning for Russia and		07:00	
Japan —— WC/ATWC No 25 – Cancelled for all areas in Alaska ——	07:00 - 07:13 _		07:00 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 —	08:00	– 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for	00.50 -	09:00	00:00 DTMC Bullotin No 26 received
Japan	08:59 —		– 09:00 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	09:40		– 09:42 PTWC Bulletin No.27 received
		10:00] 19:35 (28 Feb/10) → National Advisory Update #18 - 0
			on 01/03 (National Advisory Cancellation)

Country comments

19:35 (28 Feb/10) → National Advisory Update #18 - 08:37am on 01/03 (National Advisory Cancellation)
19:40 (28 Feb/10) → Cancellation of Request for Broadcast

Other sources of information: USGS

"Updates to the MCDEM website were also accompanied by a tweet through the MCDEM Twitter account. MCDEM's Twitter account went live two weeks prior to the event and had approximately 160 followers on the day prior to the tsunami. Within 24 hours the number of followers had increased to 1500, and has progressively risen to 1700 since this time".

4.11 NICARAGUA – INSTITUTE OF TERRITORIAL STUDIES

Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and06:41 PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and06:44	\	06:47 PTWC Bulletin No.1 received
WC/ATWC No.1 - M=8.5: Tsunami Information 06:49		06:47 Evaluation and monitoring of the information through international agencies
PTWC No.2 - M=8.5: Additional watch for Colombia, Antarctica, Panama, Costa Rica WC/ATWC No.2 - M=8.6: Tsunami Information07:52	- 08:00	 707:30 Authorities of the Civil Defence activated the mechanisms of coastal monitoring 07:45 PTWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised)08:44 WC/ATWC No.3 - M=8.8: Tsunami Information08:57	_	_ 08:44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,09:47 El Salvador, Guatemala, Fr. Polynesia		 - 09:30 Warning issued through the media and the Civil Defence - 09:47 PTWC Bulletin No. 4 received
WC/ATWC No.4 - M=8.8: Tsunami Information ——09:58	10:00	
PTWC No.5 - Warning for all Pacific area 10:45 WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)10:55 Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)		10: 45 PTWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area — 11:47 WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53 (from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	<u>12:00</u>	_ 11:48 PTWC Bulletin No. 6 received
Columbia and Alaska (from Oregon-California border to Kodiak) PTWC No.7 - Warning for all Pacific area 12:49 WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska — 12:55 (from Kodiak to Attu)	13:00	 12:50 PTWC Bulletin No. 7 received
PTWC No.8 - Warning for all Pacific area 13:46 WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03 California to Attu, Alaska.	_ <u>14:00</u>	13:47 PTWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area 14:46	15:00	_ 14:47 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 California to Attu, Alaska	-	
PTWC No.10 - Warning for all Pacific area—15:45 WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03 California to Attu, Alaska	- <mark>16:00</mark>	_ 15:46 PTWC Bulletin No. 10 received
PTWC No.11 - Warning for all Pacific area 16:50 WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04 California to Attu, Alaska	_ 17:00	 16:50 PTWC Bulletin No. 11 received 17:30 Tsunami warning cancelled by authorities of the Civil Defence
PTWC No.12 - Warning for all Pacific area 17:52 WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 California to Attu, Alaska	<u>18:00</u>	 17:52 PTWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area18:43	_	18:44 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska19:06	19:00	
PTWC No.14 - Warning for all Pacific area ——19:34	20:00	[–] 19:35 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska	-	
PTWC No.15 - Warning for all Pacific area20:28	21:00	_ 20:29 PTWC Bulletin No. 15 received

NICARAGUA- INSTITUTE OF TERRITORIAL STUDIES

NICARAGUA-INSTITUTE OF TERRIT	URIAL	310	DIES
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _	_	21:32 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 -	22:00	
PTWC No.17 - Warning issued for all Pacific area	- 22:41		22:41 PTWC Bulletin No.17 received
WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	<u> </u>	23:00	_
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu. Alaska			
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	— 23:54 _ — 00:12 -	00:00	- 00:13 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington -	00:54 -	01:00	
PTWC No.19 - Warning for Russia and Japan -	01:35		_ 01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska		02:00	
PTWC No.20 - Warning for Russia and Japan	02:35		_ 02:36 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	03:05	<u>03:00</u>	
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	03:44 04:03	04:00	O3:44 PTWC Bulletin No.21 received
PTWC No.22 – Tsunami Warning for Russia and Japan		_	
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01 -	05:00	— 04:50 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan –	05:56	06:00	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.		-	
PTWC No.24 – Tsunami Warning for Russia and Japan ——	07.00	07:00	
WC/ATWC No 25 – Cancelled for all areas in Alaska —	— 07:00 — 07:13	_	07:00 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan.		08:00	
Cancelled for Russia	<u> </u>	08.00	 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	<u> </u>	09:00	— 09:00 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin ——	09:40 _	_	— 09:41 PTWC Bulletin No.26 received
		10:00	

<u>Country comments</u> Other sources of information: NEIC- USGS-GEOFON.

4.12 PALAU – NATIONAL EMERGENCY MANAGEMENT OFFICE (Not IOC Member State)

Earthquake occurred			
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34 - 06:41\		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and	-06:44	4	
Peru. Watch for Ecuador ——— WC/ATWC No.1 - M=8.5: Tsunami Information	- 06:46 - 06:49 -	07:00	_ 06:53 PTWC Bulletin No.1 received
	-		
PTWC No.2 - M=8.5: Additional watch for Colombia,			
Antarctica, Panama, Costa Rica —— WC/ATWC No.2 - M=8.6: Tsunami Information	_07:45 _	08:00	– 07:46 PTWC Bulletin No. 2 received
	07:52	00.00	
PTWC No.3 - M=8.8: (revised)	08:44 _		- 08: 45 PTWC Bulletin No. 3 received
WC/ATWC No.3 - M=8.8: Tsunami Information —	—08:57 _	09:00	00. 43 FTWC Buildin NO. 3 Teceiveu
PTWC No.4 - M=8.8: Additional warning for Ecuador.			
Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia	_09:47 _	-	09:47 PTWC Bulletin No. 4 received
WC/ATWC No.4 - M=8.8: Tsunami Information	-09:58 _	10:00	
PTWC No.5 - Warning for all Pacific area	- 10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	_	-	10: 46 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British	-10:55 _	11:00	11:30 Specific NEC members (Vice President, Public Safety,
Columbia and Alaska (from Oregon-California border to Kodiak)			General Manager of PNCC, Minister of Health and Director of Communications Development, were called in and were informed of
			Tsunami Warning
PTWC No.6 - Warning for all Pacific area	- 11:47	12:00	11:48 PTWC Bulletin No. 6 received
(from Kodiak to Attu)	_11:53 _	12.00	
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			12:30 Issued public announcement through local radio stations
PTWC No.7 - Warning for all Pacific area	- 12:49 _		_
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —— (from Kodiak to Attu)	-12:55	13:00	12:50 PTWC Bulletin No. 7 received
			12:39 Scroll message sent to local T.V. Station
PTWC No.8 - Warning for all Pacific area WC/ATWC No 8 - Tsunamy Advisory for entire AOR from	- 13:46 –	14:00	_ 13:47 PTWC Bulletin No. 8 received
California to Attu, Alaska.	14:03 -		
PTWC No.9 - Warning for all Pacific area	14:46		
	14.40 _	15:00	_ 14:47 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from	15:04		
California to Attu, Alaska			
PTWC No.10 - Warning for all Pacific area—	-15:45 _	16:00	15:53 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu. Alaska	16:03 _		
PTWC No.11 - Warning for all Pacific area	- 16:50 _	17:00	_ 16:50 PTWC Bulletin No. 11 received
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	17:04		
PTWC No.12 - Warning for all Pacific area	17:52		17:52 PTWC Bulletin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	17:58 _	18:00	_
California to Attu, Alaska			
PTWC No.13 - Warning for all Pacific area	_18:43		18:44 PTWC Bulletin No. 13 received
	_10.45 _	19:00	
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	-19:06 -	-	
	_		19:35 PTWC Bulletin No. 14 received
PTWC No.14 - Warning for all Pacific area —	_19:34	20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_20:03 _	-	
PTWC No.15 - Warning for all Pacific area	-20:28		20:29 PTWC Bulletin No. 15 received
-		21:00	_
		21.00	

PALAU- NATIONAL EMERGENCY MANAGEMENT OFFICE

			OFFICE
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _	-	22:29 Update scroll message sent to T.V. Station 21:33 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00	22:42 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	02.54	00.00	
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacificarea	23:54 00:12 _	- 00:00	00:12 Cancellation announcement sent to local radio station and to $^-$ T.V. Station
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 -	01:00	00:13 PTWC Bulletin No.18 received
PTWC No.19 - Warning for Russia and Japan——	-01:35 _		_ 01:43 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan	02:57	02:00	_ 02:36 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 -	03:00	
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	- 03:45 PTWC Bulletin No.21 received
PTWC No.22 – Tsunami Warning for Russia and Japan —			
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	—04:49 ⁻ —05:01 —	05:00	⁻ 04:51 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska	_ 05:56 _	06:00	_ 05:57 PTWC Bulletin No.23 received
from Sand Point to Attu.	- 06:02 -		
PTWC No.24 – Tsunami Warning for Russia and Japan ———	07:00 -	07:00	- 07:01 PTWC Bulletin No.24 received
WC/ATWC No 25 – Cancelled for all areas in Alaska ——	07:13 _	-	07.01 F1WC Buildin N0.24 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 _	08:00	- 07:58 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	08:59 -	09:00	
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	09:40 _		
		10:00	

<u>Country comments</u> Emergency office received PTWC Bulletin No.1 from NWS by fax. Other sources of information: CNN.

4.13 PANAMA – GEOSCIENCES INSTITUTE- UNIVERSITY OF PANAMA

Earthquake occurred			
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34 — 06:41∖		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador	—06:44 \ — 06:46 =	4	06:46 PTWC Bulletin No.1 received
WC/ATWC No.1 - M=8.5: Tsunami Information	06:40	07:00	06:47 Contacted SINAPROC (Civil Defence) and gave seismic parameters
PTWC No.2 - M=8.5: Additional watch for Colombia,	07:45		
Antarctica, Panama, Costa Rica — WC/ATWC No.2 - M=8.6: Tsunami Information	07:43 07:52	08:00	_ 07:45 PTWC Bulletin No. 2 received
	07.02		
PTWC No.3 - M=8.8: (revised)			
WC/ATWC No.3 - M=8.8: Tsunami Information	08:44 08:57 _	09:00	_ 08:44 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,	09:47		09:47 PTWC Bulletin No. 4 received
El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information	_	10:00	-
	09:58	10.00	
PTWC No.5 - Warning for all Pacific area —— WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	10:4 5		
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British			10: 45 PTWC Bulletin No. 5 received
Columbia and Alaska (from Oregon-California border to Kodiak)		11:00	
PTWC No.6 - Warning for all Pacific area	- 11:47 _		11:47 PTWC Bulletin No. 6 received
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu)	11:53	12:00	
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.7 - Warning for all Pacific area	- 12:49		 12:49 PTWC Bulletin No. 7 received
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —— (from Kodiak to Attu)	—12:55	13:00	- 12.49 F TWC Buildin No. 7 Teceived
PTWC No.8 - Warning for all Pacific area	— 13:46 —	14:00	_ 13:46 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from—— California to Attu, Alaska.	- 14:03 -		
PTWC No.9 - Warning for all Pacific area	- 14:46		14:46 PTWC Bulletin No. 9 received
	14.40 _	15:00	
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from	_ 15:04 _		
California to Attu, Alaska	15.45		15:45 DTM/C Dulletin No. 10 received
PTWC No.10 - Warning for all Pacific area—	—15:45 _	16:00	_ 15:45 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 16:03 _		
PTWC No.11 - Warning for all Pacific area—	10.50		
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	— 16:50 17:04	17:00	⁻ 16:50 PTWC Bulletin No. 11 received
California to Attu, Alaska			
•	- 17:52 _		- 17:52 PTWC Bulletin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 17:58 _	18:00	
PTWC No.13 - Warning for all Pacific area	18:43	-	18:43 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from		19:00	
California to Attu, Alaska	19:06		
PTWC No.14 - Warning for all Pacific area —	19:34		⁻ 19:34 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR	20:03	20:00	
from California to Attu, Alaska			
PTWC No.15 - Warning for all Pacific area —	20:28		_ 20:28 PTWC Bulletin No. 15 received
		21:00	

PANAMA- GEOSCIENCES INSTITUTE- UNIVERSITY OF PANAMA

PANAMA- GEUSCIENCES INSTITUTE-	UNIVI		
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32		_ 21:32 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00	22:41 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area WC/ATWC No 19 - Tsunamy Advisory for coastal area in	· 23:54 _ · 00:12 _	. 00:00	– 00:12 PTWC Bulletin No.18 received
California, BC and Alaska. Cancelled for Oregon and Washington —	— 00:54 —	01:00	
PTWC No.19 - Warning for Russia and Japan—	—01:35 _	-	_ 01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan	02:35 _	03:00	02:35 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	03:05 -	03.00	
PTWC No.21 - Warning issued for Russia and Japan — WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	- 03:44 PTWC Bulletin No.21 received
PTWC No.22 – Tsunami Warning for Russia and Japan —			
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01	05:00	O4:49 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan —	05:56	06:00	05:56 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	— 06:02 —		-
PTWC No.24 – Tsunami Warning for Russia and		07:00	
Japan ——— WC/ATWC No 25 – Cancelled for all areas in Alaska ———	07:00 - 07:13 _		07:00 PTWC Bulletin No.24 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 _	08:00	_ 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	08:59 -	. 09:00	- 08:59 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	09:40	10:00	— 09:40 PTWC Bulletin No.26 received
		10.00	1

Country comments

"It is imperative to create an active Tsunami National Warning Center in Panama and to place sea level stations in the Pacific and the Caribbean because we should be able to manage evacuation procedures and other issues regarding tsunami hazards".

4.14 PERU – DIRECTORATE OF HYDROGRAP OF THE PERUVIAN NAVY Earthquake occurred	HY AN	ND NAVIGATION
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km 06:34 06:41		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and06:44 Peru. Watch for Ecuador06:44 WC/ATWC No.1 - M=8.5: Tsunami Information06:49	06 07:00	6:46 PTWC Bulletin No.1 received
PTWC No.2 - M=8.5: Additional watch for Colombia, Antarctica, Panama, Costa Rica07:45 WC/ATWC No.2 - M=8.6: Tsunami Information07:52		07:46 PTWC Bulletin No. 2 received 07:51 Civil Defence issued tsunami warning to the public 08:00 Evacuation in Ilo city , Southern Peru
PTWC No.3 - M=8.8: (revised) 08:44 WC/ATWC No.3 - M=8.8: Tsunami Information 08:57 -		08: 44 PTWC Bulletin No. 3 received08:50 Evacuation in Mollendo Beach, Southern Peru
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia		09:47 PTWC Bulletin No. 4 received
WC/ATWC No.4 - M=8.8: Tsunami Information09:58 PTWC No.5 - Warning for all Pacific area 10:45 WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	10:00	
(from Kodiak to Attu)10:55 _ Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	11:00	10: 45 PTWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area — 11:47 _ WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:53 _ (from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	1	1:48 PTWC Bulletin No. 6 received
PTWC No.7 - Warning for all Pacific area — 12:49 WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska — 12:55 (from Kodiak to Attu)	<u>13:00</u> – 1	2:49 PTWC Bulletin No. 7 received
PTWC No.8 - Warning for all Pacific area 13:46 – WC/ATWC No 8 - Tsunamy Advisory for entire AOR from 14:03 – California to Attu, Alaska.	<mark>14:00</mark> _ 1	3:46 PTWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area 14:46 _	15:00 1	4:46 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 California to Attu, Alaska PTWC No.10 - Warning for all Pacific area—15:45 _ WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03 _	16:00 _ 18	5: 45 PTWC Bulletin No. 10 received
California to Attu, Alaska PTWC No.11 - Warning for all Pacific area— 16:50 _ WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04 California to Attu, Alaska	<u>17:00</u> - 1	6:50 PTWC Bulletin No. 11 received
PTWC No.12 - Warning for all Pacific area 17:52 _ WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 _ California to Attu, Alaska	- 1 18:00	7:52 PTWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area18:43 _	19:00	8:43 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska ——19:06 —		9:34 PTWC Bulletin No. 14 received
PTWC No.14 - Warning for all Pacific area —19:34 WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03	20:00	
PTWC No.15 - Warning for all Pacific area ——20:28 _	21:00	0:28 PTWC Bulletin No. 15 received

PERU – DIRECTORATE OF HYDROGRAPHY AND NAVIGATION OF THE PERUVIAN NAVY

WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _		21:32 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46	23:00	22:41 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area WC/ATWC No 19 - Tsunamy Advisory for coastal area in	23:54 00:12	00:00	- 00:12 PTWC Bulletin No.18 received
California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 01:35 _	01:00	_ 01:35 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	02:57 _ _ 03:05 -	03:00	_ 02:35 PTWC Bulletin No.20 received
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	- 03:44 PTWC Bulletin No.21 received
PTWC No.22 – Tsunami Warning for Russia and Japan — WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	04:49 05:01	05:00	[—] 04:49 PTWC Bulletin No.22 received
PTWC No.23 – Tsunami Warning for Russia and Japan WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	05:56 06:02	06:00	_ 05:56 PTWC Bulletin No.23 received
PTWC No.24 – Tsunami Warning for Russia and Japan ———	07:00 -	07:00	07:00 PTWC Bulletin No.24 received
WC/ATWC No 25 – Cancelled for all areas in Alaska	07:13 _		
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 —	08:00	– 07:57 PTWC Bulletin No.25 received
PTWC No.26 – Tsunami Warning for Japan	08:59 -	09:00	- 08:59 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin———	09:40	10:00	— 09:40 PTWC Bulletin No.27 received

4.15 RUSSIAN FEDERATION - THE KAMTCHATKA TWC, ROSHYDROMET

	_		-,
Earthquake occurred WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km]		
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34 06:41\		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador ——	—06:44 \ — 06:46 =	4	06:50 PTWC Bulletin No.1 received
WC/ATWC No.1 - M=8.5: Tsunami Information	06:49	07:00	 06:55 Estimated the arrival time of the initial tsunami wave to the coast of Kamchatka
PTWC No.2 - M=8.5: Additional watch for Colombia, Antarctica, Panama, Costa Rica —	07:45 _		07:49 PTWC Bulletin No. 2 received
WC/ATWC No.2 - M=8.6: Tsunami Information	07:52	08:00	
PTWC No.3 - M=8.8: (revised)	08:44		_ 08: 46 PTWC Bulletin No. 3 received
WC/ATWC No.3 - M=8.8: Tsunami Information —	——08:57	09:00	
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,	09:47 _		
El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information ——	09:58	10:00	_ 09:49 PTWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area	10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska (from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	10:55		10: 46 PTWC Bulletin No. 5 received
Columbia and Alaska (from Oregon-California border to Kodiak)		11:00	10: 57 WC/ATWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area	— 11:47 _ —11:53 _	12:00	11:49 PTWC Bulletin No. 6 received 11: 57 WC/ATWC Bulletin No. 6 received
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.7 - Warning for all Pacific area —— WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska ——	— 12:49 _ —12:55 _	13:00	_ 12:51 PTWC Bulletin No. 7 received - 12: 57 WC/ATWC Bulletin No. 7 received
(from Kodiak to Attu)			
PTWC No.8 - Warning for all Pacific area WC/ATWC No 8 - Tsunamy Advisory for entire AOR from	— 13:46 — — 14:03 —	14:00	 13:48 PTWC Bulletin No. 8 received 14:05 WC/ATWC Bulletin No. 8 received
California to Attu, Alaska.			
PTWC No.9 - Warning for all Pacific area—	14:46	15:00	- 14:49 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from — California to Attu, Alaska	15:04 _		 15:06 WC/ATWC Bulletin No. 9 received
PTWC No.10 - Warning for all Pacific area—	—15:45 _	10.00	15: 47 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from	16:03	16:00	- 16:05 WC/ATWC Bulletin No. 10 received
California to Attu, Alaska			
PTWC No.11 - Warning for all Pacific area WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	16:50 17:04	17:00	_ 16:52 PTWC Bulletin No. 11 received - 17:06 WC/ATWC Bulletin No. 11 received
California to Attu, Alaska			
PTWC No.12 - Warning for all Pacific area WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	4	18:00 [:]	- 17:54 PTWC Bulletin No. 12 received
California to Attu, Alaska			18:00 WC/ATWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area—	18:43		_ 18:47 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska		19:00	- 19:08 WC/ATWC Bulletin No. 13 received
PTWC No.14 - Warning for all Pacific area —			19:36 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR		20:00	20:06 WC/ATWC Bulletin No. 14 received
from California to Attu, Alaska — PTWC No.15 - Warning for all Pacific area —			20:30 PTWC Bulletin No. 15 received
_		21:00	-
	L		

RUSSIAN FEDERATION – THE KAMCHATKA TWC, ROSHYDROMET

RUSSIAN FEDERATION - THE RANGE	IAINA		C, RUSHTDRUMET
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32		_ 21:07 WC/ATWC Bulletin No. 15 received
	_ 21.52 _		21:34 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 21:47 —	22:00	_ 21:49 WC/ATWC Bulletin No. 16 received
PTWC No.17 - Warning issued for all Pacific area	- 22:41		22:45 PTWC Bulletin No.17 received
WC/ATWC No 17 - Tsunamy Advisory for entire AOR	22:46 =	23:00	22:48 WC/ATWC Bulletin No. 17 received
from California to Attu, Alaska			23:23 Earthquake epicentre is located in the zone presenting the
			danger of occurrence of the tsunami wave at the coast of Kamchatka
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	- 23:54 _	00:00	
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific	- 00:12 _		23:56 WC/ATWC Bulletin No. 18 received – 00:15 PTWC Bulletin No.18 received
area WC/ATWC No 19 - Tsunamy Advisory for coastal area in			
California, BC and Alaska. Cancelled for Oregon and Washington —	— 00:54 —	01:00	_ 00:56 WC/ATWC Bulletin No. 19 received
			01:22 Tsunami bulletin with estimated initial wave arrival
PTWC No.19 - Warning for Russia and Japan—	-01:35 _		times to the coast of Kamchatka issued to the public 01:37 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and	01:57	02:00	01:59 WC/ATWC Bulletin No. 20 received
Alaska. Cancelled for areas from BC/Washington border to — Sitka, Alaska			
PTWC No.20 - Warning for Russia and Japan			
	02:35 _		02:38 PTWC Bulletin No.20 received
WC/ATWC No 21 - Tsunamy Advisory for California	03:05 -	03:00	
and Alaska from Seward to Attu. Cancelled for areas — in Alaska from Sitka to Seward			_ 03:07 WC/ATWC Bulletin No. 21 received
	02.44		
PTWC No.21 - Warning issued for Russia and Japan — WC/ATWC No 22 - Tsunamy Advisory for areas in	03:44	04:00	03:47 PTWC Bulletin No.21 received
Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	— 04:03 —		[—] 04:05 WC/ATWC Bulletin No. 22 received
PTWC No.22 – Tsunami Warning for Russia and Japan —			04:51 PTWC Bulletin No.22 received
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01 —	05:00	05:03 <u>W</u> C/ATWC Bulletin No. 23 received
PTWC No.23 – Tsunami Warning for Russia and Japan —	05:56	06:00	05:58 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.		-	 06:04 WC/ATWC Bulletin No. 23 received
nom cana r onn to rad.			-
PTWC No.24 – Tsunami Warning for Russia and		07:00	07:00 Tsunami bulletin with the cancellation of the warning
Japan ——	- 07:00 -		07:02 PTWC Bulletin No.24 received
WC/ATWC No 25 – Cancelled for all areas in Alaska ———	• 07:13 _		_ 07:15 WC/ATWC Bulletin No. 25 received
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	. 07:57 —	08:00	
	. 07.57		07:59 PTWC Bulletin No.25 received
	aa	09:00	
PTWC No.26 – Tsunami Warning for Japan	- 08:59 -		_09:01 PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	. 09:40		
		-	_09:42 PTWC Bulletin No.27 received
		10:00	

<u>Country comments</u> Other sources of information: Seismic station "Petropavlovsk-Kamchatski" – 06:54

4.16 RUSSIAN FEDERATION – SUKHALIN TWC, ROSHYDROMET

Earthquake occurred			
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34 _ 06:41\		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and	-06:44 \	4	
Peru. Watch for Ecuador ——— WC/ATWC No.1 - M=8.5: Tsunami Information	- 06:46 - 06:49 ⁻	07:00	
	_ 00.40		Content of the optimized of the information to the Sakhalin Transmission of the information to the Sakhalin
PTWC No.2 - M=8.5: Additional watch for Colombia,			Department of the EMERCOM of Russia
Antarctica, Panama, Costa Rica	07:45 _		07:49 PTWC Bulletin No. 2 received
WC/ATWC No.2 - M=8.6: Tsunami Information	-07:52	08:00	
PTWC No.3 - M=8.8: (revised)	08:44		
WC/ATWC No.3 - M=8.8: Tsunami Information	08:57 _	09:00	_ 08: 49 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador.			
Additional watch for Nicaragua, Pitcairn Islands, Honduras,	09:47		
El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information		10:00	09:51 PTWC Bulletin No. 4 received
	09.00	10.00	
PTWC No.5 - Warning for all Pacific area WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	_10:45		
(from Kodiak to Attu)	—10:55 [—]		10: 48 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)		11:00	10: 59 WC/ATWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area	- 11:47		
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska	11:53	12:00	11:51 PTWC Bulletin No. 6 received 11: 59 WC/ATWC Bulletin No. 6 received
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British	_		
Columbia and Alaska (from Oregon-California border to Kodiak)			
PTWC No.7 - Warning for all Pacific area —— WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska ——	- 12:49 —12:55	13:00	- 12:53 PTWC Bulletin No. 7 received
(from Kodiak to Attu)	_12.55 _	10.00	– 13:00 WC/ATWC Bulletin No. 7 received
PTWC No.8 - Warning for all Pacific area WC/ATWC No 8 - Tsunamy Advisory for entire AOR from	- 13:46 -	14:00	13:50 PTWC Bulletin No. 8 received
California to Attu, Alaska.	14:03 -		_ 14: 08 WC/ATWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area	- 14:46		
	14.40 _	15:00	14:52 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from	_ 15:04 _	-	15: 09 WC/ATWC Bulletin No. 9 received
California to Attu, Alaska			13. 09 WOATWO Builetin No. 9 Teceived
PTWC No.10 - Warning for all Pacific area—	—15:45 _	16:00	_ 15: 49 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from	_ 16:03 _		_ 16: 08 WC/ATWC Bulletin No. 10 received
California to Attu, Alaska			
PTWC No.11 - Warning for all Pacific area—	- 16:50 _	17:00	16:54 PTWC Bulletin No. 11 received
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 17:04		_ 17: 08 WC/ATWC Bulletin No. 11 received
PTWC No.12 - Warning for all Pacific area WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	- 17:52 - 17:58	18:00	17:55 PTWC Bulletin No. 12 received
California to Attu, Alaska		10.00	18: 02 WC/ATWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area	18:43 _	-	18:49 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from		19:00	- 19:49 F1WC Buileun No. 13 received
California to Attu, Alaska	-19:06	Ī	
PTWC No.14 - Warning for all Pacific area —	_19:34 _	-	19:38 PTWC Bulletin No. 14 received
-		20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_20:03 _	-	20:08 WC/ATWC Bulletin No. 14 received
PTWC No.15 - Warning for all Pacific area ——	-20:28 _	-	20:32 PTWC Bulletin No. 15 received
		21:00	

RUSSIAN FEDERATION- SUKHALIN TWC, ROSHYDROMET

		21:00	
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _		
PTWC No.16 - Warning issued for all Pacific area	21:32	21:09	9 WC/ATWC Bulletin No. 15 received
	_		6 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00 21:5	1 WC/ATWC Bulletin No. 16 received
PTWC No.17 - Warning issued for all Pacific area		22:/	7 PTWC Bulletin No.17 received
WC/ATWC No 17 - Tsunamy Advisory for entire AOR	22:41 22:46 =) WC/ATWC Bulletin No. 17 received
from California to Attu, Alaska			
WC/ATWC No 18 - Tsunamy Advisory for entire AOR			
from California to Attu, Alaska	23:54 _	00:00 23:5	9 WC/ATWC Bulletin No. 18 received
PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific	00:12 _	00:1	8 PTWC Bulletin No.18 received
area		00:47	7 Tsumami warning for all Kuril Islands
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00.54	Vuzh) Areas evacuated: Severo-Kourilsk, Bourevestnik, Malo-Kurilsk, noKurilsk
California, DC and Alaska. Cancelled for Oregon and Washington	- 00:54 -	01:00	3 WC/ATWC Bulletin No. 19 received
			5 End of the evacuation
PTWC No.19 - Warning for Russia and Japan——	-01:35 _	_ 01:3	8 PTWC Bulletin No.19 received
WC/ATWC No 20 - Tsunamy Advisory for California and	01:57	02:00	
Alaska. Cancelled for areas from BC/Washington border to — Sitka, Alaska			1 WC/ATWC Bulletin No. 20 received
PTWC No.20 - Warning for Russia and Japan			
	02:35 _		
WC/ATWC No 21 - Tsunamy Advisory for California	_ 03:05 -	03:00 02:4	1 PTWC Bulletin No.20 received
and Alaska from Seward to Attu. Cancelled for areas —— in Alaska from Sitka to Seward		_ 03:0	9 WC/ATWC Bulletin No. 21 received
PTWC No.21 - Warning issued for Russia and Japan —	-03:44 -	04:00 03:5	0 PTWC Bulletin No.21 received
WC/ATWC No 22 - Tsunamy Advisory for areas in	- 04:03 -	- 04:09	3 WC/ATWC Bulletin No. 22 received
Alaska from Seward to Kodiak and California			
PTWC No.22 – Tsunami Warning for Russia and Japan —	-04:49 -		4 PTWC Bulletin No.22 received
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska	05:01	05:00	5 WC/ATWC Bulletin No. 23 received
from Kodiak to Sand Point			
PTWC No.23 – Tsunami Warning for Russia and Japan	_ 05:56	06:00 05:5	9 PTWC Bulletin No.23 received
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.			
nom Sand Foint to Allu.			
PTWC No.24 – Tsunami Warning for Russia and			
Japan	07:00 -	07:00	6 PTWC Bulletin No.24 received
WC/ATWC No 25 – Cancelled for all areas in Alaska	07:13 _		7 WC/ATWC Bulletin No. 25 received
PTWC No.25 – Tsunami Warning for Japan.		- 07:3	3 Tsumami warning cancellation
Cancelled for Russia	07:57 _	08:00 08:0	3 PTWC Bulletin No.25 received
DTWC No 26 Toursmi Warning for	00.50 -	09:00	
PTWC No.26 – Tsunami Warning for Japan	08:59 -		PTWC Bulletin No.26 received
PTWC No.27 – Tsunami Warning Cancellation Final bulletin	09:40	Γ	
		09:45	PTWC Bulletin No.27 received
		10:00	

<u>Country comments</u> Other sources of information: Yuzhno – Sakhalius Seismic Station.

4.17 SINGAPORE – METEOROLOGICAL SERVICES DIVISION (MSD), NATIONAL ENVIRONMENT AGENCY

Earthquake occurred			
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34 06:41\		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and Peru. Watch for Ecuador	-06:44 - 06:46 -	4	
WC/ATWC No.1 - M=8.5: Tsunami Information	_ 06:49 -	07:00	 - 06:47 PTWC Bulletin No.1 received 06:47 No action required to be taken. The time of the receipt of the message was noted
PTWC No.2 - M=8.5: Additional watch for Colombia, Antarctica, Panama, Costa Rica ——	07:45 _		
WC/ATWC No.2 - M=8.6: Tsunami Information	—07:52	08:00	07:45 PTWC Bulletin No. 2 received
PTWC No.3 - M=8.8: (revised)	08:44		-
WC/ATWC No.3 - M=8.8: Tsunami Information —	—08:57 _	09:00	08: 45 PTWC Bulletin No. 3 received
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras, El Salvador, Guatemala, Fr. Polynesia	09:47 _		-
WC/ATWC No.4 - M=8.8: Tsunami Information	09:58	10:00	09:48 PTWC Bulletin No. 4 received
PTWC No.5 - Warning for all Pacific area —— WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	10:45		_
(from Kodiak to Attu) Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	—10:55 _	11:00	10: 46 PTWC Bulletin No. 5 received
			_ 11:13 WC/ATWC Bulletin No. 5 received
PTWC No.6 - Warning for all Pacific area	- 11:47 _ 11:53 _	12:00	_ 11:49 PTWC Bulletin No. 6 received
Tsunami Information for: Oregon- Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)			-
PTWC No.7 - Warning for all Pacific area —— WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska —— (from Kodiak to Attu)	- 12:49 _ 	13:00	_ 12:51 PTWC Bulletin No. 7 received
PTWC No.8 - Warning for all Pacific area	- 13:46 -	14:00	13:48 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska.	· 14:03		14:04 WC/ATWC Bulletin No. 8 received
PTWC No.9 - Warning for all Pacific area	- 14:46 _	15:00	- 14:48 PTWC Bulletin No. 9 received
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from —— California to Attu, Alaska	_ 15:04 _		15:06 WC/ATWC Bulletin No. 9 received
PTWC No.10 - Warning for all Pacific area—	—15:45 _	16:00	_ 15: 47 PTWC Bulletin No. 10 received
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_ 16:03 _		 16:05 WC/ATWC Bulletin No. 10 received
PTWC No.11 - Warning for all Pacific area— WC/ATWC No 11 - Tsunamy Advisory for entire AOR from		17:00	16:51 PTWC Bulletin No. 11 received 17:05 WC/ATWC Bulletin No. 11 received
California to Attu, Alaska	_ 11.01		-
PTWC No.12 - Warning for all Pacific area WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	- 17:52 _ - 17:58 _	18:00	- 17:53 PTWC Bulletin No. 12 received
California to Attu, Alaska			18:00 WC/ATWC Bulletin No. 12 received
PTWC No.13 - Warning for all Pacific area	18:43 _		_ 18:45 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	-19:06	19:00	_ 19:07 WC/ATWC Bulletin No. 13 received
PTWC No.14 - Warning for all Pacific area —	19:34 _	20:00	[—] 19:36 PTWC Bulletin No. 14 received
WC/ATWC No 14 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	_20:03 _	-	20:05 WC/ATWC Bulletin No. 14 received
PTWC No.15 - Warning for all Pacific area —	—20:28 _	21:00	⁻ 20:30 PTWC Bulletin No. 15 received

SINGAPORE - METEOROLOGICAL SERVICES DIVISION (MSD), NATIONAL ENVIRONMENT AGENCY

ENVIRONMENT AGENCY			
WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	21:06 WC/ATWC Bulletin No. 15 received
PTWC No.16 - Warning issued for all Pacific area	21:32 _		21:34 PTWC Bulletin No.16 received
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	21:48 WC/ATWC Bulletin No. 16 received
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46 —	23:00	22:42 PTWC Bulletin No.17 received
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	23:54 _ 00:12 _	00:00	
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	— 00:54 —	01:00	
PTWC No.19 - Warning for Russia and Japan —	-01:35 _	-	
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan	02:35 _	_	
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 -	03:00	
PTWC No.21 - Warning issued for Russia and Japan WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	
PTWC No.22 – Tsunami Warning for Russia and Japan —			
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01	05:00	
PTWC No.23 – Tsunami Warning for Russia and Japan	05:56	06:00	
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.	- 06:02 -	00.00	
PTWC No.24 – Tsunami Warning for Russia and Japan———	07:00 -	07:00	
WC/ATWC No 25 – Cancelled for all areas in Alaska	07:13 _		
PTWC No.25 – Tsunami Warning for Japan. Cancelled for Russia	07:57 –	08:00	
PTWC No.26 – Tsunami Warning for Japan	08:59 -	09:00	
PTWC No.27 – Tsunami Warning Cancellation Final bulletin ———	09:40 _	10:00	

<u>Country comments</u> "This event is not within our watch areas that are specified in our standard operational procedures. Hence no actions are taken by MSD upon receipt of the warning bulletins from PTWC. In the case that the event is within our watch area, our National Warning Centre will generate numerical model scenarios for our assessment purposes".

4.18 THAILAND - NATIONAL DISASTER WARNING CENTER



THAILAND – NATIONAL DISASTER WARNING CENTER



<u>Country comments</u> Other sources of information: JMA, TMD, USGS, GEOFON.

4.19 TUVALU – NATIONAL DISASTER MANAGEMENT OFFICE (Not IOC Member State)

Earthquake occurred —	7		
WC/ATWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=31Km			
PTWC EQ Obs msg= Mwp 8,3, [36,1S, 72.8W], D=55 Km	06:34		
PTWC 1 No.1 - M=8.5: Tsunami Warning for Chile and	06:44 \	4	
Peru. Watch for Ecuador —	- 06:46 -		
WC/ATWC No.1 - M=8.5: Tsunami Information	06:49 -	07:00	
PTWC No.2 - M=8.5: Additional watch for Colombia,			
Antarctica, Panama, Costa Rica —	07:45		07:46 PTWC Bulletin No. 2 received
WC/ATWC No.2 - M=8.6: Tsunami Information		08:00	-
	07.52		
PTWC No.3 - M=8.8: (revised)	08:44		08: 44 PTWC Bulletin No. 3 received
WC/ATWC No.3 - M=8.8: Tsunami Information —	08:57 _	09:00	
PTWC No.4 - M=8.8: Additional warning for Ecuador.			
Additional watch for Nicaragua, Pitcairn Islands, Honduras,	09:47		09:47 PTWC Bulletin No. 4 received
El Salvador, Guatemala, Fr. Polynesia	03.47 _	-	-
WC/ATWC No.4 - M=8.8: Tsunami Information —		10:00	
PTWC No.5 - Warning for all Pacific area —	10:45		
WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska			
(from Kodiak to Attu)			10:46 PTWC Bulletin No. 5 received
Tsunami Information for: Oregon- Washington- British	10.55 _	11:00	
Columbia and Alaska (from Oregon-California border to Kodiak)			11:15 Bulletin 5 was dispatched to Scientific Officer, Chief Met Officer,
			Disaster Officer and Secretary to Government (SEGOV).
PTWC No.6 - Warning for all Pacific area —	— 11:47		11:20 Dispatch bulletin 5 to police.
WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska	-	12:00	
(from Kodiak to Attu)	11:53 _		12:00 After Disaster officer and Secretary to government has made the
Tsunami Information for: Oregon- Washington- British			decision to issue the warning Funafuti informed Met outer island offices
Columbia and Alaska (from Oregon-California border to Kodiak)			via HF of bulletin 5 Funafuti Met Office released the warning to outer
	12.40		islands (Nanumea, Nui, Niulakita) Met Offices.
PTWC No.7 - Warning for all Pacific area	— 12:49 _	13:00	12:30: Meeting NDC, tasks allocated to NDC members, tasks done should be reported right away and
WC/ATWC No 7 - Tsunamy Advisory for: California and Alaska — (from Kodiak to Attu)	—12:55	13.00	should be reported right away and
(ITOTIT ROUAR to Alla)			
			13:30 Funafuti Met update bulletin and check with other countries of
			their hit time etc
DTWC No 9 Worning for all Desifie area	- 12.46	14:00	- 14:47 DTWC Dullatin No. 8 received
PTWC No.8 - Warning for all Pacific area	— 13:46 –	14.00	14:47 PTWC Bulletin No. 8 received
WC/ATWC No 8 - Tsunamy Advisory for entire AOR from California to Attu, Alaska.	— 14:03 —		
California to Attu, Alaska.			
PTWC No.9 - Warning for all Pacific area—			
FTWC NO.5 - Waiting for all Fachic area	14:46	15:00	- 14:47 PTWC Bulletin No. 9 received
		13.00	15:00 Radio Tuvalu on the air and Police went on patrol car informing
MCATING No. 0. Toursomy Advisory for optics AOD from	15:04	-	residents on Funafuti.
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	15:04		
	·- ·-		
PTWC No.10 - Warning for all Pacific area-	15:45	16:00	15:47 PTWC Bulletin No. 10 received
	16:03 _	10.00	13.47 FIVO DUIIEUII NO. IU IECEIVEU
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from	10.05	1	
California to Attu, Alaska			
DTMO No 44 Manual for all Desid			
PTWC No.11 - Warning for all Pacific area	— 16:50 <u></u>	17:00	16:50 PTWC Bulletin No. 11 received
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from	17:04		
California to Attu, Alaska			
PTWC No.12 - Warning for all Pacific area—	— 17:52 _		 17:52 PTWC Bulletin No. 12 received
WC/ATWC No 12 - Tsunamy Advisory for entire AOR from	— 17:58 _	18:00	
California to Attu, Alaska			
	10.10		
PTWC No.13 - Warning for all Pacific area—	18:43	ł	
		19:00	18:55 PTWC Bulletin No. 13 received
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from		-	
California to Attu, Alaska	19:06		
		-	
PTWC No.14 - Warning for all Pacific area –	19:34	00.00	19:35 PTWC Bulletin No. 14 received
	<u> </u>	20:00	
WC/ATWC No 14 - Tsunamy Advisory for entire AOR	20:03	-	
from California to Attu, Alaska			
PTWC No.15 - Warning for all Pacific area —	20:28	ł	
		21.00	
		21:00	

TUVALU – NATIONAL DISASTER MANAGEMENT OFFICE – (Not IOC Member State)

WC/ATWC No 15 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:05 _	21:00	
PTWC No.16 - Warning issued for all Pacific area	21:32 _		
WC/ATWC No 16 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	21:47 —	22:00	
PTWC No.17 - Warning issued for all Pacific area WC/ATWC No 17 - Tsunamy Advisory for entire AOR from California to Attu, Alaska	22:41 22:46 =	23:00	
WC/ATWC No 18 - Tsunamy Advisory for entire AOR from California to Attu, Alaska PTWC No.18 Tsunami warning remains for Russia and Japan. Cancellation of tsunami warning for other Pacific area	23:54 00:12	00:00	– 00:14 PTWC Bulletin No.18 received
WC/ATWC No 19 - Tsunamy Advisory for coastal area in California, BC and Alaska. Cancelled for Oregon and Washington —	- 00:54 -	01:00	
PTWC No.19 - Warning for Russia and Japan—	-01:35 _	-	
WC/ATWC No 20 - Tsunamy Advisory for California and Alaska. Cancelled for areas from BC/Washington border to Sitka, Alaska	01:57	02:00	
PTWC No.20 - Warning for Russia and Japan	02:35 _	-	
WC/ATWC No 21 - Tsunamy Advisory for California and Alaska from Seward to Attu. Cancelled for areas in Alaska from Sitka to Seward	_ 03:05 –	03:00	
PTWC No.21 - Warning issued for Russia and Japan — WC/ATWC No 22 - Tsunamy Advisory for areas in Alaska from Kodiak to Attu. Cancelled for areas in Alaska from Seward to Kodiak and California	—03:44 - — 04:03 -	04:00	
PTWC No.22 – Tsunami Warning for Russia and Japan —	-04:49 -	-	
WC/ATWC No 23 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu. Cancelled for areas in Alaska from Kodiak to Sand Point	05:01 —	05:00	
PTWC No.23 – Tsunami Warning for Russia and Japan	_ 05:56	06:00	
WC/ATWC No 24 - Tsunamy Advisory for areas in Alaska from Sand Point to Attu.		00.00	
PTWC No.24 – Tsunami Warning for Russia and Japan———	07:00 -	07:00	
WC/ATWC No 25 – Cancelled for all areas in Alaska			
PTWC No.25 – Tsunami Warning for Japan.	07.57	08:00	
Cancelled for Russia	U1:57 —		
PTWC No.26 – Tsunami Warning for	08:59 -	09:00	
Japan PTWC No.27 – Tsunami Warning Cancellation	00.40		
Final bulletin ———	09:40		
		10:00	1

Country comments

Radio Tuvalu on the air until morning after 9 a.m. when warning was cancelled.

4.20 UNITED STATES- NATIONAL WEATHER SERVICE PACIFIC REGION The United States do not receive Bulletins as the PTWC is the USA National Focal Point

Peru. Watch for Ecuador 06:46 06:49 07:45 06:49 07:45	 06:46 US Pacific Coast State/Local Emergency Mgmt Orgs Notified //US Weather Forecast Offices for Pacific Coasts Notified // US Media Organizations Notified // US Coast Guard Notified
PTWC No.3 - M=8.8: (revised)08:44	
WC/ATWC No.3 - M=8.8: Tsunami Information ——08:57 - 09	:00
PTWC No.4 - M=8.8: Additional warning for Ecuador. Additional watch for Nicaragua, Pitcairn Islands, Honduras,09:47 El Salvador, Guatemala, Fr. Polynesia WC/ATWC No.4 - M=8.8: Tsunami Information09:58 10	:00
PTWC No.5 - Warning for all Pacific area 10:45 WC/ATWC No 5 - Tsunamy Advisory for: California and Alaska	10:46 Tsunami Warning for Hawaii
(from Kodiak to Attu)10:55	10:55 Tsunami Advisory for Alaska and US West Coast
PTWC No.6 - Warning for all Pacific area — 11:47 WC/ATWC No 6 - Tsunamy Advisory for: California and Alaska11:5312 (from Kodiak to Attu)11:5312 Tsunami Information for: Oregon-Washington- British Columbia and Alaska (from Oregon-California border to Kodiak)	.00
PTWC No.7 - Warning for all Pacific area — 12:49	:00
PTWC No.8 - Warning for all Pacific area —— 13:46 – 14 WC/ATWC No 8 - Tsunamy Advisory for entire AOR from— 14:03 – California to Attu, Alaska.	:00
PTWC No.9 - Warning for all Pacific area 14:46 _ 15	:00
WC/ATWC No 9 - Tsunamy Advisory for entire AOR from 15:04 California to Attu, Alaska	
PTWC No.10 - Warning for all Pacific area—15:45	00
WC/ATWC No 10 - Tsunamy Advisory for entire AOR from 16:03 California to Attu, Alaska	
	:00
WC/ATWC No 11 - Tsunamy Advisory for entire AOR from 17:04 California to Attu, Alaska	
PTWC No.12 - Warning for all Pacific area 17:52 _ WC/ATWC No 12 - Tsunamy Advisory for entire AOR from 17:58 _ 18 California to Attu, Alaska	<u>.00⁻</u>
PTWC No.13 - Warning for all Pacific area18:43 _	
WC/ATWC No 13 - Tsunamy Advisory for entire AOR from California to Attu, Alaska19:06	<u>.00</u>
PTWC No.14 - Warning for all Pacific area ——19:34	00
WC/ATWC No 14 - Tsunamy Advisory for entire AOR20:03 from California to Attu, Alaska	
PTWC No.15 - Warning for all Pacific area20:28 _	
21	:00

5. SURVEY RESULTS

The Member States' responses to the questions asked in the survey questionnaire have been compiled into tables and figures, as follows:

TABLES

- Table 5.1
 Summary of responses by countries to "yes/no" questions. (Q2, 4, 5, 6, 7, 8, 9, 10, 12, 15, 17, 18, 19, 20, 22)
- Table 5.2Time of earthquake awareness by countries and means of notification. Time of
receipt of first PTWC and WC/ATWC bulletins (Q1, 2)
- Table 5.3Time of receipt by countries of all PTWC and WC/ATWC bulletins. (Q5)
- Table 5.4Earthquake parameters calculated by countries. (Q7)
- Table 5.5Actions taken by countries before the first PTWC/ WC/ATWC bulletin was received.
(Q8)
- Table 5.6Actions taken by countries after the first PTWC/ WC/ATWC bulletin was received.
(Q9)
- Table 5.7Time of national warnings issued by countries. Time lapse between earthquake
awareness and issuance of first warning. Source information on which the warning
was based. (Q10, 11)
- Table 5.8Time of warning cancellation for those countries that issued warnings (UTC). Time
period between warning issuance and cancellation (Q14)
- Table 5.9
 Actions taken by National Disaster Management Organisations. (Q16)
- Table 5.10Evacuations by countries. (Q17)
- Table 5.11Sea level stations monitored by countries. (Q20)

FIGURES

- Figure 5.1 Time of earthquake awareness expressed as lapsed time since earthquake.
- Figure 5.2 Time of official tsunami warnings issued by countries and modelled tsunami travel times.
- Figure 5.3 Time of warning cancellation for countries that issued warnings and modelled tsunami travel times.

	Country	AUS	СНІ	COL	FNC	FRP	ECU	ESAV	нк	JAP	NZ	NIC	PAN	PER	PAL	RF- S	RF- K	SIN	THA	τυν	USA
	Received first bulletin from PTWC and/or WC/ATWC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0	-
ADVISORY SERVICE	Acknowledged receipt of bulletin	•	0	0	0	0	•	•	•	0	•	0	•	•	•	0	•	0	•	0	-
ADVIS	Received subsequent PTWC/ WC/ATWC bulletin	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	-
	Received info from other sources	•	•	•	•	•	•	•	•	•	•	•	0	0	•	•	•	•	•	0	•
	Calculated earthquake parameter	•	•	0	0	•	0	0	•	•	0	•	•	0	0	•	•	0	•	0	•
NATIONAL ACTIONS	Action taken before bulletin	•	0	0	0	•	•	•	0	•	0	•	•	0	0	0	0	0	•	0	0
ACT	Action taken after bulletin	•	•	•	•	•	•	•	•	•	•	•	٠	0	•	•	•	0	•	•	•
ONAL	Issued a tsunami warning	•	•	0	•	•	•	•	0	•	•	•	0	•	٠	•	•	0	•	•	•
NATI	Wave height forecasted	0	0	0	0	•	•	•	n/a	•	•	0	n/a	0	0	•	0	n/a	•	N/A	•
	Communication Problem with warning	0	n/a	n/a	•	0	•	•	n/a	0	0	0	n/a	0	0	0	0	n/a	0	N/A	0
NS	Any area evacuated	•	•	0	•	•	•	0	0	•	•	0	0	•	0	•	0	0	0	•	•
NA LIUNAL RESPONS F	Smooth evacuation	•	N/A	n/a	•	•	•	n/a	n/a	•	N/A	n/a	n/a	N/A	N/A	•	n/a	n/a	n/a	0	•
RE	Self evacuation	0	N/A	n/a	•	0	•	0	0	•	•	0	0	0	0	0	0	0	0	0	0
	Monitored sea level	•	•	•	•	•	•	•	•	•	•	0	0	•	0	•	•	0	•	•	•
Q	 Accessed through GTS 	0	0	0		•	•	•	•	•	0	n/a	n/a	0	n/a	•	0	n/a	•	•	-
DELLIN	 Accessed through IOC Sea Level Observation Facility 	0	0	•		•	0	0	•	0	•	n/a	n/a	•	n/a	•	0	n/a	0	•	-
DM DI	 Accessed through other systems 	•	•	0	•	0	0	0	0	•	٠	n/a	n/a	•	n/a	•	•	n/a	0	•	-
RING AN	Knowledge on accessing sea level data through GTS	N/A	N/A	N/A	N/A	•	•	N/A	•	•	N/A	0	0	N/A	0	•	•	•	•	-	•
MONITORING AND MODELLING	Knowledge on accessing sea level data through IOC Sea Level Observation Facility	N/A	N/A	•	N/A	•	N/A	•	•	N/A	•	0	0	N/A	0	•	•	•	•	•	•
	Used numerical modelling	•	N/A	•	0	0	•	•	•	•	٠	0	0	•	0	•	•	0	•	0	•

Table 5.1 Summary of responses by countries to "yes/no" questions

AUS=Australia; CHI=Chile; COL=Colombia; FNC=New Caledonia; FRP=French Polynesia; ECU=Ecuador; ESAV=EI Salvador; CHK= China HK=Hong-Kong; JAP=Japan; NZ=New Zealand; NIC=Nicaragua; PAN=Panama; PER=Peru; PAL=Palau; RF-K=Russian Federation- Kamchatka; RF-S=Russian Federation Sukhalin; SIN=Singapore; THA=Thailand; TUV= Tuvalu; USA=United States.

●= yes, ○= no, n/a= not applicable, NA= No answer provided
Country	Time learnt	Means of Notification	PTWC	WC/ATWC
Palau	06:30	Received call from Japan Embassy in	06:53	
Nicaragua	06:40	Through the Seismic Network Nicaragua	06:47	
Japan	06:41	Seismic analysis by JMA system	06:48	06:50
Tuvalu	6:43	On the CISN (California Integrated	-	
Colombia - OSSO	06:44	Email	06:47	10:49
Australia	06:45	PTWC P-Time Message	06:47	06:50
El Salvador	06:45	SMS	06:47	
French Polynesia	06:45	TREMORS system sent warning by	06:47	
Peru	06:46	PTWC/CISN	06:46	
New Zealand	06:47	Email, fax	06:47	
Singapore	06:47	PTWC via email and GTS	06:47	
Thailand	06:48	Email, phone, geofon, EMSC, USG	06 :55	
China- Hong- Kong	06:49	PTWC RANET SMS	06:48	
Russian Federation- Sukhalin TWC	06:50	PTWC bulletin 1	06:50	-
Russian Federation – Kamchatka TWC	06:51	PTWC bulletin 1	06:51	
France- New Caledonia	06:52	SMS	06:58	
Ecuador	06:56	USGS-NEI-PTWC	06:56	

<u>Table 5.2</u> Time of earthquake awareness by countries and means of notification. Time of receipt of first PTWC and WC/ATWC bulletins. All times are in UTC. See also Figure 5.1.



Figure 5.1 Time of earthquake awareness expressed as lapsed time since earthquake

Country	Bull. 1	Bull. 2	Bull. 3
Chile	06:46	07 :45	08:44
Panama	06:46	07 :45	08:44
Peru	06:46	07 :45	08:44
Australia	06:47	07:46	08:44
Colombia	06:47	07:45	08:44
El Salvador	06:47	07:46	08:45
French Polynesia	06:47	07:45	08:44
New Zealand	06:47	07:46	08:44
Nicaragua	06:47	07:45	08:47
Singapore	06:47	07:45	08:45
Japan	06:48	07:46	08:46
China – Hong-Kong	06:48	07:46	08:44
Russian Federation- Sukhalin TWC	06:50	07:49	08:49
Russian Federation – Kamchatka TWC	06:51	07:49	08:46
Palau	06:53	07:46	08:45
Thailand	06:55	07:55	08:55
Ecuador	06:56	07:55	08:54
France- New Caledonia	06:58	07 :47	08 :45

Table 5.3 Time of receipt by countries of three first PTWC bulletins.

Country		Origin Time (UTC)	Location (lat and long)	Depth (Km)	Magnitu de	Type of Mag	Time UTC
Australia	1st estimate	06:34	-35.72, - 72.68	0 Km	8.5	Mwp	06:50
Australia	2nd estimate	06:34	-35.32, - 72.93	50 Km	8.8	Mwp	07:19
Chile	1 st estimate	06:35:43	-33, - 71,8	Not estimated	8.9	Mw	06:48
China-	1st estimate	06:34	-35.6, -72.6	16 Km	8.4	Ms	06:44
Hong-Kong	2nd estimate	06:34	-35.6,-72.6	17 Km	8.8	Mwp	06:45
	1st estimate	06:34	-36.0, - 72.6	Shallow (<40 Km)	Mw=8.5 (Mm = 9.0)	Moment magnitude	07:15
French Polynesia	2nd estimate				Mw= 8.7 (Mm=9.2)	Moment magnitude	08:00
	3rd estimate	06:34	-35.8, -72.7	35 Km	Mw= 8.8	Computed from CMT (PDFM)	
Nicaragua	1st estimate	06:52	-36.04, - 72,66	55 Km	8.9	Ms	06:34
Panama	1st estimate	06:34	-36.09, - 72,56	50 Km	Mw=8.7		06:34
Russian Federation-	1st estimate	06:34	-36.05, - 72.59	8			06:47

Country		Origin Time (UTC)	Location (lat and long)	Depth (Km)	Magnitu de	Type of Mag	Time UTC
Sukhalin TWC	2nd estimate	06:34	-36.10, - 72.64		8.5		06:48
Russian Federation	1st estimate	06:34					06:54
– Kamchatka TWC	2nd estimate	06:34	-35.16,- 73.78	33 Km	8.3	Ms	08:21
Thailand	1st estimate	P-wave 06:53			8.2	Ms	08:31
	1st estimate	06:34	-36.1, -72,6	55 Km	8.5	Mw	06:46
United States	2nd estimate	06:34	-36.1, -72,6	55 Km	8.6	Mw	07:47
	3rd estimate	06:34	-36.1, -72.6	55 Km	8.8	Mw	08:44

<u>Table 5.4</u> Earthquake parameters calculated by countries

Country	Action details					
Australia	 Initiated seismic assessment of earthquake location and magnitude. 					
	 Harbourmasters were communicated on the event. 					
Ecuador	 Bulletin was issued on INOCAR website. 					
	 All the personnel of the warning centre met up. 					
	• The action protocol was activated by the National Oceanographic					
El Salvador	Service.					
	 Deep water sea level stations near to the epicentre were monitored. 					
French Polynesia	Own seismic warning called the geophysist on duty.					
Japan	Seismic analysis by JMA system.					

Table 5.5 Actions taken by countries before the first PTWC/ WC/ATWC bulletin was received

Country	Time	Details
Australia	06:50	Issued JATWC Earthquake Bulletin
	08:45	Tsunami Watch 1 for NSW, Queensland, Lord Howe and Norfolk Islands.
	09:48	Tsunami Warning 1 for NSW: Marine Threat Broken Bay to Point Danger
	09:48	Tsunami Warning 1 for Queensland: Marine Threat Point Danger to Double Island Point.
	09:48	Tsunami Warning 1 for Norfolk Island: Marine Threat
	09:48	Tsunami Warning 1 for Lord Howe Island: Marine Threat
		Hourly updates were then issued for all warnings until cancellation
	16:57	Tsunami Warnings (Marine Threat) were extended to central and
		southern Qld, all NSW, eastern Victorian and Tasmania coasts.
Chile	06:51	SHOA communicated warning to ONEMI
	07:05	Issuance of the warning to the Navy through messages by wired communication and email.
	07:07	Issuance of tsunami warning via fax // attempt to communicate via
		fixed line, mobile and satellital telephone.

Country	Time	Details
China-Hong-Kong	06:50	Informed relevant personnel
5 5	06:50	Started tsunami operation procedures
	07:21	Issued a press release on earthquake
Colombia	06:48	Revision of the earthquake parameters
oolombia	06:56	Internal communication among the OSSO members
	07:37	Sent SMS to person responsible in CCO in Colombia, in order to
	01101	inform about the earthquake and that there was any danger for
		Colombian coasts.
	9:15	Revision of information available on TWCs websites in Ecuador.
	•••••	Peru and Chile.
	08:23	OSSO Corporation Information Bulletin No. 1 sent to the National
		Institution of Risk Management (DFR) – per email.
	12:25	OSSO Corporation Information Bulletin No. 2 sent to the National
	0	Institution of Risk Management (DFR).
	13:50	Phone communication with people on the coast in order to obtain
		information of direct observation of the sea level.
	From	Phone communication with local risk management entities in order
	11:15 -	to inform that there was no danger for Colombian coasts.
	rest of	.
	the day	
	00:30	OSSO Corporation Information Bulletin No. 3 sent to the National
	(28/02)	Institution of Risk Management (DFR) and to the media to clarify
		confusion and reiterate the absence of danger in Columbia coasts.
Ecuador	07:00	Called INOCAR Director
	07:10	Called Ministry of Risk Management
	07:10	Called the harbourmaster
El Salvador	06:50	Deep water sea level stations monitored
	08:17	Sea levels sensors in the coastline of Chile and Peru monitored
		Defence Civil contacted in order to inform them about the
	10:00	earthquake.
	12:30	National press conference to issue tsunami warning
France- New	07:47	Operational Centre started watch
Caledonia		
	14:47	Information was sent to the Police
	14:47	Pre-warning status
	15:00	Operational Centre was activated
French Polynesia	07:24	Yellow warning level given to Civil Defense
	09:26	Red warning level given to Civil Defense
	20:10	Green (cancellation) for Polynesia except Marquesas
	21:30	Green (cancellation) for Marquesas
Japan	06:52	Starting monitoring sea level station data in the Pacific region
	06:55	Assembling staff concerned
	07:00	Issuance of Earthquake Information and providing it to the national
	07.00	disaster management organizations.
	10:00	Media Briefing
	23:30	Media Briefing
	00.22	Issuance of Tsunami Warning/Advisory
	00:33	Establishing a JMA disaster response headquarters
	07:50	Media Briefing
	12:45	
	28.02.10	Media Briefing
	01.00	Modia Priofing
	01:00	Media Briefing

Country	Time	Details
	01.03.10	
	1-2 Mar.	Dispatching JMA Mobile Observation Team to the disaster areas for field survey.
New Zealand	06:55	MCDEM Duty Officer and Duty Manager received a page message from the New Zealand Fire Service notifying them of the receipt of
		a PTWC Bulletin (Note: NZFS are contracted by MCDEM to
		monitor hazard notifications and issue warning messages via the National Warning System on a 24/7 basis on behalf of MCDEM).
	06:57	MCDEM Duty Officer confirmed receipt with New Zealand Fire
		Service and requested to await further instruction following
	06:57	scientific advice to be provided by GNS Science. MCDEM Duty Manager contacted GNS Science Duty Officer for
	00.07	scientific assessment and modeling related to New Zealand.
	07:20	MCDEM Duty Officer, MCDEM Duty Manager and National
		Controller held a teleconference to decide on action to take
	07.00	following GNS Science assessment of threat to NZ.
	07:33	Contacted the New Zealand Fire Service, and requested a 'National Advisory: No Threat' message be issued via the National
		Warning System.
	07:38	'National Advisory: No Threat' issued to response agencies and the
		media via the National Warning System.
	07:45	MCDEM website updated to include warning information.
	ongoing	Monitored the situation and PTWC bulletins. Teleconferences held between the MCDEM Duty Officer, MCDEM Duty Manager and the
		National Controller following the issue of updated PTWC Bulletins.
		Discussions held on whether to upgrade the 'National Advisory: No
		Threat message as the earthquake parameters were refined, and
	09:00	the watch and warning criteria continued to widen. Duty Team requested to activate the National Crisis Management
	09.00	Centre (NCMC). Relevant agency liaison officers requested to staff
		the NCMC.
	11:00	Following the issuing of PTWC Bulletin 005 (1045Z) placing New
		Zealand under a 'warning' and further GNS Science assessment
	11:15	and modeling a 'National Warning: Threat to NZ' was issued. Requested the broadcast of an emergency announcement via
	11.10	national TV and radio broadcasters (using the existing
		memorandum of understanding between MCDEM and national
		broadcasters- broadcasting every 15 minutes).
	ongoing	Monitoring of the situation at the national level and engagement with local response organizations continued. Issuing of updated
		'National Warning' messages to response agencies and the media
		continued approximately every hour.
	12:10	National Warning Update #02
	13:10	National Warning Update #03
	14:07	National Warning Update #04
	15:11	National Warning Update #05
	16:22 17:09	National Warning Update #06 National Warning Update #07
	16:18	National Warning Update #07
	19:01	National Warning Update #09
	19:42	National Warning Update #10

Country	Time	Details		
	20:21	National Warning Update #11		
	21:12	National Warning Update #12		
	22:17	National Warning Update #13		
	23:45	National Warning Update #14		
	00:52	National Warning Update #15 - 01:52 pm on 28/02		
	02:00	National Advisory Update #16 - 03:00 pm on 28/02 (downgraded National Warning to National Advisory).		
	04:14	National Advisory Update #17 - 05:14 pm on 28/02 (National Advisory to remain in effect overnight).		
	19:35	National Advisory Update #18 - 08:37am on 01/03 (National Advisory Cancellation).		
	19:40	Cancellation of Request for Broadcast		
Palau	11:30	Specific NEC members (Vice President, Public Safety, General Manager of PNCC, Minister of Health and Director of Communications Development, were called in and were informed of Tsunami Warning.		
	12:30	Issued public announcement through local radio stations		
	13:39	Scroll message sent to local T.V. Station		
	22:29	Update scroll message sent to T.V. Station		
	00:12	Cancellation announcement sent to local radio station and to T.V. Station.		
Russian Federation – Kamchatka TWC	06: 55	Estimated the arrival time of the initial tsunami wave to the coast of Kamchatka .		
Russian Federation- Sukhalin TWC	06:51	Analysis of the situation and transmission of the information to the Sukhalin Department of the Ermercom of Russie.		
Tonga		 Public Awareness on National Radio and TV to inform people of likely direction, what to do, Consequences, direction, possible height of wave, nature of tsunami, direct people where to go, Direct people of where to go and what they need to take. Activate emergencyCoordinate operation, Emergency management system; Activate the Coordination Centre. 		
Tuvalu	11:15	Bulletin 5 was dispatched to Scientific Officer, Chief Met Officer, Disaster Officer and Secretary to Government (SEGOV).		
	11:20	Dispatch bulletin 5 to police. Because this happened early mornings, police has to get National Disaster Committee (NDC) members for a meeting.		
	12:00	After Disaster officer and Secretary to government made the decision to issue the warning, Funafuti informed Met outer island offices via HF about the bulletin 5. // Funafuti Met Office released the warning to outer islands (Nanumea, Nui, Niulakita) Met Offices.		
	12:30	Meeting NDC, tasks allocated to NDC members, tasks done should be reported right away.		
	13:30	Funafuti Met update bulletin and check with other countries of their hit time etc.		
	Time not known	Boats travelled to inform residents on Funafuti motu (Amatuku, Funafala, Papaelise).		

Country	Time	Details
	Time not	Telecom/Police/Red Cross/Disaster Office inform outer-islands
	known	
	13:30	SEGOV informed Cabinet of tasks carried out by NDC
	15:00	Radio Tuvalu on the air and Police went on patrol car informing residents on Funafuti.
		Radio Tuvalu on the air until morning after 9am when warning was cancelled.

Table 5.6 Actions taken by countries after the first PTWC/WC/ATWC bulletin was received

Country	Earthquake Notification	Warning issued	Time lapse (h:mm)	Information for warning
Australia	06:45	09:48 (Queensland, Norfolk Island, Lord Howe Island); 16:57 (Central and southern Qld, all NSW, eastern Victorian and Tasmania coasts)	3:03 / 10:10	National TWC
France- New Caledonia	06:52	15:00	8:08	PTWC
French Polynesia	06:48	14:00	7:12	National TWC
Ecuador	06:56	07:20	1:24	PTWC
El Salvador	06:45	12:30	5:45	PTWC and National TWC
Japan	06:41	00:33	17:52	National TWC
New Zealand	06:46	07:45	0:59	PTWC and National TWC
Nicaragua	06:40	09:30	2:50	PTWC
Palau	11:30	12:30	1:00	PTWC
Peru	06:46	07:51	1:05	PTWC
Russian Federation- Kamchatka	06:50	01:22	18:32	PTWC and National TWC
Russian Federation - Sukhalin	06:51	00:47	17:56	National TWC
Singapore	06:55	06:55	0:00	PTWC
United States	06:44	10:46	4:02	-

<u>Table 5.7</u> Time of national warnings issued by countries (UTC). "Time lapse" is period between earthquake awareness and issuance of first warning. "Information for warning" is the source on which the warning was based. See also Figure 5.2.



<u>Figure 5.2</u> Time of official tsunami warnings issued by countries and modelled tsunami arrival times. All times in UTC.



<u>Figure 5.3</u> Time of warning cancellation for countries that issued warnings and modelled tsunami travel times. All times in UTC.

Country	Time of warning	Cancel time	Time on alert (hh:mm)	Reason for cancellation	Mode of cancellation
Australia	09:48 16:57	04:47 (28/02)	18:59	Sea-level gauge observations below marine threat threshold for extended period	Phone, fax, radio, television, Web pages
Ecuador	07:20	16:30	09:10	It was confirmed that sea level did not increase drastically according to the sea level stations near the Ecuadorian coasts. Aditionally, according to the arrival time, no	Web INOCAR, Press bulletin, Email, phone and radio

Country	Time of warning	Cancel time	Time on alert (hh:mm)	Reason for cancellation	Mode of cancellation
				destructive effects were estimated for Ecuadorian coasts.	
El Salvador	12:30	02:00 (28/02)	13:30	PTWC cancellation	Fax and email
France-New Caledonia	15:00	N/A		The tsunami had already passed by the coasts.	Radio, fax
French Polynesia	14:00	20:10 except for Marquesas (21:30)	06:10 / 07:30	Tsunami risk discarded.	Media (radio, TV)
Japan	00:33 (28/02)	18:06 (28/02)	17:33	Tsunami danger had passed.	Fax and online systemto mass media, governmental disaster management organizations, local governments, etc
New Zealand	11:00	19:35 (28/02)	1 day and 08:35	Scientific assessment information: sea level data.	Via the National Warning System to all response and media agencies using email, SMS and fax. Media forwarded this message to the public using TV and radio broadcasts
Nicaragua	9:30	17:30	8:00	The impact time had passed and there was no impact registed in the southern countries.	Media, radio, prensa, TV
Palau	12:30	00:12 (28/02)	11:42	Little or no destructive waves recorded.	NWS office
Peru	7:51	11:05	03:14	Short wave from tidal gauge.	Phone
Russian Federation – Kamchatka TWC Russian	01:22 (28/02)	07:00 (28/02)	05:38	According to supervision, the amplitude did not exceed 0.20 m.	Phone, fax, email
Federation- Sukhalin TWC	00:47 (28/02)	07:33 (28/02)	06:46	Small fluctuations of the sea level.	Telegraph channel, TV, radio, phone
Thailand	06:55	04:57 (28/02)	22:02	There was no effect in Thailand.	SMS, fax, opencare

<u>Table 5.8</u> Time of warning cancellation for those countries that issued warnings (UTC). Time on alert indicates the time between warning issuance and cancellation. See also Figure 5.3.

Country	Time	Response
	On issue of	5 5 5
	Watch 08:45	emergency service managers and federal government
	On issue of	ministers. State emergency services alerted coastal units
Australia	Warning 10:00	State emergency services diented boubtar anno
	From predicted	Surf-Life Saving closed beaches to swimming
	tsunami arrival	
	time – approx 21:00	
	06:50 (27 Feb)	Monitor sea-level readings and tsunami messages
China – Hong Kong	07:21 (27 Feb)	Issue a press release on earthquake
5 5	11:30 (28 Feb)	Issue a press release on conclusion of the event
	From 10:00 and	DGR phone communication with local committees of
	over the day	Emergency Management in the Colombian coast to inform
Colombia		that there was no danger. Press release from the National Institution of Risk
	From 12:00	Management to the press and community, informing the
		absence of danger for Colombia.
Ecuador	8:00	Constant communication with INOCAR
	Over the day	Constant communication with the President of the country.
El Salvador	12:30	National press conference to issue tsunami warning
	13:00	National institutions related to emergency management were contacted (National Police, Navy, Civil Defence, etc).
France- New	16:00	Census of information regarding the distribution of
Caledonia	10.00	messages.
	08:30	Cell crisis established with High Commisionner – Civil Defence.
French Polynesia	09:30 - 10:00	Majors and communes advertised by High Commisionner.
	14:00	Sirens
	Commenced at	MCDEM Duty Team responded to the bulletins as received
	06:55- ongoing	by PTWC and according to our set Standard Operating Procedures.
		Issuing of national advisories and warnings to repose
	Commenced at	agencies and the public via the National Warning System
	07:38 - ongoing	(managed and operated by MCDEM). This began with the
		first PTWC bulletin and finished after the threat having passed for New Zealand.
New Zealand		The National Crisis Management Centre (NCMC) an all-of-
		Government facility providing for the national management
	09:00 (27 Feb) – 19:35 (28 Feb)	of an emergency was activated by MCDEM and used by MCDEM and other national level response agencies for the
	19.00 (201 60)	entirety of the event until stand down following the threat
		having passed for New Zealand.
		Media liaison and issuing of public information took place
	07:38 (27 Feb) – 19:35 (28 Feb)	from the NCMC following the first PTWC Bulletin and up until the issuing of the Cancellation of the National Warning
		at 1935Z (28 Feb).
Nicaragua	07:00	Monitoring of the information received
Inicalagua	17:00	Warning cancellation
Palau	11:30	Alert NEC members
	12:30	Issue public announcement via radio station, TV
Russian Federation-	23:23	National Disaster Management Organization was brought

Country	Time	Response
Kamchatka TWC		into the higher state of readiness.
Russian Federation- Sukhalin TWC	00:47	Dissemination of the tsunami warning
	06:56	Department of Disaster Prevention and Mitigation
Thailand	06:57	Miang Island
	06:58	Navy

Table 5.9 Actions taken by National Disaster Management Organisations

Country	Warning Time	Evacuation Area	Evacuation Time	Number of people evacuated
Australia	09:48	Kingston, Norfolk Island	Aprox. 18:30	200
Chile	Some	people evacuated by own initiative	or by guided by I	ocal authorites.
France- New	15:00	Coastal lines and east coast	N/A	N/A
Caledonia	15:00	Coast lines at Loyaute Islands	N/A	N/A
French Polynesia	14:00	French Polynesia	14:00 - 15:00	Several thousands
Ecuador	07:20	Galapagos Islands	10:55	Around 300,000
		Hokkaido Prefecture	unknown	7,465
		Aomori Prefecture	unknown	3,014
		Iwate Prefecture	unknown	10,117
		Miyagi Prefecture	unknown	12,512
		Fukushima Prefecture	unknown	931
		Ibaraki Prefecture	unknown	768
		Chiba Prefecture	unknown	383
	00:33 (28 Feb)	Kanagawa Prefecture	unknown	355
		Tokyo	unknown	492
lanan		Shizuoka Prefecture	unknown	2,679
Japan		Aichi Prefecture	unknown	104
		Mie Prefecture	unknown	3,460
		Wakayama Prefecture	unknown	442
		Tokushima Prefecture	unknown	229
		Ehime Prefecture	unknown	1,909
		Kochi Prefecture	unknown	3,483
		Oita Prefecture	unknown	374
		Miyazaki Prefecture	unknown	344
		Kagoshima Prefecture	unknown	926
		Okinawa Prefecture	unknown	13,229
		Hawkes Bay (self evacuation)	unknown	unknown
		Gisborne (self evacuation)	unknown	unknown
New Zealand	11:00	Tararua District (self evacuation)	unknown	unknown
		Horowhena District (self evacuation)	unknown	unknown
Peru	7:51	Mollendo Beach	08:50	800
	1.51	ILO city	08:00	2500

Country	Warning Time	Evacuation Area	Evacuation Time	Number of people evacuated
		Severo-Kourilsk,	00:50 - 01:05	100
Russian	00:47	YuzhnoKurilsk	00:50 – 01:05	15
Federation- Sukhalin TWC		Bourevestnik,	00:50 - 01:05	10
		Malo-Kurilsk,	00:50 - 01:05	8
	12:00	Funafuti Coastal Area	12:00-08:00	800
Tuvalu		Vaitupu	12:00-08:00	980
		Nui	12:00-08:00	210

Table 5.10 Evacuations by countries. All times in UTC

Country	Sea Level Station	Monitoring method
	Honiara, Solomon Is	Other (Bureau of Meteorology comms links)
	Luganville, Vanuatu	Other (Bureau of Meteorology comms links)
	Honiara, Solomon IsOther (Bureau of Meter Luganville, VanuatuPort Vila, VanuatuOther (Bureau of Meter Port Vila, VanuatuAvatiu, Cook IsOther (Bureau of Meter Avatiu, Cook IsNuku'alofa, TongaOther (Bureau of Meter Apia, SamoaOther (Bureau of Meter Apia, SamoaOther (Bureau of Meter Bureau of Meter Suva, FijiOther (Bureau of Meter Suva, FijiOther (Bureau of Meter Bureau of Meter Fongfale, TuvaluFongfale, TuvaluOther (Bureau of Meter Betio, KiribatiOther (Bureau of Meter Bureau of Meter Bother (Bureau of Meter Bother (Bureau of Meter Bother (Bureau of Meter Burnie, TasPort Kembla, NSWOther (Bureau of Meter Burnie, TasPort Kembla, NSWOther (Bureau of Meter Southport, TasSouthport, TasOther (Bureau of Meter Bureau of Meter DART 32401, ChileDART 32412 PeruOther (Direct comms to DART 55013 AustraliaOther (Direct comms to DART 55013 AustraliaOther (Direct comms to DART 55013 Australia	Other (Bureau of Meteorology comms links)
		Other (Bureau of Meteorology comms links)
	Nuku'alofa, Tonga	Other (Bureau of Meteorology comms links)
	Apia, Samoa	Other (Bureau of Meteorology comms links)
	Suva, Fiji	Other (Bureau of Meteorology comms links)
	Lautoka, Fiji	Other (Bureau of Meteorology comms links)
	Fongfale, Tuvalu	Other (Bureau of Meteorology comms links)
	Betio, Kiribati	Other (Bureau of Meteorology comms links)
	Aiwo, Nauru	Other (Bureau of Meteorology comms links)
Australia	Uliga, Marshall Is	Other (Bureau of Meteorology comms links)
Australia	Dekehtik, FSM	Other (Bureau of Meteorology comms links)
	Cape Ferguson, Qld	Other (Bureau of Meteorology comms links)
	Rosslyn Bay, Qld	Other (Bureau of Meteorology comms links)
	Port Kembla, NSW	Other (Bureau of Meteorology comms links)
	Burnie, Tas	Other (Bureau of Meteorology comms links)
	Spring Bay, Tas	Other (Bureau of Meteorology comms links)
	Southport, Tas	Other (Bureau of Meteorology comms links)
	Jackson Bay, NZ	Other (Bureau of Meteorology comms links)
	DART 32401, Chile	Other (Direct comms to US DART data server)
	DART 32412 Peru	Other (Direct comms to US DART data server)
	DART 55013 Australia	Other (Direct comms to US DART data server)
	DART 55015 Australia	Other (Direct comms to US DART data server)
	Valparaíso	Other
	San Antonio	Other
	Talcahuano	Other
	Corral	Other
Chile	Juan Fernández	Other
	Coquimbo	Other
	Isla de Pascua	Other
	San Felix	Other

Country	Sea Level Station	Monitoring method
	San Felix CL	IOC Sea Level Monitoring Facility
Colombia	Talcahuano CL	IOC Sea Level Monitoring Facility
	Callao, La Punta Peru	IOC Sea Level Monitoring Facility
	Valparaíso	GTS
	Talcahuano	GTS
Ecuador	Callao	GTS
	San Cristobal	GTS
	Baltra	GTS
	Talcahuano CL	IOC Sea Level Monitoring Facility
	Valparaíso CL	IOC Sea Level Monitoring Facility
El Salvador	DART Peru	IOC Sea Level Monitoring Facility
	DART Marquesas	IOC Sea Level Monitoring Facility
	DART Panama	IOC Sea Level Monitoring Facility
France- New	Sea level station of the	
Caledonia	Hydrographic Service of the	
	National Navy (Ducos)	Other
	32412 DART	IOC Sea Level Monitoring Facility
	52406 DART	IOC Sea Level Monitoring Facility
French Polynesia -	Easter Island	GTS and IOC Sea Level Monitoring Facility
Tahiti	Rikiteae	GTS and IOC Sea Level Monitoring Facility
	Papeete	GTS and IOC Sea Level Monitoring Facility
	Hiva Oa	GTS and IOC Sea Level Monitoring Facility
	Nuku Hiva	GTS and IOC Sea Level Monitoring Facility
	Severo Kurilsk	GTS
	Ust Kamchatsk	GTS
Japan	Adak	GTS
	Dutch Harbour	GTS
	Kodiak	GTS
	Midway Is.	GTS
	Tern, Fr. Frigate	GTS
	Hilo	GTS
	Honolulu	GTS
	Johnston Is.	GTS
	Wake Is.	GTS
	Saipan	GTS
	Pago Pago	GTS
	Quarry Bay	GTS
	Shek Pik	GTS
	Qui Nhon	GTS
	Vung Tau	GTS
	Subic Bay	GTS
	Manila	GTS
	Davao	GTS
	Legaspi	GTS
	Үар	GTS
	Pohnpei	GTS

Country	Sea Level Station	Monitoring method
	Kapingamarangi	GTS
	Malakal	GTS
	Manus	GTS
	Honiara	GTS
	Majuro	GTS
	Nauru	GTS
	Funafuti	GTS
	Port Vila	GTS
	Lautoka	GTS
	Suva	GTS
	Nuku Alofa	GTS
	Jackson Bay	GTS
	Betio	GTS
	Kanton	GTS
	Christmas	GTS
Japan	Apia	GTS
	Penrhyn	GTS
	Rarotonga	GTS
	Rikitea	GTS
	Astoria	GTS
	Monterey	GTS
	Socorro Is.	GTS
	Santa Cruz	GTS
	Callao	GTS
	Iquique	GTS
	Antofagasta	GTS
	Coquimbo	GTS
	Juan Fernández	GTS
	San Antonio	GTS
	Talcahuano	GTS
	Corral	GTS
	Puerto Montt	GTS
	Ancud	GTS
	San Pedro	GTS
	Puerto Williams	GTS
	Easter	GTS
	Port Kembla	GTS
	Spring Bay	GTS
	Hanasaki	Other
	Ofunato	Other
	Omaezaki	Other
	Tosashimizu	Other
	Naha	Other
	Ishigakijima	Other

Country	Sea Level Station	Monitoring method
New Zealand	New Zealand Stations	Other
	South Pacific Stations	IOC Sea Level Monitoring Facility
	32412	GTS
	21413	GTS
Palau	21418	GTS
	55015	GTS
	23401	GTS
	NDBC Station 42407	IOC Sea Level Monitoring Facility
	Tidal Gauge Callo	Other
Peru	Tidal Gauge Matarini	Other
	Tidal Gauge San Juan	Other
	Tidal Gauge Mollendo	Other
	Kahului	GTS and IOC Sea Level Monitoring Facility
Russian Federation –	Alaska Station	Other
Sukhalin TWC	Japan Station	Other
	Russian Stations	Other
Duration Forderation	Vodopadnaya	Other
Russian Federation - Kamchatka	Petropavlovsk-Kamchatski	Other
Ramonatka	Bering's Island	Other
	32412	GTS
	21413	GTS
Thailand	21418	GTS
	55015	GTS
	23401	GTS

Table 5.11 Sea level stations monitored by countries

6. SUMMARY

A series of severe earthquakes hit Central Chile on Saturday, 27th February 2010. The main shock off Concepcion at 06:34 UTC (3:34 AM local time) had a magnitude of 8.8 Mw. The Pacific Tsunami Warning Center PTWC in Hawaii, USA issued a regional warning at 06:46 UTC (12 minutes after the event). This was the first ocean wide scale test of a system that was put in place nearly 50 years ago by UNESCO's Member States through its Intergovernmental Oceanographic Commission (IOC), after a 9.5 magnitude earthquake on May 22, 1960 off Chile triggered a wide ocean tsunami that killed people in Hawaii and in Japan, several hours after the earthquake.

As indicated above, 12 minutes after the 27th February 2010 earthquake the Pacific Ocean Tsunami Warning System (PTWS) went into action, with timely and adequate information produced and disseminated across the Pacific Ocean. However, near the epicenter, official accounts indicate 156 fatalities due to the tsunami. Preliminary measures of a Rapid Survey Team deployed the week after the event by UNESCO showed run up measurements as high as 30 meters with most common measurements between 6 and 10 meters in the most affected area of the central-southern Chilean coast.

This earthquake and tsunami event presented an ideal opportunity to assess the performance of the PTWS. To that end the UNESCO IOC Secretariat for the PTWS sent out a post-event survey questionnaire to the Tsunami Warning Focal Points (TWFPs) and Tsunami National Contacts

(TNCs) from its 32 Member States and territories. This report has been prepared by the Secretariat based on the responses received from 19 TWFPs and TNCs. Factual details of the earthquake event and the tsunami are presented and the results of the survey are listed in tables and displayed as timelines and maps.

It is beyond the scope of this report to conduct a detailed interpretation of the results; however it is expected that the survey results are useful for individual Member States and the PTWS to draw conclusions from this exercise and decide on future action. In this regard, some highlights can be noted:

- From the 19 response, 18 National Tsunami Warning Centres (NTWCs) received the first bulletins from PTWC and or WC/ATWC.
- 16 NTWCs received subsequent tsunami bulletins from PTWC.
- 17 NTWCs received information from other sources other than PTWC and or WC/ATWC.
- 9 Member States and territories took some action before receiving the PTWC and or WC/ATWC bulletin.
- 17 Member States and territories took some action after receiving the PTWC and or WC/ATWC bulletin.
- 14 Member States and territories issued a tsunami warning.
- 3 Member States and territories reported communication problems when issuing the warning.
- In 9 Member States there were areas evacuated.
- 8 Member States forecasted tsunami wave height.
- 15 Member States and territories monitored sea level.
 - o 7 through the World Metorological Organisation (WMO)'s Global Telecommunications Systems (GTS).
 - 7 through the IOC Sea Level Station Monitoring Facility.
 - 8 by other methods.
- 11 undertook their own earthquake analysis.
- 12 NTWCs used numerical models in their analysis.
- 9 Member States affirmed to have knowledge on how to access sea level data through GTS.
- 10 Member States affirmed to have knowledge on how to access sea level data through the IOC Sea Level Station Monitoring Facility website.

We underscore that all NTWCs received the first PTWC bulletin. However, not all NTWCs reported to have received all the PTWC bulletins. In addition, most of the countries reported PTWC as source of awareness of the earthquake. Furthermore, some countries undertook actions before the reception of the PTWC bulletin. Among these actions, it was mentioned: (1) Seismic monitoring; (2) Sea level monitoring; (3) Gathering of especialized personnel.

In addition, as mentioned before, 14 countries issued tsunami a warning. The media (radio, TV and/or press) was used as communication channel by 11 of the Member States and territories for both emission and cancellation of the warning. Three countries reported communication problems (i.e. no answer from the part of the concerned institutions because of holiday; insufficient technical

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capacity to answer public calls – saturation of phone lines; zones that were not covered by the network GSM).

Furthermore, in 9 Member States coastal zones were evacuated. The decision of issuing an evacuation order is based on the estimation of the tsunami travel time, the wave height and the identification of the potentially impacted zones. In this regard, evacuations were carried out where it was considered necessary from a technical point of view. It would be pertinent that each Member State analyse if an evacuation would have been necessary in zones where no evacuation was made. In 4 countries, some areas were evacuated preventively (self-evacuation). Moreover, it was observed that sea level was monitored by most of the countries. Moreover, some countries also used numerical modelling and calculated earthquake parameters.

Based on data and information collected from Member States the PTWS acted promptly and efficiently throughout the Pacific. However, and at the same time, this event demonstrated the need to reinforce the work of PTWS for near field events, particularly with denser sea level real time networks close to active subduction areas. Indeed, as it has been demonstrated by the case of the sea level station in Talcahuano, Chile, sea level stations close to the epicenter may be partially or totally destroyed by the impact of a tsunami. Given the critical role sea level readings play in tsunami warning systems, the sea level monitoring networks should be densified close to active subduction areas.

Most of the issues revealed by the survey can be addressed both by the PTWS and at the national level through increased regional cooperation and training where needed. Post-event assessments assist in this process by highlighting the strengths and weaknesses of the PTWS at regional, national and local levels and by raising the awareness of how Member States responded, both individually and collectively. The true value of such assessments is that it allows Member States to share information and experiences for the mutual benefit of improving the PTWS for all members.

7. REFERENCES

USGS, 2010. United States Geological Survey Earthquake Hazards Program http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010rja6.php

Tsunami Travel Time Software. Geoware tsunami product list, 2007. http://www.geoware-online.com/tsunami.html ANNEX I

PTWC BULLETINS

PTWC MESSAGES – 27 FEBRUARY 2010

TSUNAMI BULLETIN NUMBER 001 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0646Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU

A TSUNAMI WATCH IS IN EFFECT FOR

ECUADOR

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR INFORMATION ONLY AT THIS TIME.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.5

EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN STRIKE COASTLINES NEAR THE EPICENTER WITHIN MINUTES AND MORE DISTANT COASTLINES WITHIN HOURS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL MONITOR SEA LEVEL DATA FROM GAUGES NEAR THE EARTHQUAKE TO DETERMINE IF A TSUNAMI WAS GENERATED AND ESTIMATE THE SEVERITY OF THE THREAT.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
CHILE	TALCAHUANO	36.7S 73.1W	0729Z 27 FEB

	VALPARAÍSO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS	33.0S 71.6W 29.9S 71.3W 39.8S 73.5W 27.1S 70.8W 23.3S 70.4W 20.2S 70.1W 18.5S 70.3W 47.1S 74.9W	0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0844Z 27 FEB 0911Z 27 FEB 0929Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB
PERU	PUERTO MONTT EASTER IS. PUNTA ARENAS MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA	41.5S 73.0W 27.1S 109.4W 53.2S 70.9W 17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W	1052Z 27 FEB 1205Z 27 FEB 1213Z 27 FEB 0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB
ECUADOR	CHIMBOTE LA LIBERTAD ESMERELDAS	4.6S 81.5W 9.0S 78.8W 2.2S 81.2W 1.2N 79.8W	1127Z 27 FEB 1132Z 27 FEB 1202Z 27 FEB 1234Z 27 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 002 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0745Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU

A TSUNAMI WATCH IS IN EFFECT FOR

ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN... IT IS FOR INFORMATION ONLY AT THIS TIME.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.6

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION LAT LON TIME AMPL PER

VALPARAÍSO CL 33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

TALCAHUANO CL 36.7S 73.4W 0652Z 1.15M / 3.8FT 46MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER AND COULD ALSO BE A THREAT TO MORE DISTANT COASTS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
CHILE	TALCAHUANO VALPARAÍSO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT EASTER IS.	36.7S 73.1W 33.0S 71.6W 29.9S 71.3W 39.8S 73.5W 27.1S 70.8W 23.3S 70.4W 20.2S 70.1W 18.5S 70.3W 47.1S 74.9W 41.5S 73.0W 27.1S 109.4W	0729Z 27 FEB 0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0844Z 27 FEB 0911Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB 1052Z 27 FEB 1205Z 27 FEB
PERU	PUNTA ARENAS MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA	53.2S 70.9W 17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W	1213Z 27 FEB 0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB 1127Z 27 FEB
ECUADOR	CHIMBOTE LA LIBERTAD ESMERELDAS BALTRA IS.	9.0S 78.8W 2.2S 81.2W 1.2N 79.8W 0.5S 90.3W	1132Z 27 FEB 1202Z 27 FEB 1234Z 27 FEB 1313Z 27 FEB
COLOMBIA	TUMACO BAHIA SOLANO BUENAVENTURA	1.8N 78.9W 6.3N 77.4W 3.8N 77.2W	1253Z 27 FEB 1253Z 27 FEB 1327Z 27 FEB 1340Z 27 FEB
ANTARCTICA PANAMA	THURSTON IS. PUERTO PINA PUNTA MALA PUNTA BURICA	72.0S 100.0W 7.4N 78.1W 7.5N 79.9W 8.0N 82.8W	1312Z 27 FEB 1331Z 27 FEB 1334Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB
COSTA RICA	CABO MATAPALO	8.4N 83.3W	1344Z 27 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL **IOC Technical Series No 92** Annex I – Page 4

FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 003 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0844Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON... OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU

A TSUNAMI WATCH IS IN EFFECT FOR

ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN ... IT IS FOR INFORMATION ONLY AT THIS TIME.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON TIME	AMPL	PER
CORRAL CL SAN FELIX CL VALPARAÍSO CL TALCAHUANO CL	39.9S 73.4W 0739Z 26.3S 80.1W 0815Z 33.0S 71.6W 0708Z 36.7S 73.4W 0652Z	0.53M / 1.7FT 1.29M / 4.2FT	08MIN 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER AND COULD ALSO BE A THREAT TO MORE DISTANT COASTS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
CHILE	TALCAHUANO	36.7S 73.1W	0729Z 27 FEB
	VALPARAÍSO	33.0S 71.6W	0739Z 27 FEB
	COQUIMBO	29.9S 71.3W	0801Z 27 FEB
	CORRAL	39.8S 73.5W	0810Z 27 FEB
	CALDERA	27.1S 70.8W	0821Z 27 FEB
	ANTOFAGASTA	23.3S 70.4W	0844Z 27 FEB
	IQUIQUE	20.2S 70.1W	0911Z 27 FEB
	ARICA	18.5S 70.3W	0929Z 27 FEB
	GOLFO DE PENAS	47.1S 74.9W	0934Z 27 FEB
	PUERTO MONTT	41.5S 73.0W	1052Z 27 FEB
	EASTER IS.	27.1S 109.4W	1205Z 27 FEB
	PUNTA ARENAS	53.2S 70.9W	1205Z 27 FEB
PERU	PUERTO WILLIAMS MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA	17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W	1404Z 27 FEB 0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB 1127Z 27 FEB
ECUADOR	CHIMBOTE	9.0S 78.8W	1132Z 27 FEB
	LA LIBERTAD	2.2S 81.2W	1202Z 27 FEB
	ESMERELDAS	1.2N 79.8W	1234Z 27 FEB
	BALTRA IS.	0.5S 90.3W	1313Z 27 FEB
COLOMBIA	TUMACO	1.8N 78.9W	1253Z 27 FEB
	BAHIA SOLANO	6.3N 77.4W	1327Z 27 FEB
	BUENAVENTURA	3.8N 77.2W	1340Z 27 FEB
ANTARCTICA PANAMA	THURSTON IS. PUERTO PINA PUNTA MALA PUNTA BURICA	72.0S 100.0W 7.4N 78.1W 7.5N 79.9W 8.0N 82.8W	1312Z 27 FEB 1331Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB
COSTA RICA	CABO MATAPALO	8.4N 83.3W	1344Z 27 FEB
	PUERTO QUEPOS	9.4N 84.2W	1417Z 27 FEB

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 004 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0947Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR

A TSUNAMI WATCH IS IN EFFECT FOR

COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA

FOR ALL OTHER AREAS COVERED BY THIS BULLETIN ... IT IS FOR INFORMATION ONLY AT THIS TIME.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON	TIME	AMPL	PER
CALDERA CL	27.1S 70.8W	0843Z	0.45M / 1.5FT	20MIN
ANTOFAGASTA CL	23.2S 70.4W	0832Z	0.40M / 1.3FT	58MIN
TALCAHUANO CL	36.7S 73.4W	0653Z	2.34M / 7.7FT	88MIN
COQUIMBO CL	30.0S 71.3W	0852Z	1.32M / 4.3FT	30MIN
CORRAL CL	39.9S 73.4W	0739Z	0.90M / 2.9FT	16MIN
SAN FELIX CL	26.3S 80.1W	0815Z	0.53M / 1.7FT	08MIN
VALPARAÍSO CL	33.0S 71.6W	0708Z	1.29M / 4.2FT	20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)

AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER AND COULD ALSO BE A THREAT TO MORE DISTANT COASTS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
CHILE	TALCAHUANO VALPARAÍSO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT EASTER IS.	36.7S 73.1W 33.0S 71.6W 29.9S 71.3W 39.8S 73.5W 27.1S 70.8W 23.3S 70.4W 20.2S 70.1W 18.5S 70.3W 47.1S 74.9W 41.5S 73.0W 27.1S 109.4W	0729Z 27 FEB 0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0844Z 27 FEB 0911Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB 1052Z 27 FEB 1205Z 27 FEB 1205Z 27 FEB
PERU	PUNTA ARENAS PUERTO WILLIAMS MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA	53.2S 70.9W 54.8S 68.2W 17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W	1404Z 27 FEB 0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB 1127Z 27 FEB
ECUADOR	CHIMBOTE LA LIBERTAD ESMERELDAS BALTRA IS.	9.0S 78.8W 2.2S 81.2W 1.2N 79.8W 0.5S 90.3W	1132Z 27 FEB 1202Z 27 FEB 1234Z 27 FEB 1313Z 27 FEB
COLOMBIA	TUMACO BAHIA SOLANO BUENAVENTURA	0.33 90.3W 1.8N 78.9W 6.3N 77.4W 3.8N 77.2W	1253Z 27 FEB 1253Z 27 FEB 1327Z 27 FEB 1340Z 27 FEB
ANTARCTICA PANAMA		72.0S 100.0W 7.4N 78.1W 7.5N 79.9W 8.0N 82.8W 9.0N 79.6W	1312Z 27 FEB 1331Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB 1457Z 27 FEB
COSTA RICA	CABO MATAPALO PUERTO QUEPOS CABO SAN ELENA	8.4N 83.3W 9.4N 84.2W	1344Z 27 FEB 1417Z 27 FEB 1452Z 27 FEB
NICARAGUA	SAN JUAN DL SUF PUERTO SANDINO CORINTO	R 11.2N 85.9W	1452Z 27 FEB 1512Z 27 FEB 1520Z 27 FEB
PITCAIRN HONDURAS EL SALVADOF GUATEMALA FR. POLYNES	PITCAIRN IS. AMAPALA R ACAJUTLA SIPICATE	25.1S 130.1W 13.2N 87.6W 13.6N 89.8W 13.9N 91.2W 23.1S 135.0W	1455Z 27 FEB 1520Z 27 FEB 1520Z 27 FEB 1531Z 27 FEB 1539Z 27 FEB 1542Z 27 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 005 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1045Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / **IOC Technical Series No 92** Annex I – Page 8

GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST - 55 KM DEPTH LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON TIME	AMPL	PER
IQUIQUE CL ANTOFAGASTA CL ARICA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	20.2S 70.1W 0906Z 23.2S 70.4W 0941Z 18.5S 70.3W 1007Z 18.0S 86.4W 0941Z 27.1S 70.8W 0843Z 36.7S 73.4W 0653Z 30.0S 71.3W 0852Z 39.9S 73.4W 0739Z 26.3S 80.1W 0815Z 33.0S 71.6W 0708Z	0.49M / 1.6FT 0.94M / 3.1FT 0.24M / 0.8FT 0.45M / 1.5FT 2.34M / 7.7FT 1.32M / 4.3FT 0.90M / 2.9FT 0.53M / 1.7FT	52MIN 44MIN 36MIN 20MIN 88MIN 30MIN 16MIN 08MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

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LOCATION	FORECAST POINT		
CHILE	TALCAHUANO VALPARAÍSO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT EASTER IS. PUNTA ARENAS PUERTO WILLIAMS	36.7S 73.1W 33.0S 71.6W 29.9S 71.3W 39.8S 73.5W 27.1S 70.8W 23.3S 70.4W 20.2S 70.1W 18.5S 70.3W 47.1S 74.9W 41.5S 73.0W 27.1S 109.4W 53.2S 70.9W 54.8S 68.2W	0729Z 27 FEB 0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB 1052Z 27 FEB 1205Z 27 FEB 1205Z 27 FEB 1205Z 27 FEB 1404Z 27 FEB 1404Z 27 FEB 1404Z 27 FEB 114Z 27 FEB 1127Z 27 FEB 1234Z 27 FEB 1327Z 27 FEB 1327Z 27 FEB 1327Z 27 FEB 1327Z 27 FEB 1340Z 27 FEB 1350Z 27 FEB 1452Z 27 FEB 1452Z 27 FEB 1520Z 27 FEB
PERU	MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA CHIMBOTE	17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W 9.0S 78.8W	0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB 1127Z 27 FEB 1132Z 27 FEB
ECUADOR	LA LIBERTAD ESMERELDAS BALTRA IS	2.2S 81.2W 1.2N 79.8W 0.5S 90.3W	12022 27 FEB 1234Z 27 FEB 1313Z 27 FEB
COLOMBIA	TUMACO BAHIA SOLANO BUENAVENTURA	1.8N 78.9W 6.3N 77.4W 3.8N 77.2W	1253Z 27 FEB 1327Z 27 FEB 1340Z 27 FEB
ANTARCTICA	THURSTON IS.	72.0S 100.0W	1312Z 27 FEB 1650Z 27 FEB
PANAMA	PUERTO PINA PUNTA MALA PUNTA BURICA BALBOA HTS	7.4N 78.1W 7.5N 79.9W 8.0N 82.8W	1331Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB 140Z 27 FEB
COSTA RICA	CABO MATAPALO PUERTO QUEPOS CABO SAN ELENA	8.4N 83.3W 9.4N 84.2W	1344Z 27 FEB 1417Z 27 FEB 1452Z 27 FEB
NICARAGUA	SAN JUAN DL SUR PUERTO SANDINO CORINTO	11.2N 85.9W 12.2N 86.8W 12.5N 87.2W	1452Z 27 FEB 1512Z 27 FEB 1512Z 27 FEB 1520Z 27 FEB
PITCAIRN HONDURAS EL SALVADOF GUATEMALA FR. POLYNES	PITCAIRN IS. AMAPALA R ACAJUTLA SIPICATE IA RIKITEA HIVA OA PAPEETE	25.1S 130.1W 13.2N 87.6W 13.6N 89.8W 13.9N 91.2W 23.1S 135.0W 10.0S 139.0W 17.5S 149.6W	1455Z 27 FEB 1520Z 27 FEB 1531Z 27 FEB 1539Z 27 FEB 1542Z 27 FEB 1723Z 27 FEB 1748Z 27 FEB
MEXICO	ACAPULCO MANZANILLO SOCORRO CABO SAN LUCAS MAZATLAN PUNTA ABREOJOS	14.8N 92.5W 16.9N 99.9W 19.1N 104.3W 18.8N 111.0W 22.8N 110.0W 23.2N 106.4W 26.7N 113.6W	15522 27 FEB 1615Z 27 FEB 1709Z 27 FEB 1719Z 27 FEB 1749Z 27 FEB 1753Z 27 FEB 1856Z 27 FEB
COOK ISLANE	ENSENADA DS RAROTONGA PENRYN IS. PUKAPUKA IS.	31.8N 116.8W 21.2S 159.8W 8.9S 157.8W 10.8S 165.9W	2016Z 27 FEB 1814Z 27 FEB 1925Z 27 FEB 1950Z 27 FEB
KIRIBATI	FLINT IS. MALDEN IS. CHRISTMAS IS.	11.4S 151.8W 3.9S 154.9W 2.0N 157.5W	1836Z 27 FEB 1934Z 27 FEB 2028Z 27 FEB

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KERMADEC IS NIUE NEW ZEALAN	NIUE IS. D EAST CAPE GISBORNE DUNEDIN NAPIER WELLINGTON MILFORD SOUND NORTH CAPE BLUFF LYTTELTON AUCKLAND(E) NELSON WESTPORT AUCKLAND(W)	34.4S 173.3E 46.6S 168.3E 43.6S 172.7E 36.7S 175.0E 41.3S 173.3E 41.8S 171.6E 37.1S 174.2E	2112Z 27 FEB 2258Z 27 FEB 1912Z 27 FEB 1918Z 27 FEB 1918Z 27 FEB 1922Z 27 FEB 1952Z 27 FEB 1954Z 27 FEB 2005Z 27 FEB 2010Z 27 FEB 2030Z 27 FEB 2030Z 27 FEB 2056Z 27 FEB 2056Z 27 FEB 2127Z 27 FEB 2129Z 27 FEB 2140Z 27 FEB
	NEW PLYMÓUTH	39.1S 174.1E	2219Z 27 FEB
	NUKUALOFA	21.0S 175.2W	1940Z 27 FEB
	AMOA PAGO PAGO	14.3S 170.7W	1951Z 27 FEB
SAMOA JARVIS IS.	APIA JARVIS IS.	13.8S 171.8W	2006Z 27 FEB
WALLIS-FUTL	JNA WALLIS IS.	0.4S 160.1W 13.2S 176.2W	2026Z 27 FEB 2028Z 27 FEB
TOKELAU	SUVA	9.2S 171.8W	2030Z 27 FEB
FIJI		18.1S 178.4E	2104Z 27 FEB
AUSTRALIA	HOBART	43.3S 147.6E	2105Z 27 FEB
	SYDNEY	33.9S 151.4E	2146Z 27 FEB
	BRISBANE	27.2S 153.3E	2310Z 27 FEB
	GLADSTONE	23.8S 151.4E	0101Z 28 FEB
	CAIRNS	16.7S 145.8E	0159Z 28 FEB
	MACKAY	21.1S 149.3E	0251Z 28 FEB
HAWAII	HILO	19.7N 155.1W	2119Z 27 FEB
	HONOLULU	21.3N 157.9W	2152Z 27 FEB
	NAWILIWILI	22.0N 159.4W	2158Z 27 FEB
TUVALU	PALMYRA IS.	6.3N 162.4W	2124Z 27 FEB
	FUNAFUTI IS.	7.9S 178.5E	2125Z 27 FEB
ESF	ANATOM IS.	20.2S 169.9E	2137Z 27 FEB
	PERITU SANTO	15.1S 167.3E	2235Z 27 FEB
NEW CALEDO	AKER HOWLAND IS. DNIA NOUMEA	22.3S 166.5E	2154Z 27 FEB 2218Z 27 FEB
JOHNSTON IS	6. JOHNSTON IS.	16.7N 169.5W	2245Z 27 FEB
	. KIRAKIRA	10.4S 161.9E	2321Z 27 FEB
	MUNDA	8.4S 157.2E	0001Z 28 FEB
	GHATERE	7.8S 159.2E	0001Z 28 FEB
	AUKI	8.8S 160.6E	0004Z 28 FEB
	HONIARA	9.3S 160.0E	0004Z 28 FEB
	FALAMAE	7.4S 155.6E	0017Z 28 FEB
	PANGGOE	6.9S 157.2E	0020Z 28 FEB
	NAURU	0.5S 166.9E	2331Z 27 FEB
MARSHALL IS	KWAJALEIN	7.1N 171.4E 8.7N 167.7E	2339Z 27 FEB 0013Z 28 FEB
MIDWAY IS.	ENIWETOK	11.4N 162.3E	0102Z 28 FEB
	MIDWAY IS.	28.2N 177.4W	0022Z 28 FEB
KOSRAE	KOSRAE IS.	5.5N 163.0E	0026Z 28 FEB
PAPUA NEW (GUINE_AMUN	6.0S 154.7E	0036Z 28 FEB
	KIETA	6.1S 155.6E	0038Z 28 FEB
	RABAUL	4.2S 152.3E	0102Z 28 FEB
	PORT MORESBY	9.3S 146.9E 6.8S 147.0E	0123Z 28 FEB 0128Z 28 FEB
	KAVIENG	2.5S 150.7E	0135Z 28 FEB
	MADANG	5.2S 145.8E	0154Z 28 FEB
	MANUS IS.	2.0S 147.5E	0214Z 28 FEB
	WEWAK	3.5S 143.6E	0237Z 28 FEB
POHNPEI	VANIMO	2.6S 141.3E	0258Z 28 FEB
	POHNPEI IS.	7.0N 158.2E	0111Z 28 FEB
WAKE IS.	WAKE IS.	19.3N 166.6E	0112Z 28 FEB
CHUUK	CHUUK IS.	7.4N 151.8E	0213Z 28 FEB

RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK	54.7N 167.4E 56.1N 162.6E K 53.2N 159.6E	0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB
MARCUS IS. INDONESIA	URUP IS SEVERO KURILSK	46.1N 150.5E 50.8N 156.1E 24.3N 154.0E 2.4S 140.8E 0.6S 135.8E	03332 20 FEB 0354Z 28 FEB 0410Z 28 FEB 0248Z 28 FEB 0302Z 28 FEB 0345Z 28 FEB
	MANOKWARI SORONG	0.8S 134.2E 0.8S 131.1E	0405Z 28 FEB 0433Z 28 FEB
	BEREBERE PATANI GEME	2.5N 128.7E 0.4N 128.8E 4.6N 126.8E	0452Z 28 FEB 0505Z 28 FEB 0512Z 28 FEB
N. MARIANAS GUAM		15.3N 145.8E 13.4N 144.7E	0303Z 28 FEB 0311Z 28 FEB
YAP	YAP IS.	9.5N 138.1E	0352Z 28 FEB
BELAU JAPAN	MALAKAL KUSHIRO	7.3N 134.5E 42.9N 144.3E	0413Z 28 FEB 0435Z 28 FEB
0/11/11	KATSUURA	35.1N 140.3E	0453Z 28 FEB
	HACHINOHE	40.5N 141.5E	0509Z 28 FEB
	SHIMIZU OKINAWA	32.8N 133.0E 26.2N 127.8E	0557Z 28 FEB 0610Z 28 FEB
PHILIPPINES	DAVAO	6.8N 125.7E	0527Z 28 FEB
	PALANAN	17.1N 122.6E	0559Z 28 FEB
CHINESE TAI	LEGASPI PEI HUALIEN HUALIEN	13.2N 123.8E 24.0N 121.6E 24.0N 121.7E	0604Z 28 FEB 0626Z 28 FEB 0626Z 28 FEB
	CHILUNG	25.2N 121.8E	0654Z 28 FEB
	TAITUNG	22.7N 121.2E	0655Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 006 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1147Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

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ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON TIME	AMPL PER
ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	18.0S 86.4W 0941Z 27.1S 70.8W 0843Z 36.7S 73.4W 0653Z 30.0S 71.3W 0852Z 39.9S 73.4W 0739Z 26.3S 80.1W 0815Z	0.36M / 1.2FT 30MIN 0.94M / 3.1FT 42MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 007 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS **ISSUED AT 1249Z 27 FEB 2010**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON TIME	AMPL PER
EASTER CL ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	12.1\$ 77.2W 1029Z 18.5\$ 70.3W 1008Z 20.2\$ 70.1W 0907Z 23.2\$ 70.4W 0941Z 18.0\$ 86.4W 0941Z 27.1\$ 70.8W 0843Z 36.7\$ 73.4W 0653Z 30.0\$ 71.3W 0852Z 39.9\$ 73.4W 0739Z 26.3\$ 80.1W 0815Z	0.62M / 2.0FT 84MIN 0.36M / 1.2FT 30MIN 0.94M / 3.1FT 42MIN 0.28M / 0.9FT 68MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.

IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT

VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT)

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE

APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

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ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
CHILE	TALCAHUANO VALPARAISO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT EASTER IS. PUNTA ARENAS PUERTO WILLIAMS	41.5S 73.0W 27.1S 109.4W 53.2S 70.9W	0729Z 27 FEB 0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0844Z 27 FEB 0911Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB 1052Z 27 FEB 1205Z 27 FEB 1205Z 27 FEB 1205Z 27 FEB
PERU	MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA CHIMBOTE	17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W 9.0S 78.8W	0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 114Z 27 FEB 1127Z 27 FEB 1127Z 27 FEB 1132Z 27 FEB
ECUADOR	LA LIBERTAD ESMERELDAS BALTRA IS.	2.2S 81.2W 1.2N 79.8W 0.5S 90.3W	1202Z 27 FEB 1234Z 27 FEB 1313Z 27 FEB
COLOMBIA	TUMACO BAHIA SOLANO BUENAVENTURA	1.8N 78.9W 6.3N 77.4W 3.8N 77.2W	1253Z 27 FEB 1327Z 27 FEB 1340Z 27 FEB
ANTARCTICA		72.0S 100.0W 71.0S 170.0E	1312Z 27 FEB 1650Z 27 FEB
PANAMA	PUERTO PINA PUNTA MALA PUNTA BURICA BALBOA HTS.	7.4N 78.1W 7.5N 79.9W 8.0N 82.8W 9.0N 79.6W	1331Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB
COSTA RICA	CABO MATAPALO PUERTO QUEPOS CABO SAN ELENA	8.4N 83.3W 9.4N 84.2W 10.9N 86.0W	1457Z 27 FEB 1344Z 27 FEB 1417Z 27 FEB 1452Z 27 FEB
NICARAGUA	SAN JUAN DL SUR PUERTO SANDINO CORINTO	11.2N 85.9W 12.2N 86.8W 12.5N 87.2W	1452Z 27 FEB 1512Z 27 FEB 1520Z 27 FEB
PITCAIRN HONDURAS EL SALVADOF GUATEMALA	PITCAIRN IS. AMAPALA	25.1S 130.1W 13.2N 87.6W 13.6N 89.8W 13.9N 91.2W	1455Z 27 FEB 1520Z 27 FEB 1531Z 27 FEB 1531Z 27 FEB 1539Z 27 FEB

FR. POLYNESIA RIKITEA	23.1S 135.0W	1542Z 27 FEB
HIVA OA	10.0S 139.0W	1723Z 27 FEB
PAPEETE	17.5S 149.6W	1748Z 27 FEB
MEXICO PUERTO MADERO	14.8N 92.5W	1552Z 27 FEB
ACAPULCO	16.9N 99.9W	1615Z 27 FEB
SOCORRO	19.1N 104.3W 18.8N 111.0W	1709Z 27 FEB 1719Z 27 FEB
CABO SAN LUCAS	22.8N 110.0W	1749Z 27 FEB
MAZATLAN	23.2N 106.4W	1753Z 27 FEB
PUNTA ABREOJOS ENSENADA	31.8N 116.8W	1856Z 27 FEB 2016Z 27 FEB
COOK ISLANDS RAROTONGA	21.2S 159.8W	1814Z 27 FEB
PENRYN IS.	8.9S 157.8W	1925Z 27 FEB
PUKAPUKA IS.	10.8S 165.9W	1950Z 27 FEB
KIRIBATI FLINT IS.	11.4S 151.8W	1836Z 27 FEB
MALDEN IS.	3.9S 154.9W	1934Z 27 FEB
CHRISTMAS IS.	2.0N 157.5W	2028Z 27 FEB
		2112Z 27 FEB
	2.8S 171.7W 1.5N 173.0E 29.2S 177.9W	2258Z 27 FEB 1912Z 27 FEB
NIUE NIUE IS.	19.0S 170.0W	1918Z 27 FEB
NEW ZEALAND_EAST_CAPE	37.7S 178.5E	1918Z 27 FEB
GISBORNE	38.7S 178.0E	1922Z 27 FEB
DUNEDIN	45.9S 170.5E	1952Z 27 FEB
NAPIER	39.5S 176.9E	1954Z 27 FEB
WELLINGTON	41.3S 174.8E	1955Z 27 FEB
MILFORD SOUND	44.6S 167.9E	2005Z 27 FEB
NORTH CAPE	34.4S 173.3E	2010Z 27 FEB
BLUFF	46.6S 168.3E	2030Z 27 FEB
LYTTELTON	43.6S 172.7E	2040Z 27 FEB
AUCKLAND(E)	36.7S 175.0E	2056Z 27 FEB
NELSON	41.3S 173.3E	2127Z 27 FEB
WESTPORT	41.8S 171.6E 37.1S 174.2E	2129Z 27 FEB 2140Z 27 FEB
AUCKLAND(W) NEW PLYMOUTH	39.1S 174.1E	2219Z 27 FEB
TONGA NUKUALOFA	21.0S 175.2W	1940Z 27 FEB
AMERICAN SAMOA PAGO PAGO	14.3S 170.7W	1951Z 27 FEB
SAMOA APIA	13.8S 171.8W	2006Z 27 FEB
JARVIS IS. JARVIS IS.	0.4S 160.1W	2026Z 27 FEB
WALLIS-FUTUNA WALLIS IS.	13.2S 176.2W	2028Z 27 FEB
TOKELAU NUKUNONU IS.	9.2S 171.8W	2030Z 27 FEB
FIJI SUVA	18.1S 178.4E	2104Z 27 FEB
AUSTRALIA HOBART	43.3S 147.6E	2105Z 27 FEB
SYDNEY	33.9S 151.4E	2146Z 27 FEB
BRISBANE	27.2S 153.3E	2310Z 27 FEB
GLADSTONE	23.8S 151.4E	0101Z 28 FEB
CAIRNS	16.7S 145.8E	0159Z 28 FEB
MACKAY	21.1S 149.3E	0251Z 28 FEB
HAWAII HILO	19.7N 155.1W	2119Z 27 FEB
HONOLULU	21.3N 157.9W	2152Z 27 FEB
NAWILIWILI	22.0N 159.4W	2158Z 27 FEB
PALMYRA IS. PALMYRA IS.	6.3N 162.4W	2124Z 27 FEB
TUVALU FUNAFUTI IS.	7.9S 178.5E	2125Z 27 FEB
VANUATU ANATOM IS.	20.2S 169.9E	2137Z 27 FEB
ESPERITU SANTO	15.1S 167.3E	2235Z 27 FEB
HOWLAND-BAKER HOWLAND IS.	0.6N 176.6W	2154Z 27 FEB
NEW CALEDONIA NOUMEA	22.3S 166.5E	2218Z 27 FEB
JOHNSTON IS. JOHNSTON IS.	16.7N 169.5W	2245Z 27 FEB
SOLOMON IS. KIRAKIRA	10.4S 161.9E	2321Z 27 FEB
MUNDA	.4S 157.2E	0001Z 28 FEB
GHATERE	7.8S 159.2E	0001Z 28 FEB
AUKI	8.8S 160.6E	0004Z 28 FEB
HONIARA	9.3S 160.0E	0004Z 28 FEB
FALAMAE	7.4S 155.6E	0017Z 28 FEB
PANGGOE	6.9S 157.2E	0020Z 28 FEB
NAURU NAURU	0.5S 166.9E	2331Z 27 FEB
MARSHALL IS. MAJURO	7.1N 171.4E	2339Z 27 FEB

MIDWAY IS. KOSRAE PAPUA NEW (KIETA RABAUL PORT MORESBY LAE KAVIENG	8.7N 167.7E 11.4N 162.3E 28.2N 177.4W 5.5N 163.0E 6.0S 154.7E 6.1S 155.6E 4.2S 152.3E 9.3S 146.9E 6.8S 147.0E 2.5S 150.7E	0013Z 28 FEB 0102Z 28 FEB 0022Z 28 FEB 0026Z 28 FEB 0036Z 28 FEB 0038Z 28 FEB 0102Z 28 FEB 0123Z 28 FEB 0123Z 28 FEB 0128Z 28 FEB 0135Z 28 FEB
POHNPEI WAKE IS. CHUUK RUSSIA	MADANG MANUS IS. WEWAK VANIMO POHNPEI IS. WAKE IS. CHUUK IS. MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS	5.2S 145.8E 2.0S 147.5E 3.5S 143.6E 2.6S 141.3E 7.0N 158.2E 19.3N 166.6E 7.4N 151.8E 54.7N 167.4E 56.1N 162.6E 53.2N 159.6E 46.1N 150.5E	0154Z 28 FEB 0214Z 28 FEB 0237Z 28 FEB 0258Z 28 FEB 0111Z 28 FEB 0213Z 28 FEB 0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB 0354Z 28 FEB
MARCUS IS. INDONESIA	SEVERO KURILSK MARCUS IS. JAYAPURA WARSA MANOKWARI SORONG BEREBERE PATANI	50.8N 156.1E 24.3N 154.0E 2.4S 140.8E 0.6S 135.8E 0.8S 134.2E 0.8S 131.1E 2.5N 128.7E 0.4N 128.8E	0410Z 28 FEB 0248Z 28 FEB 0302Z 28 FEB 0345Z 28 FEB 0405Z 28 FEB 0433Z 28 FEB 0452Z 28 FEB 0452Z 28 FEB 0505Z 28 FEB
n. Marianas Guam Yap Belau Japan	GUAM YAP IS. MALAKAL KUSHIRO KATSUURA HACHINOHE SHIMIZU	4.6N 126.8E 15.3N 145.8E 13.4N 144.7E 9.5N 138.1E 7.3N 134.5E 42.9N 144.3E 35.1N 140.3E 40.5N 141.5E 32.8N 133.0E	0512Z 28 FEB 0303Z 28 FEB 0311Z 28 FEB 0352Z 28 FEB 0413Z 28 FEB 0435Z 28 FEB 0453Z 28 FEB 0453Z 28 FEB 0509Z 28 FEB 0557Z 28 FEB
PHILIPPINES CHINESE TAIF	OKINAWA DAVAO PALANAN LEGASPI PEI HUALIEN HUALIEN CHILUNG TAITUNG	26.2N 127.8E 6.8N 125.7E 17.1N 122.6E 13.2N 123.8E 24.0N 121.6E 24.0N 121.7E 25.2N 121.8E 22.7N 121.2E	0610Z 28 FEB 0527Z 28 FEB 0559Z 28 FEB 0604Z 28 FEB 0626Z 28 FEB 0626Z 28 FEB 0654Z 28 FEB 0655Z 28 FEB

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TSUNAMI BULLETIN NUMBER 008 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1346Z 27 FEB 2010

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... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA /

COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
EASTER CL ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	41.9S 12.1S 18.5S 20.2S 23.2S 18.0S 27.1S 36.7S 30.0S 39.9S 26.3S	73.8W 77.2W 70.3W 70.1W 70.4W 86.4W 70.8W 73.4W 73.4W 73.4W 80.1W	0838Z 1029Z 1008Z 0907Z 0941Z 0941Z 0843Z 0653Z 0852Z 0739Z 0815Z	0.62M / 0.36M / 0.94M / 0.28M / 0.49M / 0.24M / 0.45M / 2.34M / 1.32M / 0.90M / 0.53M /	1.1FT 52MIN 2.0FT 84MIN 1.2FT 30MIN 3.1FT 42MIN 0.9FT 68MIN 1.6FT 52MIN 0.8FT 36MIN 1.5FT 20MIN 7.7FT 88MIN 4.3FT 30MIN 2.9FT 16MIN 1.7FT 08MIN 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

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EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

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ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
QUEPOS CR BALTRA GALAPAGS EC EASTER CL ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL	0.4S 9 27.2S 41.9S 12.1S 18.5S 20.2S 23.2S 18.0S 27.1S 36.7S 30.0S	0.3W 109.5W 73.8W 77.2W 70.3W 70.1W 70.4W 86.4W 70.8W 73.4W 71.3W	1313Z 0838Z 1029Z 1008Z 0907Z 0941Z 0941Z 0843Z 0653Z 0852Z		36MIN 52MIN 84MIN 30MIN 42MIN 68MIN 52MIN 36MIN 20MIN 88MIN 30MIN
SAN FELIX CL	26.3S	80.1W	0815Z	0.53M / 1.7FT	08MIN
VALPARAÍSO CL 33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

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TSUNAMI BULLETIN NUMBER 010 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1545Z 27 FEB 2010

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MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT LON TIME AMPL	PER
QUEPOS CR	0.0N 9.4E 1416Z 0.24M / 0.8FT	52MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT	14MIN
DART MARQUESAS	5140 8.5S 125.0W 1519Z 0.28M / 0.9FT	48MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT	52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT	84MIN
CALLAO LA-PUNTA PE	12.1S 77.2W 1029Z 0.36M / 1.2FT	30MIN
ARICA CL	18.5S 70.3W 1008Z 0.94M / 3.1FT	42MIN
IQUIQUE CL	20.2S 70.1W 0907Z 0.28M / 0.9FT	68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z 0.49M / 1.6FT	52MIN
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT	20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT	88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT	30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT	16MIN
SAN FELIX CL	26.3S 80.1W 0815Z 0.53M / 1.7FT	08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT	20MIN

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ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION FORECAST POINT COORDINATES ARRIVAL TIME

CHILE	TALCAHUANO VALPARAÍSO COQUIMBO CORRAL CALDERA ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT FASTER IS	36.7S 73.1W 33.0S 71.6W 29.9S 71.3W 39.8S 73.5W 27.1S 70.8W 23.3S 70.4W 20.2S 70.1W 18.5S 70.3W 47.1S 74.9W 41.5S 73.0W 27 1S 109 4W	0729Z 27 FEB 0739Z 27 FEB 0801Z 27 FEB 0810Z 27 FEB 0821Z 27 FEB 0844Z 27 FEB 0911Z 27 FEB 0929Z 27 FEB 0934Z 27 FEB 1052Z 27 FEB 1205Z 27 FEB
PERU	ANTOFAGASTA IQUIQUE ARICA GOLFO DE PENAS PUERTO MONTT EASTER IS. PUNTA ARENAS PUERTO WILLIAMS MOLLENDO SAN JUAN LA PUNTA PIMENTAL TALARA CHIMBOTE LA LIBERTAD ESMERELDAS BALTRA IS. TUMACO BAHIA SOLANO BUENAVENTURA THURSTON IS. CAPE ADARE PUERTO PINA PUNTA MALA PUNTA BURICA BALBOA HTS. CABO MATAPALO PUERTO QUEPOS CABO SAN ELENA SAN JUAN DL SUR PUERTO SANDINO CORINTO PITCAIRN IS. AMAPALA ACAJUTLA SIPICATE RIKITEA HIVA OA PAPEETE PUERTO MADERO ACAPULCO MANTAPALO	53.2S 70.9W 54.8S 68.2W 17.1S 72.0W 15.3S 75.2W 12.1S 77.2W 6.9S 80.0W 4.6S 81.5W	1213Z 27 FEB 1404Z 27 FEB 0936Z 27 FEB 0952Z 27 FEB 1045Z 27 FEB 1114Z 27 FEB 1114Z 27 FEB
ECUADOR	LA LIBERTAD ESMERELDAS	9.05 78.8W 2.2S 81.2W 1.2N 79.8W	1202Z 27 FEB 1202Z 27 FEB 1234Z 27 FEB 1313Z 27 FEB
COLOMBIA	TUMACO BAHIA SOLANO	0.33 90.3W 1.8N 78.9W 6.3N 77.4W	1253Z 27 FEB 1257Z 27 FEB 127Z 27 FEB
ANTARCTICA	THURSTON IS.	72.0S 100.0W	1340Z 27 FEB
Panama I	CAPE ADARE PUERTO PINA PUNTA MALA PUNTA BURICA	71.0S 170.0E 7.4N 78.1W 7.5N 79.9W 8.0N 82.8W	1650Z 27 FEB 1331Z 27 FEB 1334Z 27 FEB 1340Z 27 FEB
COSTA RICA	CABO MATAPALO PUERTO QUEPOS	9.0N 79.6W 8.4N 83.3W 9.4N 84.2W	1457Z 27 FEB 1344Z 27 FEB 1417Z 27 FEB 1452Z 27 FEB
NICARAGUA	SAN JUAN DL SUR PUERTO SANDINO COPINTO	10.9N 80.0W 11.2N 85.9W 12.2N 86.8W	1452Z 27 FEB 1452Z 27 FEB 1512Z 27 FEB 1520Z 27 FEB
PITCAIRN HONDURAS EL SALVADOR GUATEMALA FR. POLYNESIA	PITCAIRN IS. AMAPALA ACAJUTLA SIPICATE RIKITEA HIVA OA PAPEETE	25.1S 130.1W 13.2N 87.6W 13.6N 89.8W 13.9N 91.2W 23.1S 135.0W 10.0S 139.0W 17.5S 149.6W	1455Z 27 FEB 1520Z 27 FEB 1531Z 27 FEB 1539Z 27 FEB 1542Z 27 FEB 1723Z 27 FEB 1748Z 27 FEB
MEXICO	PUERTO MADERO ACAPULCO MANZANILLO SOCORRO CABO SAN LUCAS PUNTA ABREOJOS ENSENADA	14.8N 92.5W 16.9N 99.9W 19.1N 104.3W 18.8N 111.0W 22.8N 110.0W 26.7N 113.6W 31.8N 116.8W	1552Z 27 FEB 1615Z 27 FEB 1709Z 27 FEB 1719Z 27 FEB 1749Z 27 FEB 1856Z 27 FEB 2016Z 27 FEB
COOK ISLANDS		21.2S 159.8W 8.9S 157.8W 10.8S 165.9W	1814Z 27 FEB 1925Z 27 FEB 1950Z 27 FEB
KIRIBATI	FLINT IS. MALDEN IS. CHRISTMAS IS. KANTON IS.	11.4S 151.8W 3.9S 154.9W 2.0N 157.5W 2.8S 171.7W	1836Z 27 FEB 1934Z 27 FEB 2028Z 27 FEB 2112Z 27 FEB
KERMADEC IS NIUE NEW ZEALAND	TARAWA IS. RAOUL IS. NIUE IS. EAST CAPE GISBORNE DUNEDIN NAPIER WELLINGTON MILFORD SOUND	1.5N 173.0E 29.2S 177.9W 19.0S 170.0W 37.7S 178.5E 38.7S 178.0E 45.9S 170.5E 39.5S 176.9E 41.3S 174.8E 44.6S 167.9E	2258Z 27 FEB 1912Z 27 FEB 1918Z 27 FEB 1918Z 27 FEB 1922Z 27 FEB 1952Z 27 FEB 1954Z 27 FEB 1955Z 27 FEB 2005Z 27 FEB

TONGA AMERICAN SAM SAMOA JARVIS IS. WALLIS-FUTUN TOKELAU FIJI AUSTRALIA	NORTH CAPE BLUFF LYTTELTON AUCKLAND(E) NELSON WESTPORT AUCKLAND(W) NEW PLYMOUTH NUKUALOFA IOA PAGO PAGO APIA JARVIS IS. A WALLIS IS. NUKUNONU IS. SUVA HOBART SYDNEY BRISBANE GLADSTONE CAIRNS MACKAY HILO HONOLULU NAWILIWILI PALMYRA IS. FUNAFUTI IS. ANATOM IS. ESPERITU SANTO ER HOWLAND IS. IA NOUMEA JOHNSTON IS.	37.15 174.2E 39.1S 174.1E 21.0S 175.2W 14.3S 170.7W 13.8S 171.8W	2010Z 27 FEB 2030Z 27 FEB 2040Z 27 FEB 2056Z 27 FEB 2127Z 27 FEB 2129Z 27 FEB 2140Z 27 FEB 2040Z 27 FEB 1940Z 27 FEB 2006Z 27 FEB 2026Z 27 FEB 2030Z 27 FEB 2030Z 27 FEB 2104Z 27 FEB 2104Z 27 FEB 2105Z 27 FEB 2105Z 27 FEB 2146Z 27 FEB 2105Z 27 FEB
HAWAII	HILO HONOLULU	21.13 149.3E 19.7N 155.1W 21.3N 157.9W	2119Z 27 FEB 2152Z 27 FEB 2152Z 27 FEB
PALMYRA IS. TUVALU VANUATU	PALMYRA IS. FUNAFUTI IS. ANATOM IS. ESPERITU SANTO	6.3N 162.4W 7.9S 178.5E 20.2S 169.9E 15 1S 167 3F	2124Z 27 FEB 2124Z 27 FEB 2125Z 27 FEB 2137Z 27 FEB 2235Z 27 FEB
HOWLAND-BAK NEW CALEDON JOHNSTON IS. SOLOMON IS.	ER HOWLAND IS. IA NOUMEA JOHNSTON IS. KIRAKIRA MUNDA GHATERE AUKI HONIARA FALAMAE PANGGOE NAURU MAJURO KWAJALEIN ENIWETOK MIDWAY IS. KOSRAE IS.	0.6N 176.6W 22.3S 166.5E 16.7N 169.5W 10.4S 161.9E 8.4S 157.2E 7.8S 159.2E 8.8S 160.6E 9.3S 160.0E 7.4S 155.6E 6.9S 157.2E	2154Z 27 FEB 2218Z 27 FEB 2245Z 27 FEB 2321Z 27 FEB 0001Z 28 FEB 0001Z 28 FEB 0004Z 28 FEB 0004Z 28 FEB 0004Z 28 FEB 0017Z 28 FEB 0020Z 28 FEB
NAURU MARSHALL IS.	NAURU MAJURO KWAJALEIN	0.5S 166.9E 7.1N 171.4E 8.7N 167.7E	2331Z 27 FEB 2339Z 27 FEB 0013Z 28 FEB
MIDWAY IS. KOSRAE PAPUA NEW GU	ENIWETOK MIDWAY IS. KOSRAE IS. JINE AMUN KIETA RABAUL PORT MORESBY LAE KAVIENG MADANG MANUS IS. WEWAK VANIMO	11.4N 162.3E 28.2N 177.4W 5.5N 163.0E 6.0S 154.7E 6.1S 155.6E 4.2S 152.3E 9.3S 146.9E 6.8S 147.0E 2.5S 150.7E 5.2S 145.8E 2.0S 147.5E 3.5S 143.6E 2.6S 141.3E	01022 28 FEB 00222 28 FEB 0026Z 28 FEB 0036Z 28 FEB 0038Z 28 FEB 0102Z 28 FEB 0123Z 28 FEB 0128Z 28 FEB 0128Z 28 FEB 0154Z 28 FEB 0214Z 28 FEB 0237Z 28 FEB 0237Z 28 FEB
POHNPEI WAKE IS. CHUUK RUSSIA	POHNPEI IS. WAKE IS. CHUUK IS. MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS	7.0N 158.2E 19.3N 166.6E 7.4N 151.8E 54.7N 167.4E 56.1N 162.6E 53.2N 159.6E 46.1N 150.5E	0111Z 28 FEB 0112Z 28 FEB 0213Z 28 FEB 0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB 0333Z 28 FEB 0354Z 28 FEB
MARCUS IS. INDONESIA	SEVERO KURILSK MARCUS IS. JAYAPURA WARSA MANOKWARI SORONG	50.8N 156.1E 24.3N 154.0E 2.4S 140.8E 0.6S 135.8E 0.8S 134.2E 0.8S 131.1E	04102 28 FEB 0248Z 28 FEB 0302Z 28 FEB 0345Z 28 FEB 0405Z 28 FEB 0433Z 28 FEB

n. Marianas Guam Yap Belau Japan	BEREBERE PATANI GEME SAIPAN GUAM YAP IS. MALAKAL KUSHIRO KATSUURA HACHINOHE SHIMIZU	2.5N 128.7E 0.4N 128.8E 4.6N 126.8E 15.3N 145.8E 13.4N 144.7E 9.5N 138.1E 7.3N 134.5E 42.9N 144.3E 35.1N 140.3E 40.5N 141.5E 32.8N 133.0E	0452Z 28 FEB 0505Z 28 FEB 0512Z 28 FEB 0303Z 28 FEB 0311Z 28 FEB 0352Z 28 FEB 0413Z 28 FEB 0435Z 28 FEB 0453Z 28 FEB 0509Z 28 FEB 0557Z 28 FEB
PHILIPPINES	OKINAWA DAVAO PALANAN LEGASPI	26.2N 127.8E 6.8N 125.7E 17.1N 122.6E 13.2N 123.8E	0610Z 28 FEB 0527Z 28 FEB 0559Z 28 FEB 0604Z 28 FEB
CHINESE TAIPE		24.0N 121.6E 24.0N 121.7E 25.2N 121.8E 22.7N 121.2E	0626Z 28 FEB 0626Z 28 FEB 0654Z 28 FEB 0655Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 011 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1650Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION LAT LON TIME AMPL PER

434 16.0N 107.0W 1611Z 16.8N 99.9W 1549Z 23.1S 134.9W 1559Z 5140 8.5S 125.0W 1531Z 0.4S 90.3W 1452Z 27.2S 109.5W 1205Z	0.16M / 0.5FT 24MIN 0.15M / 0.5FT 22MIN 0.18M / 0.6FT 18MIN 0.35M / 1.2FT 14MIN 0.35M / 1.1FT 52MIN
	0.62M / 2.0FT 84MIN
	0.36M / 1.2FT 30MIN
	0.94M / 3.1FT 42MIN
20.2S 70.1W 0907Z	0.28M / 0.9FT 68MIN
23.2S 70.4W 0941Z	0.49M / 1.6FT 52MIN
18.0S 86.4W 0941Z	0.24M / 0.8FT 36MIN
27.1S 70.8W 0843Z	0.45M / 1.5FT 20MIN
36.7S 73.4W 0653Z	2.34M / 7.7FT 88MIN
30.0S 71.3W 08527	1.32M / 4.3FT 30MIN
	0.90M / 2.9FT 16MIN
	0.53M / 1.7FT 08MIN
	1.29M / 4.2FT 20MIN
55.05 / 1.0W 0/00Z	
	16.8N 99.9W 1549Z 23.1S 134.9W 1559Z 5140 8.5S 125.0W 1531Z 0.4S 90.3W 1452Z 27.2S 109.5W 1205Z 41.9S 73.8W 0838Z 12.1S 77.2W 1029Z 18.5S 70.3W 1008Z 20.2S 70.1W 0907Z 23.2S 70.4W 0941Z 18.0S 86.4W 0941Z 27.1S 70.8W 0843Z

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.

VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT)

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MUST AND SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 012 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS **ISSUED AT 1752Z 27 FEB 2010**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION LAT LON TIME	AMPL	PER
MANZANILLO MX 19.1N 104.3W 1705 DART MANZANILLO 434 16.0N 107.0W 1611 ACAPULCO MX 16.8N 99.9W 1549 RIKITEA PF 23.1S 134.9W 1559 DART MARQUESAS 5140 8.5S 125.0W 1531 BALTRA GALAPAGS EC 0.4S 90.3W 1452Z EASTER CL 27.2S 109.5W 1205 ANCUD CL 41.9S 73.8W 0838 CALLAO LA-PUNTA PE 12.1S 77.2W 1029Z ARICA CL 18.5S 70.3W 1008 IQUIQUE CL 20.2S 70.1W 0907 ANTOFAGASTA CL 23.2S 70.4W 0941 DART LIMA 32412 18.0S 86.4W 0941 CALDERA CL 27.1S 70.8W 08433 TALCAHUANO CL 36.7S 73.4W 06533 COQUIMBO CL 30.0S 71.3W 0852 CORRAL CL 39.9S 73.4W 07392 SAN FELIX CL 26.3S 80.1W 0815 VALPARAÍSO CL 33.0S 71.6W 0708	1Z 0.07M / 0.2F 2 0.16M / 0.5F 9Z 0.15M / 0.5F 1Z 0.18M / 0.6F 2 0.35M / 1.2F 5Z 0.35M / 1.2F 2 0.62M / 2.0F 2 0.36M / 1.2F 2 0.94M / 3.1F 2 0.28M / 0.9F 2 0.24M / 0.8F 2 0.24M / 0.8F 2 0.24M / 0.8F 2 0.24M / 1.5F 2 0.36M / 1.5F 2 0.36M / 1.5F 2 0.90M / 2.9F 2 0.53M / 1.7F	T 24MIN 24MIN 24MIN 22MIN 18MIN 14MIN 52MIN 44MIN 42MIN 42MIN 52MIN 52MIN 52MIN 52MIN 52MIN 536MIN 530

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 013 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 1843Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT LON TIME	AMPL	PER
HIVA OA MARQUESAS PAPEETE TAHITI CABO SAN LUCAS MX NUKU HIVA MARQUESAS MANZANILLO MX DART MANZANILLO 434 ACAPULCO MX	9.8S 139.0W 1741Z 17.5S 149.6W 1810Z 22.9N 109.9W 1743Z 8.9S 140.1W 1745Z 19.1N 104.3W 1705Z 16.0N 107.0W 1611Z 16.8N 99.9W 1549Z	1.79M / 5.9FT 0.16M / 0.5FT 0.28M / 0.9FT 0.95M / 3.1FT 0.32M / 1.0FT 0.07M / 0.2FT 0.16M / 0.5FT	10MIN 18MIN 04MIN 24MIN 24MIN

RIKITEA PF DART MARQUESAS 5140 BALTRA GALAPAGS EC EASTER CL ANCUD CI	0.4S 27.2S	125.0W 90.3W	/ 1205Z	0.15M / 0 0.18M / 0 0.35M / 1 0.35M / 1 0.62M / 2).6FT 1.2FT 1.1FT	18MIN 14MIN 52MIN
CALLAO LA-PUNTA PE	12.1S_7	7.2W 1	1029Z	0.36M / 1	1.2FT	30MIN
ARICA CL IQUIQUE CL	20.2S	70.3W 70.1W	0907Z	0.94M / 3 0.28M / 0	0.9FT	68MIN
ANTOFAGASTA CL DART LIMA 32412		70.4W 86.4W	0011	0.49M / 1 0.24M / 0		•=
CALDERA CL TALCAHUANO CL		70.8W 73.4W	00100	0.45M / 1 2.34M / 7		
COQUIMBO CL CORRAL CI	30.0Š	71.3W 73.4W	0852Z	1.32M / 4 0.90M / 2	4.3FT	30MIN
SAN FELIX CL VALPARAÍSO CL	26.3Š	80.1W	0815Z	0.53M / 1 1.29M / 4	1.7FT	08MIN
	00.00	11.000	01002	1.20101/ -	T. <u>∠</u> I I	

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT)

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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TSUNAMI BULLETIN NUMBER 014 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS **ISSUED AT 1934Z 27 FEB 2010**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

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A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA /

COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON 7	ГIME	AMPL	PER
CABO SAN LUCAS MX DART TONGA 51426 HIVA OA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS MANZANILLO MX	22.9N 23.0S 9.8S 17.5S 8.9S 19.1N 16.0N 16.8N 23.1S 0.4S 27.2S 41.9S 12.1S 20.2S 23.2S 18.0S 27.1S 36.7S 30.0S 39.9S 26.3S	109.9W 168.1W 39.0W 149.6W 140.1V 107.0W 107.0W 109.9W 134.9W 125.0W 90.3W 109.5W 70.3W 70.3W 70.3W 70.4W 86.4W	/ 1833Z / 1844Z 1741Z / 1810Z / 1745Z / 1745Z / 1705Z 1611Z 1549Z / 1559Z / 1559Z / 1531Z 1452Z / 1205Z / 0838Z 1029Z 1008Z 0907Z 0941Z 0941Z 0941Z 0941Z 0843Z 0653Z 0852Z 0739Z 0815Z	0.36M / 0.04M / 1.79M / 5 0.16M / 0.95M / 0.32M / 0.32M / 0.16M / 0.16M / 0.16M / 0.35M / 1 0.35M / 0.35M / 0.36M / 0.36M / 0.94M / 0.28M / 0.24M / 0.24M / 0.45M / 2.34M / 1.32M / 0.90M / 0.53M /	1.2FT 12MIN 0.1FT 30MIN 0.9FT 12MIN 0.5FT 10MIN 3.1FT 04MIN 1.0FT 24MIN 0.2FT 24MIN 0.5FT 24MIN 0.5FT 24MIN 0.5FT 24MIN 0.5FT 22MIN 0.6FT 18MIN 1.1FT 52MIN 2.0FT 84MIN 1.2FT 30MIN 3.1FT 42MIN 0.9FT 68MIN 1.6FT 52MIN 0.8FT 36MIN 1.5FT 20MIN 7.7FT 88MIN 4.3FT 30MIN 2.9FT 16MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)

AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 015 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 2028Z 27 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

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GAUGE LOCATION	LAT LON TIME	AMPL PER	
LOTTIN PT NZ RAROTONGA CK CABO SAN LUCAS MX	21.2S 159.8W 1918Z	0.15M / 0.5FT 10MIN 0.32M / 1.0FT 06MIN 0.36M / 1.2FT 12MIN	1

DART TONGA 51426 23.0S 168.1W 1844Z 0.04M HIVA OA MARQUESAS 9.8S 139.0W 1741Z 1.79M /	
	0.5FT 10MIN
	/ 3.1FT 04MIN
	(1.0FT 24MIN
	0.2FT 24MIN
	0.5FT 22MIN
DART MARQUESAS 5140 8.5S 125.0W 1531Z 0.18M /	0.6FT 18MIN
	0.8FT 52MIN
	1.2FT 14MIN 1.1FT 52MIN
ANCUD CL 27.23 109.500 12052 0.55007	
CALLAO LA-PUNTA PE 12.1S 77.2W 1029Z 0.36M /	
ARICA CL 18.5S 70.3W 1008Z 0.94M /	
IQUIQUE CL 20.2S 70.1W 0907Z 0.28M / ANTOFAGASTA CL 23.2S 70.4W 0941Z 0.49M /	
ANTOFAGASTA CL 23.2S 70.4W 0941Z 0.49M / DART LIMA 32412 18.0S 86.4W 0941Z 0.24M /	
	1.5FT 20MIN
	7.7FT 88MIN
	4.3FT 30MIN
CORRAL CL 39.9S 73.4W 0739Z 0.90M / SAN FELIX CL 26.3S 80.1W 0815Z 0.53M /	2.9FT 16MIN 1.7FT 08MIN
	4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTRACT OF A STRUCTURES OF TO BOATS AND CHERENTS AS LOCAL CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 016 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS **ISSUED AT 2132Z 27 FEB 2010**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

VALPARAÍSO CL 33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.

IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

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FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 017 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS **ISSUED AT 2241Z 27 FEB 2010**

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / JOHNSTON IS. / SOLOMON IS. / NAURU / MARSHALL IS. / MIDWAY IS. / KOSRAE / PAPUA NEW GUINEA / POHNPEI / WAKE IS. / CHUUK / RUSSIA / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / JAPAN / PHILIPPINES / CHINESE TAIPEI

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
GAUGE LOCATION NUKUALOFA TO KAWAIHAE HAWAII BARBERS PT HI KAUMALAPAU HAWAII KAHULUI MAUI NAWILIWILI KAUAI PAGO PAGO AS MONTEREY HARBOR CA SANTA MONICA CA SANTA BARBARA CA SANTA BARBARA CA SANTA BARBARA CA SANTA BARBARA CA SANTA DIEGO CA APIA UPOLU WS RAROTONGA CK ACAPULCO MX DART SAN DIEGO 4641 LOTTIN PT NZ RAROTONGA CK CABO SAN LUCAS MX DART TONGA 51426 HIVA OA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS MANZANILLO MX DART MANZANILLO RIKITEA PF DART MARQUESAS 5140 QUEPOS CR BALTRA GALAPAGS EC EASTER CL ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	21.15 20.01 21.3N 20.8N 22.0N 22.0N 22.0N 22.0N 36.6 34.0N 33.4.4N 32.2N 37.65 21.25 22.9N 23.05 9.8S 5 9.8S 5 9.8S 5 9.4E	5 175.2 N 155.3 I 156.9 I 156.9 I 156.9 I 156.9 I 159.4 I 159.4 I 170.7 N 121. I 18.5 I 19.7 I 119.7 I 119.7 I 120.7 I 159.8 I 159.8 I 159.8 I 120.7 I 159.8 I 120.7 I 159.8 I 120.7 I 120.	 W 2024Z W 2140Z W 2136Z W 2136Z W 2137Z W 2035Z W 2035Z W 2035Z W 2029Z W 2036Z W 2036Z W 2036Z W 2036Z W 2036Z W 2036Z W 2036Z W 2036Z W 2037Z W 1937Z W 1575Z W 1747Z W 1747Z W 1747Z W 1745Z W 1757Z W 1537Z W 1537Z W 1537Z W 1537Z W 1537Z	0.10M / 0.3FT 0.52M / 1.7F 0.19M / 0.6FT 0.18M / 0.6FT 0.98M / 3.2FT 0.28M / 0.9FT 0.66M / 2.2FT 0.32M / 1.1F 0.41M / 1.4FT 0.22M / 0.7FT 0.13M / 0.4FT 0.16M / 0.5FT 0.15M / 0.5FT 0.32M / 1.0FT 0.36M / 1.2FT 0.36M / 1.2FT 0.15M / 0.5FT 0.15M / 0.5FT 0.32M / 1.0FT 0.32M / 1.0FT 0.32M / 1.0FT 0.32M / 0.5FT 0.32M / 0.5FT 0.15M / 0.5FT 0.15M / 0.5FT 0.18M / 0.6FT 0.24M / 0.8FT {	62MIN 76MIN 56MIN 22MIN 44MIN 12MIN 756MIN 32MIN 48MIN 20MIN 48MIN 20MIN 16MIN 24MIN 26MIN 24MIN 10MIN 06MIN 12MIN 12MIN 12MIN 12MIN 24MIN 24MIN 24MIN 24MIN 24MIN 24MIN 24MIN 52MIN
IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL	20.25 23.25 18.05 27.15	5 70.1 5 70.4 5 86.4 5 70.8	W 0907Z W 0941Z W 0941Z W 0943Z	0.28M / 0.9FT 0.49M / 1.6FT 0.24M / 0.8FT 0.45M / 1.5FT	68MIN 52MIN 36MIN 20MIN
ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL	20.28 23.28 18.09 27.19 36.79 30.09	5 70.1 5 70.4 5 86.4 5 70.8 5 73.4 5 71.3 5 71.3	W 09072 W 0941Z N 0941Z N 0843Z N 0653Z N 0853Z	0.28M / 0.9FT 0.49M / 1.6FT 0.24M / 0.8FT 0.45M / 1.5FT 2.34M / 7.7FT 1.32M / 4.3FT	52MIN 52MIN 36MIN 20MIN 88MIN 30MIN
SAN FELIX CL VALPARAÍSO CL	26.35 33.05	80.1 71.6	W 0815Z W 0708Z	0.53M / 1.7FT 1.29M / 4.2FT	08MIN 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)

AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

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FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

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TSUNAMI BULLETIN NUMBER 018 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0012Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... THE TSUNAMI WARNING REMAINS IN EFFECT FOR RUSSIA / JAPAN ...

THE TSUNAMI WARNING IS NOW CANCELLED FOR

CHILE / PERU / ECUADOR / COLOMBIA / ANTARCTICA / PANAMA / COSTA RICA / NICARAGUA / PITCAIRN / HONDURAS / EL SALVADOR / GUATEMALA / FR. POLYNESIA / MEXICO / COOK ISLANDS / KIRIBATI / KERMADEC IS / NIUE / NEW ZEALAND / TONGA / AMERICAN SAMOA / SAMOA / JARVIS IS. / WALLIS-FUTUNA / TOKELAU / FIJI / AUSTRALIA / HAWAII / PALMYRA IS. / JOHNSTON IS. / MARSHALL IS. / MIDWAY IS. / WAKE IS. / TUVALU / VANUATU / HOWLAND-BAKER / NEW CALEDONIA / SOLOMON IS. / NAURU / KOSRAE / PAPUA NEW GUINEA / POHNPEI / CHUUK / MARCUS IS. / INDONESIA / N. MARIANAS / GUAM / YAP / BELAU / PHILIPPINES / CHINESE TAIPEI

A TSUNAMI WARNING REMAINS IN EFFECT FOR

RUSSIA / JAPAN

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE DAMAGE FAR FROM ITS SOURCE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	6 ARRIVAL TIME
RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS	56.1N 162.6E 53.2N 159.6E 46.1N 150.5E	0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB 0354Z 28 FEB
JAPAN	SEVERO KURILSK KUSHIRO KATSUURA HACHINOHE SHIMIZU OKINAWA	42.9N 144.3E 35.1N 140.3E 40.5N 141.5E	0410Z 28 FEB 0435Z 28 FEB 0453Z 28 FEB 0509Z 28 FEB 0557Z 28 FEB 0610Z 28 FEB

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TSUNAMI BULLETIN NUMBER 019 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0135Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... THE TSUNAMI WARNING REMAINS IN EFFECT FOR RUSSIA / JAPAN ...

A TSUNAMI WARNING REMAINS IN EFFECT FOR

RUSSIA / JAPAN

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ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION LAT LON TIME AMPL PER

CRESCENT CITY CA	41.7N 124.2W 2213Z 0.37M / 1.2FT 50MIN
SANTA BARBARA CA	34.4N 119.7W 2150Z 0.53M / 1.7FT 20MIN
	34.4N 119.7VV 21302 0.33IVI / 1.7FT 20IVIIN
PAGO PAGO AS	14.3S 170.7W 2027Z 0.70M / 2.3FT 12MIN
PAGO PAGO AS JOHNSTON US VANUATU	16.7N 169.5W 2248Z 0.22M / 0.7FT 64MIN
VANUATU	17.8S 168.3E 2246Z 0.15M / 0.5FT 22MIN
BARBERS PT HI	21 3N 158 1W 21577 0 12M / 0 4FT 54MIN
NUKUALOFA TO	21.1S 175.2W 2024Z 0.10M / 0.3FT 62MIN
KAWAIHAE HAWAII	20.0N 155.8W 2211Z 0.52M / 1.7FT 24MIN
KAUMALAPAU HAWAII	20.8N 156.9W 2136Z 0.18M / 0.6FT 56MIN
KAHULUI MAUI	20.9N 156.5W 2147Z 0.98M / 3.2FT 22MIN
NAWILIWILI KAUAI	22.0N 159.4W 2151Z 0.28M / 0.9FT 44MIN
	A 36.6N 121.9W 2031Z 0.32M / 1.1FT 56MIN
SANTA MONICA CA	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN
SAN DIEGO CA	32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN
APIA UPOLU WS	13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN
RAROTONGA CK	21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN
ACAPULCO MX	16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN
	32.2N 120.7W 1931Z 0.06M / 0.2FT 24MIN
	32.21N 120.79V 19312 0.001VI / 0.2FT 241VIIN
LOTTIN PT NZ	37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN
RAROTONGA CK	21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN
CABO SAN LUCAS MX	22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN
DART TONGA 51426	23.0S 168.1W 1844Z 0.04M / 0.1FT 30MIN
HIVA OA MARQUESAS	9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN
PAPEETE TAHITI	17.5S 149.6W 1810Z 0.16M / 0.5FT 10MIN
NUKU HIVA MARQUESA	S 8.9S 140.1W 1745Z 0.95M / 3.1FT 04MIN
MANZANILLO MX	19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN
DART MANZANILLO 434	16.0N 107.0W 1611Z 0.07M / 0.2FT 24MIN
RIKITEA PF	23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN
	23.13 134.9W 13392 0.13W/ 0.3FT 22WIIN
	0 8.5\$ 125.0W 1531Z 0.18M / 0.6FT 18MIN
QUEPOS CR	0.0N 9.4E 1416Z 0.24M / 0.8FT 52MIN 0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT 52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT 84MIN
CALLAO LA-PUNTA PE	12.1S 77.2W 1029Z 0.36M / 1.2FT 30MIN
ARICA CL	18.5S 70.3W 1008Z 0.94M / 3.1FT 42MIN
ÍQÜIQUE CL	20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN
	23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN
	.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN
DART LINIA 32412 10.	
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN
SAN FELIX CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN 36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN 30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN 39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN 26.3S 80.1W 0815Z 0.53M / 1.7FT 08MIN 33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE DAMAGE FAR FROM ITS SOURCE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES ARRIVAL TIME
RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS SEVERO KURILSK	54.7N 167.4E 0236Z 28 FEB 56.1N 162.6E 0302Z 28 FEB 53.2N 159.6E 0333Z 28 FEB 46.1N 150.5E 0354Z 28 FEB 50.8N 156.1E 0410Z 28 FEB
JAPAN	KUSHIRO KATSUURA HACHINOHE SHIMIZU OKINAWA	42.9N 144.3E 0435Z 28 FEB 35.1N 140.3E 0453Z 28 FEB 40.5N 141.5E 0509Z 28 FEB 32.8N 133.0E 0557Z 28 FEB 26.2N 127.8E 0610Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 020 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0235Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... THE TSUNAMI WARNING REMAINS IN EFFECT FOR RUSSIA / JAPAN ...

A TSUNAMI WARNING REMAINS IN EFFECT FOR

RUSSIA / JAPAN

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT LON TI	ME AM	PL PER
SITKA AK	57.1N 135.3	 V 0111Z 0.08M/	0.3FT 24MIN

	22.0N 159.4W 2323Z 0.37M / 1.2FT 10MIN 21.3N 157.9W 2200Z 0.25M / 0.8FT 46MIN 23.0S 168.1W 2003Z 0.04M / 0.1FT 32MIN 41.7N 124.2W 2213Z 0.37M / 1.2FT 50MIN 34.4N 119.7W 2150Z 0.53M / 1.7FT 20MIN 14.3S 170.7W 2027Z 0.70M / 2.3FT 12MIN 16.7N 169.5W 2248Z 0.22M / 0.7FT 64MIN 17.8S 168.3E 2246Z 0.15M / 0.5FT 22MIN 21.3N 158.1W 2157Z 0.12M / 0.4FT 54MIN 21.1S 175.2W 2024Z 0.10M / 0.3FT 62MIN 20.0N 155.8W 2211Z 0.52M / 1.7FT 24MIN 20.8N 156.9W 2136Z 0.18M / 0.6FT 56MIN
KAHULUI MAUI MONTEREY HARBOR CA SANTA MONICA CA	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN
SAN DIEGO CA	32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN
APIA UPOLU WS	13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN
RAROTONGA CK	21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN
ACAPULCO MX	16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN
DART SAN DIEGO 4641	32.2N 120.7W 1931Z 0.06M / 0.2FT 24MIN
LOTTIN PT NZ	37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN
RAROTONGA CK	21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN
CABO SAN LUCAS MX HIVA OA MARQUESAS PAPEETE TAHITI	22.9N 109.9W 1810Z 0.32M / 1.0FT 00MIN 22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN 9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN 17.5S 149.6W 1810Z 0.16M / 0.5FT 10MIN
NUKU HIVA MARQUESAS MANZANILLO MX DART MANZANILLO 434	S 8.9S 140.1W 1745Z 0.95M / 3.1FT 04MIN 19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN
RIKITEA PF DART MARQUESAS 5140 QUEPOS CR	23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT 52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT 84MIN
ARICA CL IQUIQUE CL	12.1S 77.2W 1029Z 0.36M / 1.2FT 30MIN 18.5S 70.3W 1008Z 0.94M / 3.1FT 42MIN 20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN
DART LIMA 32412	18.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN
SAN FELIX CL	26.3S 80.1W 0815Z 0.53M / 1.7FT 08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

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EVALUATION

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LOCATION	FORECAST POINT	COORDINATES ARRIVAL TIME
RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS SEVERO KURILSK	54.7N 167.4E 0236Z 28 FEB 56.1N 162.6E 0302Z 28 FEB 53.2N 159.6E 0333Z 28 FEB 46.1N 150.5E 0354Z 28 FEB 50.8N 156.1E 0410Z 28 FEB
JAPAN	KUSHIRO KATSUURA HACHINOHE SHIMIZU OKINAWA	42.9N 144.3E 0435Z 28 FEB 35.1N 140.3E 0453Z 28 FEB 40.5N 141.5E 0509Z 28 FEB 32.8N 133.0E 0557Z 28 FEB 26.2N 127.8E 0610Z 28 FEB

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 021 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0344Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

RUSSIA / JAPAN

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT LON TIME	AMPL PER
MIDWAY WAKE US		0.28M / 0.9FT 10MIN 0.26M / 0.8FT 12MIN

NAWILIWILI KAUAI HONOLULU OAHU DART TONGA 51426 CRESCENT CITY CA SANTA BARBARA CA PAGO PAGO AS JOHNSTON US VANUATU BARBERS PT HI NUKUALOFA TO KAWAIHAE HAWAII KAUMALAPAU HAWAII KAUMALAPAU HAWAII KAUMALAPAU HAWAII KAHULUI MAUI MONTEREY HARBOR CA SANTA MONICA CA SAN DIEGO CA APIA UPOLU WS RAROTONGA CK ACAPULCO MX DART SAN DIEGO 4641 LOTTIN PT NZ RAROTONGA CK CABO SAN LUCAS MX HIVA OA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS MANZANILLO MX DART MANZANILLO 434 1 RIKITEA PF DART MARQUESAS 5140 QUEPOS CR BALTRA GALAPAGS EC EASTER CL ANCUD CL CALLAO LA-PUNTA PE 12 ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN 32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN 13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN 21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN 16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN 32.2N 120.7W 1931Z 0.62M / 0.2FT 24MIN 37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN 37.6S 178.2E 1934Z 0.32M / 1.0FT 06MIN 21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN 22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN 9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN 9.8S 140.1W 1745Z 0.95M / 3.1FT 04MIN 19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN 16.0N 107.0W 1611Z 0.07M / 0.2FT 24MIN 23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN 8.5S 125
IQUIQUE CL 22 ANTOFAGASTA CL 22 DART LIMA 32412 12 CALDERA CL 22 TALCAHUANO CL 23 COQUIMBO CL 33 CORRAL CL 33 SAN FELIX CL 22	20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN 23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN 18.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).

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EVALUATION

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LOCATION	FORECAST POINT	COORDINATES	S ARRIVAL TIME
RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS SEVERO KURILSK	56.1N 162.6E 53.2N 159.6E 46.1N 150.5E	0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB 0354Z 28 FEB 0410Z 28 FEB
JAPAN	KUSHIRO KATSUURA HACHINOHE SHIMIZU OKINAWA	42.9N 144.3E 35.1N 140.3E 40.5N 141.5E 32.8N 133.0E	0435Z 28 FEB 0453Z 28 FEB 0509Z 28 FEB 0557Z 28 FEB 0610Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 022 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0449Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

RUSSIA / JAPAN

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION LAT LON TIME AMPL PER

GUAM US	13.4N 144.7E 0307Z 0.16M / 0.5FT 34MIN
DART SAIPAN 52401	19.3N 155.8E 0355Z 0.08M / 0.3FT 18MIN
MIDWAY	28.2N 177.4W 0137Z 0.28M / 0.9FT 10MIN
WAKE US	19.3N 166.6E 0259Z 0.26M / 0.8FT 12MIN
SITKA AK NAWILIWILI KAUAI	57.1N 135.3W 0111Z 0.08M / 0.3FT 24MIN 22.0N 159.4W 2323Z 0.37M / 1.2FT 10MIN
HONOLULU OAHU	21.3N 157.9W 2200Z 0.25M / 0.8FT 46MIN
DART TONGA 51426	23.0S 168.1W 2003Z 0.04M / 0.1FT 32MIN
CRESCENT CITY CA	41.7N 124.2W 2213Z 0.37M / 1.2FT 50MIN
SANTA BARBARA CA	34.4N 119.7W 2150Z 0.53M / 1.7FT 20MIN
PAGO PAGO AS	14.3S 170.7W 2027Z 0.70M / 2.3FT 12MIN
JOHNSTON US	16.7N 169.5W 2248Z 0.22M / 0.7FT 64MIN
VANUATU	17.8S 168.3E 2246Z 0.15M / 0.5FT 22MIN
BARBERS PT HI	21.3N 158.1W 2157Z 0.12M / 0.4FT 54MIN
NUKUALOFA TO	21.1S 175.2W 2024Z 0.10M / 0.3FT 62MIN
KAWAIHAE HAWAII	20.0N 155.8W 2211Z 0.52M / 1.7FT 24MIN
KAUMALAPAU HAWAII	20.8N 156.9W 2136Z 0.18M / 0.6FT 56MIN
KAHULUI MAUI	20.9N 156.5W 2147Z 0.98M / 3.2FT 22MIN
MONTEREY HARBOR CA	36.6N 121.9W 2031Z 0.32M / 1.1FT 56MIN
SANTA MONICA CA	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN
SAN DIEGO CA	32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN
APIA UPOLU WS	13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN
RAROTONGA CK	21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN
ACAPULCO MX	16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN
DART SAN DIEGO 4641	32.2N 120.7W 1931Z 0.06M / 0.2FT 24MIN
LOTTIN PT NZ	37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN
RAROTONGA CK	21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN
CABO SAN LUCAS MX	22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN
HIVA OA MARQUESAS	9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN
PAPEETE TAHITI	17.5S 149.6W 1810Z 0.16M / 0.5FT 10MIN
NUKU HIVA MARQUESAS	S 8.9S 140.1W 1745Z 0.95M / 3.1FT 04MIN
MANZANILLO MX	19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN
DART MANZANILLO 434	16.0N 107.0W 1611Z 0.07M / 0.2FT 24MIN
RIKITEA PF	23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN
DART MARQUESAS 5140	8.5S 125.0W 1531Z 0.18M / 0.6FT 18MIN
QUEPOS CR	0.0N 9.4E 1416Z 0.24M / 0.8FT 52MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT 52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT 84MIN
CALLAO LA-PUNTA PE	12.1S 77.2W 1029Z 0.36M / 1.2FT 30MIN
ARICA CL	18.5S 70.3W 1008Z 0.94M / 3.1FT 42MIN
IQUIQUE CL	20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN
DART LIMA 32412	18.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN
SAN FELIX CL	26.3S 80.1W 0815Z 0.53M / 1.7FT 08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT. A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE

LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATE	S ARRIVAL TIME
RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K URUP IS SEVERO KURILSK KUSHIRO	56.1N 162.6E 53.2N 159.6E 46.1N 150.5E 50.8N 156.1E	0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB 0354Z 28 FEB 0410Z 28 FEB 0435Z 28 FEB
	KATSUURA HACHINOHE SHIMIZU OKINAWA	35.1N 140.3E 40.5N 141.5E 32.8N 133.0E	0453Z 28 FEB 0509Z 28 FEB 0557Z 28 FEB 0610Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 023 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0556Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

RUSSIA / JAPAN

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
OFUNATO HONSHU HANASAKI HOKKAIDO GUAM US DART SAIPAN 52401 MIDWAY WAKE US SITKA AK NAWILIWILI KAUAI HONOLULU OAHU DART TONGA 51426 CRESCENT CITY CA SANTA BARBARA CA PAGO PAGO AS JOHNSTON US VANUATU BARBERS PT HI NUKUALOFA TO KAWAIHAE HAWAII KAUMALAPAU HARBOR CA SANTA MONICA CA SAN DIEGO CA APIA UPOLU WS RAROTONGA CK ACAPULCO MX DART SAN DIEGO 4641 LOTTIN PT NZ	39.01 43.31 13.41 19.31 28.21 19.31 27.11 22.01 21.31 23.05 41.71 34.41 14.35 21.31 21.15 20.01 20.81 20.01 20.81 20.01 32.71 33.6 34.01 32.71 13.85 21.25 34.01 32.27 37.65	N 141.8 N 145.6 N 145.6 N 145.7 N 155.8 N 157.4 N 155.8 N 157.9 N 157.9 N 157.9 N 157.9 N 158.1 N 156.5 N 156.5 N 156.5 N 156.5 N 156.5 N 156.5 N 1171.8 N 156.5 N 120.7 N 120	E 0532Z E 0456Z E 0307Z E 0355Z W 0137Z E 0259Z W 0111Z W 2323Z W 2200Z W 2203Z W 2203Z W 2003Z W 20150Z W 20150Z W 20157Z W 2024Z W 2157Z W 2024Z W 2015Z W 2015Z W 2035Z W 2	0.21M / 0.31M / 0.16M / 0.28M / 0.28M / 0.26M / 0.26M / 0.37M / 0.37M / 0.37M / 0.37M / 0.37M / 0.37M / 0.37M / 0.32M / 0.15M / 0.18M / 0.98M / 0.98M / 0.13M / 0.13M / 0.13M / 0.15M /	0.7FT 32MIN 1.0FT 60MIN 0.5FT 34MIN 0.3FT 18MIN 0.3FT 10MIN 0.8FT 12MIN 0.3FT 24MIN 0.3FT 24MIN 0.3FT 46MIN 0.3FT 46MIN 0.1FT 32MIN 0.1FT 32MIN 1.2FT 50MIN 1.2FT 50MIN 2.3FT 12MIN 0.5FT 22MIN 0.5FT 22MIN 0.3FT 64MIN 0.3FT 64MIN 0.3FT 56MIN 1.1FT 56MIN 1.1FT 56MIN 1.1FT 56MIN 1.1FT 56MIN 0.4FT 32MIN 0.4FT 20MIN 0.4FT 20MIN 0.5FT 16MIN 0.5FT 24MIN 0.5FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.5FT 10MIN
RAROTONGA CK CABO SAN LUCAS MX HIVA OA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS MANZANILLO MX DART MANZANILLO 434 RIKITEA PF DART MARQUESAS 5140 QUEPOS CR BALTRA GALAPAGS EC EASTER CL ANCUD CL CALLAO LA-PUNTA PE ARICA CL IQUIQUE CL ANTOFAGASTA CL DART LIMA 32412 CALDERA CL TALCAHUANO CL COQUIMBO CL CORRAL CL SAN FELIX CL VALPARAÍSO CL	17.5 8.9 19.11 16.0N 23.1 0.4S 0.0N 0.4S 27.2 41.9 12.1S 20.2 23.2 18.0 27.1 36.7 30.0 39.9 26.3	5 149.6 S 140.1 N 104.3 I 107.0 S 134.9 S 125.0 9.4E 90.3 S 70.3 S 70.4 S 70	W 1810Z W 1745Z W 1705Z W 1611Z W 1559Z W 1531Z 1416Z / 1452Z W 1205Z V 0838Z	0.16M / 0.95M 0.32M / 0.15M / 0.15M / 0.24M / 0.35M / 0.35M / 0.62M / 0.36M / 0.94M / 0.28M /	 0.5FT 10MIN 3.1FT 04MIN 1.0FT 24MIN 0.2FT 24MIN 0.2FT 24MIN 0.5FT 22MIN 0.6FT 18MIN 0.8FT 52MIN 1.2FT 14MIN 1.1FT 52MIN 2.0FT 84MIN 1.2FT 30MIN 3.1FT 42MIN 0.9FT 68MIN 0.8FT 36MIN 1.5FT 20MIN 1.5FT 20MIN 7.7FT 88MIN 4.3FT 30MIN 2.9FT 16MIN 1.7FT 08MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT. VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED

WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

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		28 FEB
VLOVŠK K 53.2N	159.6E 0333Z	28 FEB 28 FEB
URILSK 50.8N 42.9N A 35.1N HE 40.5N	156.1E 0410Z 144.3E 0435Z 140.3E 0453Z 141.5E 0509Z 133.0E 0557Z	28 FEB 28 FEB 28 FEB 28 FEB 28 FEB 28 FEB 28 FEB
	HE 40.5N 32.8N	HE 40.5N 141.5E 0509Z

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 024 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0700Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... A WIDESPREAD TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

RUSSIA / JAPAN

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AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT LON TIME	AMPL	PER
OMAEZAKI HONSHU OFUNATO HONSHU HANASAKI HOKKAIDO DUTCH HBR UNALASKA ADAK AK	34.6N 138.2E 0555Z 39.0N 141.8E 0558Z 43.3N 145.6E 0551Z 53.9N 166.5W 0325Z 51.9N 176.6W 0412Z	0.41M / 1.4FT 0.45M / 1.5FT 2 0.18M / 0.6FT	48MIN 44MIN 7 28MIN
GUAM US DART SAIPAN 52401	13.4N 144.7E 0307Z 19.3N 155.8E 0355Z	0.16M / 0.5FT 0.08M / 0.3FT	34MIN 18MIN
MIDWAY WAKE US SITKA AK	28.2N 177.4W 01372 19.3N 166.6E 0259Z 57.1N 135.3W 0111	0.26M / 0.8FT Z 0.08M / 0.3F	12MIN T 24MIN
NAWILIWILI KAUAI HONOLULU OAHU DART TONGA 51426	22.0N 159.4W 23232 21.3N 157.9W 22002 23.0S 168.1W 20032	2 0.25M / 0.8FT	6MIN
CRESCENT CITY CA SANTA BARBARA CA PAGO PAGO AS	41.7N 124.2W 22132 34.4N 119.7W 21502 14.3S 170.7W 20272	2 0.53M / 1.7FT	20MIN
JOHNSTON US VANUATU	16.7N 169.5W 22482 17.8S 168.3E 2246Z	2 0.22M / 0.7F1 0.15M / 0.5FT	「 64MIN 22MIN
BARBERS PT HI NUKUALOFA TO KAWAIHAE HAWAII	21.3N 158.1W 21572 21.1S 175.2W 20242 20.0N 155.8W 22112	2 0.10M / 0.3FT 2 0.52M / 1.7FT	62MIN 24MIN
KAUMALAPAU HAWAII KAHULUI MAUI MONTEREY HARBOR CA	20.8N 156.9W 21362 20.9N 156.5W 21472 36.6N 121.9W 20312	Z 0.98M / 3.2F1	22MIN
SANTA MONICA CA SAN DIEGO CA APIA UPOLU WS 1	34.0N 118.5W 20352 32.7N 117.2W 20362 3.8S 171.8W 2018Z	2 0.13M / 0.4FT	20MIN
RAROTONGA CK ACAPULCO MX DART SAN DIEGO 4641	21.2S 159.8W 1907 16.8N 99.9W 1931Z 32.2N 120.7W 1931Z	0.62M / 2.0FT	26MIN
LOTTIN PT NZ RAROTONGA CK CABO SAN LUCAS MX	37.6S 178.2E 1934Z 21.2S 159.8W 1918Z 22.9N 109.9W 1833Z	0.15M / 0.5FT 0.32M / 1.0FT	10MIN 06MIN
HIVA OA MARQUESAS PAPEETE TAHITI NUKU HIVA MARQUESAS	9.8S 139.0W 1741Z 17.5S 149.6W 1810Z 8.9S 140.1W 1745Z	1.79M / 5.9FT	12MIN 10MIN
MANZANILLO MX DART MANZANILLO 434	19.1N 104.3W 17052 16.0N 107.0W 16112	2 0.32M / 1.0F1 2 0.07M / 0.2F1	24MIN 24MIN
RIKITEA PF DART MARQUESAS 5140	23.1S 134.9W 1559Z 8.5S 125.0W 1531Z	2 0.15M / 0.5FT 0.18M / 0.6FT	

QUEPOS CR BALTRA GALAPAGS EC	0.4S 90.3W 1452Z	0.24M / 0.8FT 52MIN 0.35M / 1.2FT 14MIN
EASTER CL ANCUD CL		0.35M / 1.1FT 52MIN 0.62M / 2.0FT 84MIN
CALLAO LA-PUNTA PE		0.36M / 1.2FT 30MIN
ARICA CL IQUIQUE CL		0.94M / 3.1FT 42MIN 0.28M / 0.9FT 68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z	0.49M / 1.6FT 52MIN
DART LIMA 32412 CALDERA CL		0.24M / 0.8FT 36MIN 0.45M / 1.5FT 20MIN
TALCAHUANO CL		2.34M / 7.7FT 88MIN
		1.32M / 4.3FT 30MIN
CORRAL CL SAN FELIX CL		0.90M / 2.9FT 16MIN 0.53M / 1.7FT 08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z	1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH)
LON - LONGITUDE (E-EAST, W-WEST)
TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME)
AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL.
IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT).
PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

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LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME

RUSSIA	MEDNNY IS UST KAMCHATSK PETROPAVLOVSK K	54.7N 167.4E 56.1N 162.6E 53.2N 159.6E	0236Z 28 FEB 0302Z 28 FEB 0333Z 28 FEB
	URUP IS SEVERO KURILSK	46.1N 150.5E 50.8N 156.1E	0354Z 28 FEB 0410Z 28 FEB
JAPAN	KUSHIRO	42.9N 144.3E	0435Z 28 FEB
	KATSUURA	35.1N 140.3E	0453Z 28 FEB
	HACHINOHE	40.5N 141.5E	0509Z 28 FEB
	SHIMIZU	32.8N 133.0E	0557Z 28 FEB
	OKINAWA	26.2N 127.8E	0610Z 28 FEB

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THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 025 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0757Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... THE TSUNAMI WARNING REMAINS IN EFFECT FOR JAPAN ...

THE TSUNAMI WARNING IS NOW CANCELLED FOR RUSSIA

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ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION	LAT LON TIME	AMPL PER
OFUNATO HONSHU	39.0N 141.8E 0559Z	0.41M / 1.3FT 48MIN
OMAEZAKI HONSHU	34.6N 138.2E 0616Z	0.34M / 1.1FT 70MIN
HANASAKI HOKKAIDO	43.3N 145.6E 0636Z	0.82M / 2.7FT 24MIN
DUTCH HBR UNALASKA	53.9N 166.5W 0325Z	0.18M / 0.6FT 28MIN
ADAK AK	51.9N 176.6W 0412Z	0.35M / 1.2FT 20MIN
GUAM US	13.4N 144.7E 0307Z	0.16M / 0.5FT 34MIN
DART SAIPAN 52401	19.3N 155.8E 0355Z	0.08M / 0.3FT 18MIN

MIDWAY	28.2N 177.4W 0137Z 0.28M / 0.9FT 10MIN
WAKE US	19.3N 166.6E 0259Z 0.26M / 0.8FT 12MIN
SITKA AK	57.1N 135.3W 0111Z 0.08M / 0.3FT 24MIN
NAWILIWILI KAUAI	22.0N 159.4W 2323Z 0.37M / 1.2FT 10MIN
HONOLULU OAHU	21.3N 157.9W 2200Z 0.25M / 0.8FT 46MIN
DART TONGA 51426	23.0S 168.1W 2003Z 0.04M / 0.1FT 32MIN
CRESCENT CITY CA	41.7N 124.2W 2213Z 0.37M / 1.2FT 50MIN
SANTA BARBARA CA	34.4N 119.7W 2150Z 0.53M / 1.7FT 20MIN
PAGO PAGO AS	
JOHNSTON US	16.7N 169.5W 2248Z 0.22M / 0.7FT 64MIN
VANUATU	17.8S 168.3E 2246Z 0.15M / 0.5FT 22MIN
BARBERS PT HI	21.3N 158.1W 2157Z 0.12M / 0.4FT 54MIN
NUKUALOFA TO	21.1S 175.2W 2024Z 0.10M / 0.3FT 62MIN
KAWAIHAE HAWAII	20.0N 155.8W 2211Z 0.52M / 1.7FT 24MIN
KAUMALAPAU HAWAII	20.8N 156.9W 2136Z 0.18M / 0.6FT 56MIN
KAHULUI MAUI	20.9N 156.5W 2147Z 0.98M / 3.2FT 22MIN
MONTEREY HARBOR CA	
SANTA MONICA CA	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN
SAN DIEGO CA	32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN
APIA UPOLU WS	13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN
RAROTONGA CK	21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN
ACAPULCO MX	16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN
DART SAN DIEGO 4641	32.2N 120.7W 1931Z 0.06M / 0.2FT 24MIN
LOTTIN PT NZ	37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN
RAROTONGA CK	21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN
CABO SAN LUCAS MX	22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN
HIVA OA MARQUESAS	9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN
PAPEETE TAHITI	17.5S 149.6W 1810Z 0.16M / 0.5FT 10MIN
NUKU HIVA MARQUESAS	8.9S 140.1W 1745Z 0.95M / 3.1FT 04MIN
MANZANILLO MX	19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN
DART MANZANILLO 434	16.0N 107.0W 1611Z 0.07M / 0.2FT 24MIN
RIKITEA PF	23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN
DART MARQUESAS 5140	8.5S 125.0W 1531Z 0.18M / 0.6FT 18MIN
QUEPOS CR	0.0N 9.4E 1416Z 0.24M / 0.8FT 52MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT 52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT 84MIN
CALLAO LA-PUNTA PE	12.1S 77.2W 1029Z 0.36M / 1.2FT 30MIN
ARICA CL	18.5S 70.3W 1008Z 0.94M / 3.1FT 42MIN
IQUIQUE CL	20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN
DART LIMA 32412	18.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN
SAN FELIX CL	26.3S 80.1W 0815Z 0.53M / 1.7FT 08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN
	55.05 / 1.0W 0/062 1.29WI / 4.2F1 20WIIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.

VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
JAPAN	KUSHIRO	42.9N 144.3E	0435Z 28 FEB
	KATSUURA	35.1N 140.3E	0453Z 28 FEB
	HACHINOHE	40.5N 141.5E	0509Z 28 FEB
	SHIMIZU	32.8N 133.0E	0557Z 28 FEB
	OKINAWA	26.2N 127.8E	0610Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 020 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0859Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... THE TSUNAMI WARNING REMAINS IN EFFECT FOR JAPAN ...

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

EVALUATION

SEA LEVEL READINGS CONFIRM THAT A TSUNAMI HAS BEEN GENERATED WHICH COULD CAUSE WIDESPREAD DAMAGE. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS THREAT. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL DATA TO DETERMINE THE EXTENT AND SEVERITY OF THE THREAT.

A TSUNAMI IS A SERIES OF WAVES AND THE FIRST WAVE MAY NOT BE THE LARGEST. TSUNAMI WAVE HEIGHTS CANNOT BE PREDICTED AND CAN VARY SIGNIFICANTLY ALONG A COAST DUE TO LOCAL EFFECTS. THE TIME FROM ONE TSUNAMI WAVE TO THE NEXT CAN BE FIVE MINUTES TO AN HOUR, AND THE THREAT CAN CONTINUE FOR MANY HOURS AS MULTIPLE WAVES ARRIVE.

FOR ALL AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES AT FORECAST POINTS WITHIN THE WARNING AND WATCH AREAS ARE GIVEN BELOW. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. A TSUNAMI IS A SERIES OF WAVES AND THE TIME BETWEEN SUCCESSIVE WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION	FORECAST POINT	COORDINATES	ARRIVAL TIME
JAPAN	KUSHIRO	42.9N 144.3E	0435Z 28 FEB

KATSUURA	35.1N 140.3E	0453Z 28 FEB
HACHINOHE	40.5N 141.5E	0509Z 28 FEB
SHIMIZU	32.8N 133.0E	0557Z 28 FEB
OKINAWA	26.2N 127.8E	0610Z 28 FEB

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

TSUNAMI BULLETIN NUMBER 027 PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS ISSUED AT 0940Z 28 FEB 2010

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

... TSUNAMI WARNING CANCELLATION ...

THIS BULLETIN APPLIES TO AREAS WITHIN AND BORDERING THE PACIFIC OCEAN AND ADJACENT SEAS...EXCEPT ALASKA...BRITISH COLUMBIA... WASHINGTON...OREGON AND CALIFORNIA.

THE PACIFIC-WIDE TSUNAMI WARNING ISSUED BY THE PACIFIC TSUNAMI WARNING CENTER IS NOW CANCELLED FOR ALL COUNTRIES.

THIS BULLETIN IS ISSUED AS ADVICE TO GOVERNMENT AGENCIES. ONLY NATIONAL AND LOCAL GOVERNMENT AGENCIES HAVE THE AUTHORITY TO MAKE DECISIONS REGARDING THE OFFICIAL STATE OF ALERT IN THEIR AREA AND ANY ACTIONS TO BE TAKEN IN RESPONSE.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0634Z 27 FEB 2010 COORDINATES - 36.1 SOUTH 72.6 WEST DEPTH - 55 KM LOCATION - NEAR COAST OF CENTRAL CHILE MAGNITUDE - 8.8

GAUGE LOCATION L	AT LON	TIME AN	ИРL	PER
NAHA OKINAWA	26 2N 1	 27 7E 07547	0 19M /	0.6FT 32MIN
OFUNATO HONSHU				1.3FT 48MIN
OMAEZAKI HONSHU	34.6N 1	38.2E 0616Z	0.34M /	1.1FT 70MIN
HANASAKI HOKKAIDO	43.3N 1	45.6E 0636Z	0.82M /	2.7FT 24MIN
DUTCH HBR UNALASKA				/ 0.6FT 28MIN
ADAK AK				/ 1.2FT 20MIN
GUAM US				0.5FT 34MIN
DART SAIPAN 52401	19.3N 1	55.8E 0355Z	0.08M /	0.3FT 18MIN

MIDWAY	28.2N 177.4W 0137Z 0.28M / 0.9FT 10MIN
WAKE US	19.3N 166.6E 0259Z 0.26M / 0.8FT 12MIN
SITKA AK	57.1N 135.3W 0111Z 0.08M / 0.3FT 24MIN
NAWILIWILI KAUAI	22.0N 159.4W 2323Z 0.37M / 1.2FT 10MIN
HONOLULU OAHU	21.3N 157.9W 2200Z 0.25M / 0.8FT 46MIN
DART TONGA 51426	23.0S 168.1W 2003Z 0.04M / 0.1FT 32MIN
CRESCENT CITY CA	41.7N 124.2W 2213Z 0.37M / 1.2FT 50MIN
SANTA BARBARA CA	34.4N 119.7W 2150Z 0.53M / 1.7FT 20MIN
PAGO PAGO AS	14.3S 170.7W 2027Z 0.70M / 2.3FT 12MIN
JOHNSTON US	16.7N 169.5W 2248Z 0.22M / 0.7FT 64MIN
VANUATU	17.8S 168.3E 2246Z 0.15M / 0.5FT 22MIN
BARBERS PT HI	21.3N 158.1W 2157Z 0.12M / 0.4FT 54MIN
NUKUALOFA TO	21.1S 175.2W 2024Z 0.10M / 0.3FT 62MIN
KAWAIHAE HAWAII	20.0N 155.8W 2211Z 0.52M / 1.7FT 24MIN
KAUMALAPAU HAWAII	20.8N 156.9W 2136Z 0.18M / 0.6FT 56MIN
KAHULUI MAUI	20.9N 156.5W 2147Z 0.98M / 3.2FT 22MIN
MONTEREY HARBOR CA	
SANTA MONICA CA	34.0N 118.5W 2035Z 0.41M / 1.4FT 32MIN
SAN DIEGO CA	32.7N 117.2W 2036Z 0.13M / 0.4FT 20MIN
APIA UPOLU WS	13.8S 171.8W 2018Z 0.16M / 0.5FT 16MIN
RAROTONGA CK	21.2S 159.8W 1907Z 0.15M / 0.5FT 24MIN
ACAPULCO MX	16.8N 99.9W 1931Z 0.62M / 2.0FT 26MIN
DART SAN DIEGO 4641	32.2N 120.7W 1931Z 0.06M / 0.2FT 24MIN
LOTTIN PT NZ	37.6S 178.2E 1934Z 0.15M / 0.5FT 10MIN
RAROTONGA CK	21.2S 159.8W 1918Z 0.32M / 1.0FT 06MIN
CABO SAN LUCAS MX	22.9N 109.9W 1833Z 0.36M / 1.2FT 12MIN
HIVA OA MARQUESAS	9.8S 139.0W 1741Z 1.79M / 5.9FT 12MIN
PAPEETE TAHITI	17.5S 149.6W 1810Z 0.16M / 0.5FT 10MIN
NUKU HIVA MARQUESAS	8.9S 140.1W 1745Z 0.95M / 3.1FT 04MIN
MANZANILLO MX	19.1N 104.3W 1705Z 0.32M / 1.0FT 24MIN
DART MANZANILLO 434	
	16.0N 107.0W 1611Z 0.07M / 0.2FT 24MIN
RIKITEA PF	23.1S 134.9W 1559Z 0.15M / 0.5FT 22MIN
DART MARQUESAS 5140	8.5S 125.0W 1531Z 0.18M / 0.6FT 18MIN
QUEPOS CR	0.0N 9.4E 1416Z 0.24M / 0.8FT 52MIN
BALTRA GALAPAGS EC	0.4S 90.3W 1452Z 0.35M / 1.2FT 14MIN
EASTER CL	27.2S 109.5W 1205Z 0.35M / 1.1FT 52MIN
ANCUD CL	41.9S 73.8W 0838Z 0.62M / 2.0FT 84MIN
CALLAO LA-PUNTA PE	12.1S 77.2W 1029Z 0.36M / 1.2FT 30MIN
ARICA CL	18.5S 70.3W 1008Z 0.94M / 3.1FT 42MIN
IQUIQUE CL	20.2S 70.1W 0907Z 0.28M / 0.9FT 68MIN
ANTOFAGASTA CL	23.2S 70.4W 0941Z 0.49M / 1.6FT 52MIN
DART LIMA 32412	18.0S 86.4W 0941Z 0.24M / 0.8FT 36MIN
CALDERA CL	27.1S 70.8W 0843Z 0.45M / 1.5FT 20MIN
TALCAHUANO CL	36.7S 73.4W 0653Z 2.34M / 7.7FT 88MIN
COQUIMBO CL	30.0S 71.3W 0852Z 1.32M / 4.3FT 30MIN
CORRAL CL	39.9S 73.4W 0739Z 0.90M / 2.9FT 16MIN
SAN FELIX CL	26.3S 80.1W 0815Z 0.53M / 1.7FT 08MIN
VALPARAÍSO CL	33.0S 71.6W 0708Z 1.29M / 4.2FT 20MIN

LAT - LATITUDE (N-NORTH, S-SOUTH) LON - LONGITUDE (E-EAST, W-WEST) TIME - TIME OF THE MEASUREMENT (Z IS UTC IS GREENWICH TIME) AMPL - TSUNAMI AMPLITUDE MEASURED RELATIVE TO NORMAL SEA LEVEL. IT IS ...NOT... CREST-TO-TROUGH WAVE HEIGHT.
VALUES ARE GIVEN IN BOTH METERS(M) AND FEET(FT). PER - PERIOD OF TIME IN MINUTES(MIN) FROM ONE WAVE TO THE NEXT.

EVALUATION

SEA LEVEL DATA INDICATE THAT A WIDESPREAD TSUNAMI HAS OCCURRED. HOWEVER - ADDITIONAL DESTRUCTIVE TSUNAMI IMPACTS ARE NOT EXPECTED FOR COASTAL AREAS NOT ALREADY AFFECTED. FOR THOSE AFFECTED AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES.

NO TSUNAMI THREAT EXISTS FOR OTHER COASTAL AREAS IN THE PACIFIC ALTHOUGH SOME OTHER AREAS MAY EXPERIENCE SMALL SEA LEVEL CHANGES. FOR ALL AREAS COVERED BY THIS CENTER...THE TSUNAMI WARNING IS CANCELLED.

THIS WILL BE THE FINAL BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE PRODUCTS FOR ALASKA...BRITISH COLUMBIA...WASHINGTON...OREGON...CALIFORNIA.

ANNEX II

SURVEY QUESTIONNAIRE

27 FEBRUARY 2010 CHILE EARTHQUAKE AND TSUNAMI EVENT

POST-EVENT ASSESSMENT QUESTIONNAIRE

COUNTRY:

Contact Details

Contact Name:	
Name of Organisation	
Nume of organioution	
Address	
Phone	Fax:
Email	

Instructions:

This is an electronic form which can be filled out in several ways:

- If you use Microsoft Word software you can fill out the form electronically. To tick checkboxes (yes/no answers), you can either use the tab button or the mouse to move to the required answer. Written answers can be typed in the grey area next to the questions, and the area will expand to fit longer answers.
- If the form fields don't work, then you can type your answers next to the relevant question.
- Please give all times in UTC, not local time.
- Please include as much information as possible in your answers. If there is not enough room on the questionnaire form, then please send extra information in a separate document.
- Where multiple answers are possible, please feel free to tick more than one box.

You may also print the questionnaire and fill out by hand, then scan/email or fax it back to us.

We may need to contact you to clarify your answers, so please include a contact phone number where we can reach you.

27 FEBRUARY 2010 CHILE EARTHQUAKE AND TSUNAMI EVENT

POST-EVENT ASSESSMENT QUESTIONNAIRE

SECTION A - WARNING/WATCH SERVICE

1)	How and at what tin	າe (UTC) did you le	earn that a big e	arthquake had taken place?	
	How:	Tim	e (UTC):		
2)	Did you receive the tsunami information		•	from the PTWC (<u>0646Z)</u> and/c <u>PM PST</u>)?	or
	Yes 🗌	No 🗌			
	If YES to either or bo	th, at what time was	the bulletin rece	ived (UTC)?	
	PTWC:	WC	/ATWC:		
3)	lf yes, how did yo appropriate)?	ou receive the bu	lletin/statement	(cross more than one box	if
	Email:	Fax:	GTS: 🗌		
	Phone:	Other (please spec	cify):		
4)	Did you acknowledg	je receipt of the bu	ulletin?		
	Yes 🗌	No 🗌			
5)	Were <u>subsequent</u> I source?	oulletins/advisorie	s received fron	n PTWC, WC/ATWC or anothe	ər
	Yes 🗌	No 🗌			

If YES, please indicate the time (UTC) you received them.

PTWC	Time UTC	PTWC	Time UTC	PTWC	Time UTC
No 1		No 10		No 19	
No 2		No 11		No 20	
No 3		No 12		No 21	
No 4		No 13		No 22	
No 5		No 14		No 23	
No 6		No 15		No 24	
No 7		No 16		No 25	
No 8		No 17		No 26	
No 9		No 18		No 27	

WC/ATWC	Time UTC	WC/ATWC	Time UTC	WC/ATWC	Time UTC
No 1		No 10		No 19	
No 2		No 11		No 20	
No 3		No 12		No 21	
No 4		No 13		No 22	
No 5		No 14		No 23	
No 6		No 15		No 24	
No 7		No 16		No 25	
No 8		No 17			
No 9		No 18			

6) Was information about the earthquake received from other sources?

No 🗌

No 🗌

Yes 🗌

If YES, please provide details:

SECTION B – NATIONAL ACTIONS

The purpose of this section is to find out what actions were taken by National Warning Centres, including independent analysis of the event, notification of relevant organisations, issuing and cancellation of warnings.

7) Were any earthquake parameters calculated at the national level?

Yes

If YES, please specify:

	Origin (UTC)	Time	Location (Lat and Long)	Depth	Magnitude	Type of Mag.	Time UTC
1st estimate							
2nd estimate							

8) Was any action taken BEFORE receiving the PTWC/WC/ATWC information?

Yes 🗌 No 🗌

If YES, please give details:

9) What action was taken AFTER receiving the first bulletin? Please list times (UTC) as well as actions. Include details of organisations or government agencies contacted.

Action Taken	Time (UTC)

(Add more rows if necessary)

10) Did your National Warning Centre issue a tsunami warning and tsunami related information to the public? If yes, what time was it issued (UTC)?

Yes:	
------	--

No:		
-----	--	--

If NO then please go to Section C Question 16

If YES, please specify:

Type of information released to the public	Time (UTC)

11) If a tsunami warning was issued to the public, was the warning based on bulletins from the PTWC and/or WC/ATWC, or on information determined by your National Warning Centre?

WC/ATWC:	
----------	--

National	TWC:	
----------	------	--

12) If a tsunami warning was issued to the public, was a tsunami wave height forecast provided?

Yes 🗌	No 🗌
-------	------

If YES, please provide details:

13) How was the warning issued? (eg phone, fax, email, sirens, police, etc). Cross more than one box if appropriate.

	Phone: 🗌	Fax: 🗌	Email: 🗌	sirens: 🗌
--	----------	--------	----------	-----------

Other	(please	specify):
-------	---------	-----------

14) If a warning was issued, at what time was the warning cancelled (UTC)? What was the reason for cancellation? How was this information communicated to the public?

Time of Cancellation:

Reason for Cancellation:

Communication method:

15) Were there any communication problems with distributing the tsunami warning or cancellation information? (eg mobile phone network overload, people not answering phones etc).

Yes 🗌 No 🗌

If YES, please provide details:

SECTION C - NATIONAL RESPONSE

The purpose of this section is to find out what the national and local response was to the event after the tsunami warning had been issued by the National Warning Centre.

16) Where any actions taken by the national disaster management organisation (or equivalent)?

Yes: 🗌 No: 🗌

If YES provide details:

Action taken	Time (UTC)

(Add more rows if necessary)

17) Were any areas evacuated?

Yes: 🗌 No: 🗌

If YES, please provide details in the following table:

Area Evacuated	Time (UTC)	Estimated No. People

(Add more rows if necessary)

18) If an evacuation occurred, did the process happen smoothly?

Yes: 🗌 No: 🗌

If NO, please provide details of problems encountered:

19) Did people in some areas self-evacuate before a warning was issued?

Yes: 🗌 No: 🗌

If YES, please provide details in the following table:

Area	Time (UTC)	Estimated No. People

(Add more rows if necessary)

SECTION D – MONITORING AND MODELLING

20) Were sea level data monitored during the event?

No 🗌

Yes 🗌

If YES, which stations were monitored and how where they monitored?

Sea Level station	Monitoring method		
	GTS 🗌	IOC Sea Level Station Monitoring Facility 🗌	Other 🗌
	GTS 🗌	IOC Sea Level Station Monitoring Facility 🗌	Other 🗌
	GTS 🗌	IOC Sea Level Station Monitoring Facility 🗌	Other 🗌
	GTS 🗌	IOC Sea Level Station Monitoring Facility	Other 🗌
	GTS 🗌	IOC Sea Level Station Monitoring Facility 🗌	Other 🗌

(Add more rows if necessary)

If "Other" please specify:

21) If the answer to question 20 is NO, does your National Warning Centre know how to access sea level data over the GTS or on the IOC Sea Level Station Monitoring Facility?

GTS:	Yes 🗌	No 🗌
IOC Sea Level Facility:	Yes 🗌	No 🗌

22) Did your National Warning Centre use any numerical model scenarios during the event (deep ocean propagation and/or inundation model scenarios)?

Yes: 🗌 No: 🗌

SECTION E – OTHER INFORMATION

Please feel free to provide any further information you would like to be included in the report. This could include comments which you can type below, or attachments such as photographs, or any other documents you consider relevant. We would particularly welcome copies of any national post-event assessment reports that are available.

ANNEX III

PICTURES



1. French Polynesia – The Marquesas islands

Credit: Photo from Eric Olivier, *Les Nouvelles Press* : Tahauku, Hiva Oa Marquesas. Low and high level of the tsunami. The run-up in more than 3.6 m, (so tsunami amplitude larger than 6 m).



2.Nuku Hiva, Taiohae, Marquesas islands Credit from: Lionel Gouverneur, Photographer, Taiohae, Nuku Hiva





3.Ua Pou, Hakahau bay, Marquesas islands Credit from: Jacques Vitellini, Ua Pou, Hakahau

IOC Technical Series

No.	Title	Languages
1	Manual on International Oceanographic Data Exchange. 1965	(out of stock)
2	Intergovernmental Oceanographic Commission (Five years of work). 1966	(out of stock)
3	Radio Communication Requirements of Oceanography. 1967	(out of stock)
4	Manual on International Oceanographic Data Exchange - Second revised edition. 1967	(out of stock)
5	Legal Problems Associated with Ocean Data Acquisition Systems (ODAS). 1969	(out of stock)
6	Perspectives in Oceanography, 1968	(out of stock)
7	Comprehensive Outline of the Scope of the Long-term and Expanded Programme of Oceanic Exploration and Research. 1970	(out of stock)
8	IGOSS (Integrated Global Ocean Station System) - General Plan Implementation Programme for Phase I. 1971	(out of stock)
9	Manual on International Oceanographic Data Exchange - Third Revised Edition. 1973	(out of stock)
10	Bruun Memorial Lectures, 1971	E, F, S, R
11	Bruun Memorial Lectures, 1973	(out of stock)
12	Oceanographic Products and Methods of Analysis and Prediction. 1977	E only
13	International Decade of Ocean Exploration (IDOE), 1971-1980. 1974	(out of stock)
14	A Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment and Baseline Study Guidelines. 1976	E, F, S, R
15	Bruun Memorial Lectures, 1975 - Co-operative Study of the Kuroshio and Adjacent Regions. 1976	(out of stock)
16	Integrated Ocean Global Station System (IGOSS) General Plan and Implementation Programme 1977-1982. 1977	E, F, S, R
17	Oceanographic Components of the Global Atmospheric Research Programme (GARP). 1977	(out of stock)
18	Global Ocean Pollution: An Overview. 1977	(out of stock)
19	Bruun Memorial Lectures - The Importance and Application of Satellite and Remotely Sensed Data to Oceanography. 1977	(out of stock)
20	A Focus for Ocean Research: The Intergovernmental Oceanographic Commission - History, Functions, Achievements. 1979	(out of stock)
21	Bruun Memorial Lectures, 1979: Marine Environment and Ocean Resources. 1986	E, F, S, R
22	Scientific Report of the Interealibration Exercise of the IOC-WMO-UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open Ocean Waters. 1982	(out of stock)
23	Operational Sea-Level Stations. 1983	E, F, S, R
24	Time-Series of Ocean Measurements. Vol.1. 1983	E, F, S, R
25	A Framework for the Implementation of the Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment. 1984	(out of stock)
26	The Determination of Polychlorinated Biphenyls in Open-ocean Waters. 1984	E only
27	Ocean Observing System Development Programme. 1984	E, F, S, R
28	Bruun Memorial Lectures, 1982: Ocean Science for the Year 2000. 1984	E, F, S, R
29	Catalogue of Tide Gauges in the Pacific. 1985	E only
30	Time-Series of Ocean Measurements. Vol. 2. 1984	E only
31	Time-Series of Ocean Measurements. Vol. 3. 1986	E only
32	Summary of Radiometric Ages from the Pacific. 1987	E only
33	Time-Series of Ocean Measurements. Vol. 4. 1988	E only

No.	Title	Languages
34	Bruun Memorial Lectures, 1987: Recent Advances in Selected Areas of Ocean Sciences in the Regions of the Caribbean, Indian Ocean and the Western Pacific. 1988	Composite E, F, S
35	Global Sea-Level Observing System (GLOSS) Implementation Plan. 1990	E only
36	Bruun Memorial Lectures 1989: Impact of New Technology on Marine Scientific Research. 1991	Composite E, F, S
37	Tsunami Glossary - A Glossary of Terms and Acronyms Used in the Tsunami Literature. 1991	E only
38	The Oceans and Climate: A Guide to Present Needs. 1991	E only
39	Bruun Memorial Lectures, 1991: Modelling and Prediction in Marine Science. 1992	E only
40	Oceanic Interdecadal Climate Variability. 1992	E only
41	Marine Debris: Solid Waste Management Action for the Wider Caribbean. 1994	E only
42	Calculation of New Depth Equations for Expendable Bathymerographs Using a Temperature-Error-Free Method (Application to Sippican/TSK T-7, T-6 and T-4 XBTS. 1994	E only
43	IGOSS Plan and Implementation Programme 1996-2003. 1996	E, F, S, R
44	Design and Implementation of some Harmful Algal Monitoring Systems. 1996	E only
45	Use of Standards and Reference Materials in the Measurement of Chlorinated Hydrocarbon Residues. 1996	E only
46	Equatorial Segment of the Mid-Atlantic Ridge. 1996	E only
47	Peace in the Oceans: Ocean Governance and the Agenda for Peace; the Proceedings of <i>Pacem in Maribus</i> XXIII, Costa Rica, 1995. 1997	E only
48	Neotectonics and fluid flow through seafloor sediments in the Eastern Mediterranean and Black Seas - Parts I and II. 1997	E only
49	Global Temperature Salinity Profile Programme: Overview and Future. 1998	E only
50	Global Sea-Level Observing System (GLOSS) Implementation Plan-1997. 1997	E only
51	L'état actuel de l'exploitation des pêcheries maritimes au Cameroun et leur gestion intégrée dans la sous-région du Golfe de Guinée <i>(cancelled)</i>	F only
52	Cold water carbonate mounds and sediment transport on the Northeast Atlantic Margin. 1998	E only
53	The Baltic Floating University: Training Through Research in the Baltic, Barents and White Seas - 1997. 1998	E only
54	Geological Processes on the Northeast Atlantic Margin (8 th training-through-research cruise, June-August 1998). 1999	E only
55	Bruun Memorial Lectures, 1999: Ocean Predictability. 2000	E only
56	Multidisciplinary Study of Geological Processes on the North East Atlantic and Western Mediterranean Margins (9 th training-through-research cruise, June-July 1999). 2000	E only
57	Ad hoc Benthic Indicator Group - Results of Initial Planning Meeting, Paris, France, 6-9 December 1999. 2000	E only
58	Bruun Memorial Lectures, 2001: Operational Oceanography – a perspective from the private sector. 2001	E only
59	Monitoring and Management Strategies for Harmful Algal Blooms in Coastal Waters. 2001	E only
60	Interdisciplinary Approaches to Geoscience on the North East Atlantic Margin and Mid-Atlantic Ridge (10 th training-through-research cruise, July-August 2000). 2001	E only
61	Forecasting Ocean Science? Pros and Cons, Potsdam Lecture, 1999. 2002	E only

No.	Title	Languages
62	Geological Processes in the Mediterranean and Black Seas and North East Atlantic (11 th training-through-research cruise, July- September 2001). 2002	E only
63	Improved Global Bathymetry – Final Report of SCOR Working Group 107. 2002	E only
64	R. Revelle Memorial Lecture, 2006: Global Sea Levels, Past, Present and Future. 2007	E only
65	Bruun Memorial Lectures, 2003: Gas Hydrates – a potential source of energy from the oceans. 2003	E only
66	Bruun Memorial Lectures, 2003: Energy from the Sea: the potential and realities of Ocean Thermal Energy Conversion (OTEC). 2003	E only
67	Interdisciplinary Geoscience Research on the North East Atlantic Margin, Mediterranean Sea and Mid-Atlantic Ridge (12 th training-through-research cruise, June-August 2002). 2003	E only
68	Interdisciplinary Studies of North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes (13 th training-through-research cruise, July-September 2003). 2004	E only
69	 Biodiversity and Distribution of the Megafauna / Biodiversité et distribution de la mégafaune. 2006 Vol.1 The polymetallic nodule ecosystem of the Eastern Equatorial Pacific Ocean / Ecosystème de nodules polymétalliques de l'océan Pacifique Est équatorial Vol.2 Annotated photographic Atlas of the echinoderms of the Clarion- 	E F
	Clipperton fracture zone / Atlas photographique annoté des échinodermes de la zone de fractures de Clarion et de Clipperton Vol.3 Options for the management and conservation of the biodiversity — The nodule ecosystem in the Clarion Clipperton fracture zone: scientific, legal and institutional aspects	
70	Interdisciplinary geoscience studies of the Gulf of Cadiz and Western Mediterranean Basin (14 th training-through-research cruise, July-September 2004). 2006	E only
71	Indian Ocean Tsunami Warning and Mitigation System, IOTWS. Implementation Plan, 7–9 April 2009 (2 nd Revision). 2009	E only
72	Deep-water Cold Seeps, Sedimentary Environments and Ecosystems of the Black and Tyrrhenian Seas and the Gulf of Cadiz (15 th training-through-research cruise, June–August 2005). 2007	E only
73	Implementation Plan for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (NEAMTWS), 2007–2011. 2007 <i>(electronic only)</i>	E only
74	Bruun Memorial Lectures, 2005: The Ecology and Oceanography of Harmful Algal Blooms – Multidisciplinary approaches to research and management. 2007	E only
75	National Ocean Policy. The Basic Texts from: Australia, Brazil, Canada, China, Colombia, Japan, Norway, Portugal, Russian Federation, United States of America. (Also Law of Sea Dossier 1). 2008	E only
76	Deep-water Depositional Systems and Cold Seeps of the Western Mediterranean, Gulf of Cadiz and Norwegian Continental margins (16 th training-through-research cruise, May–July 2006). 2008	E only
77	Indian Ocean Tsunami Warning and Mitigation System (IOTWS) – 12 September 2007 Indian Ocean Tsunami Event. Post-Event Assessment of IOTWS Performance. 2008	E only
78	Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (CARIBE EWS) – Implementation Plan 2008. 2008	E only
79	Filling Gaps in Large Marine Ecosystem Nitrogen Loadings Forecast for 64	E only

No.	Title	Languages
	LMEs – GEF/LME global project Promoting Ecosystem-based Approaches to Fisheries Conservation and Large Marine Ecosystems. 2008	
80	Models of the World's Large Marine Ecosystems. GEF/LME Global Project Promoting Ecosystem-based Approaches to Fisheries Conservation and Large Marine Ecosystems. 2008	E only
81	Indian Ocean Tsunami Warning and Mitigation System (IOTWS) – Implementation Plan for Regional Tsunami Watch Providers (RTWP). 2008	E only
82	Exercise Pacific Wave 08 – A Pacific-wide Tsunami Warning and Communication Exercise, 28–30 October 2008. 2008	E only
83.	Cancelled	
84.	Global Open Oceans and Deep Seabed (GOODS) Bio-geographic Classification. 2009	E only
85.	Tsunami Glossary	E, F, S
86	Pacific Tsunami Warning System (PTWS) Implementation Plan (under preparation)	
87.	Operational Users Guide for the Pacific Tsunami Warning and Mitigation System (PTWS) – January 2009. 2009	E only
88.	Exercise Indian Ocean Wave 2009 (IOWave09) – An Indian Ocean-wide Tsunami Warning and Communication Exercise – 14 October 2009. 2009	E only
89.	Ship-based Repeat Hydrography: A Strategy for a Sustained Global Programme. 2009	E only
90.	12 January 2010 Haiti Earthquake and Tsunami Event Post-Event Assessment of CARIBE EWS Performance. 2010	E only
91.	Compendium of Definitions and Terminology on Hazards, Disasters, Vulnerability and Risks in a coastal context	Under preparation
92.	27 February 2010 Chile Earthquake and Tsunami Event – Post-Event Assessment of PTWS Performance (Pacific Tsunami Warning System). 2010	E only