



IOC/WESTPAC



NMDIS

A Strategic Plan For NEAR-GOOS In Its Second Phase

GOOS REPORT NO.166



A Strategic Plan for NEAR-GOOS in its Second Phase

The Mission of NEAR-GOOS in its second phase

To develop a comprehensive and sustained ocean observing network in the North-East Asian regional seas and coastal regions, especially focussed on observations, monitoring and other activities that cannot be easily implemented by countries acting independently. This network will embrace a wide range of data types and will be accompanied by pilot observing experiments, trials and demonstrations, training and useful products for use by the participating members and as a contribution to the GOOS and other global observing initiatives.

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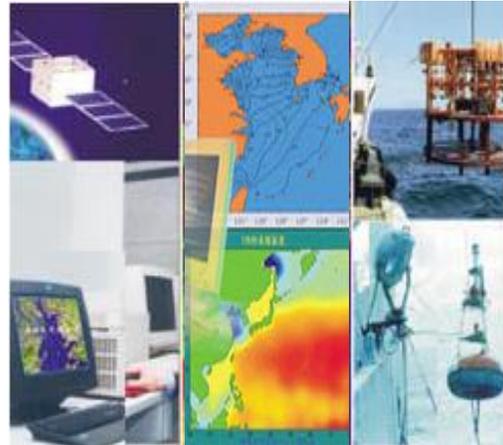
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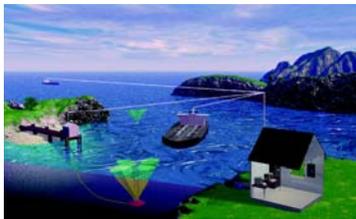
1. Background

1.1 Development of international marine data exchange networks

The conduct of any maritime activity inevitably involves the use of observational data. Among the more obvious applications are navigation, marine safety, naval operations, weather and climate forecasting, commercial operations (such as fishing and offshore oil production) and coastal environmental management and protection. Scientific and technical knowledge underpin the effective use of such data and together provide the framework for managing and exploiting the marine environment in a way that secures its future.



Historically, the collecting, analysing and collating of marine data focussed on the specific interests and objectives of the individual or the organization collecting the data. As scientific knowledge grew and the users of data developed interests extending beyond the scope of the data they could collect, it was realized that data could be gathered with multiple purposes in mind and not just for its original proposed use. Moreover, in view of the high cost of collecting data, often under extremely difficult conditions, it was seen that data, once collected, should be archived so that the reference database could gradually grow and the original investment could be fully exploited. The notion of a “climatology” based on the mean of all available data also encouraged a more systematic approach to archiving data.

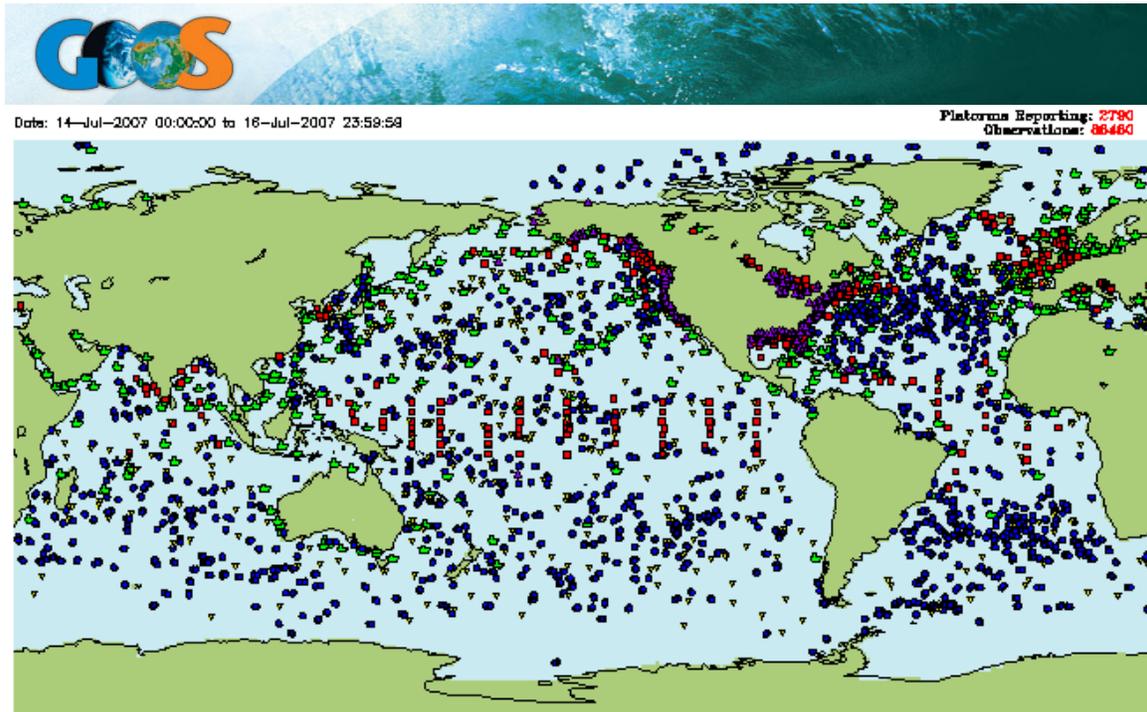


Apart from a few instances, such as tidal prediction, where theoretically based interpretation was possible, the application of data to real problems was based on the interpretation of such climatologies or on specific events as they occurred, as with marine weather, storm surges or algal blooms.

Over the last two decades the advent of satellites for remote measurements and autonomous observing instrumentation has vastly increased the quantity, complexity and geographical coverage of observed marine data. The revolution in storage media and the methods used to handle data have fundamentally changed the scope of data activities and enabled functions and capabilities that were hitherto impossible or the domain of only the most advanced operations. The Internet has made the worldwide distribution of datasets not only feasible but also potentially accessible from everywhere and relatively cheap to communicate. This in turn has made it possible to combine data from many sources and countries within networks of international coordination. Much of the international distribution of oceanographic data is now undertaken through such networks.

This development toward international networks has been driven by the recognition that science can be brought to bear on some of the most pressing environmental problems. However, for useful outcomes, extensive, quantitatively accurate and sustained observations are required. Such requirements can only be met through the coordinated efforts of many countries.

1.2 The Global Ocean Observing System (GOOS)



1.2.1 The Establishment of GOOS



With the factors outlined in 1.1 in mind and in response to Agenda 21 of the Rio Summit on Sustainable Development in 1991, the Intergovernmental Oceanographic Commission (IOC) of UNESCO formally established the Global Ocean Observing System (GOOS) with the joint sponsorship of the WMO and (later) UNEP. From a set of initial plans for observing ‘modules’ defined by perceived end use, GOOS has evolved along two major themes:

- *Ocean and Climate* (involving physical open ocean and trans-basin observation systems, and linked with the international weather forecasting networks) and
- *Coastal Systems* (incorporating the observation types needed for coastal management and protection, the conservation and sustainable use of coastal marine resources and coastal maritime operations).

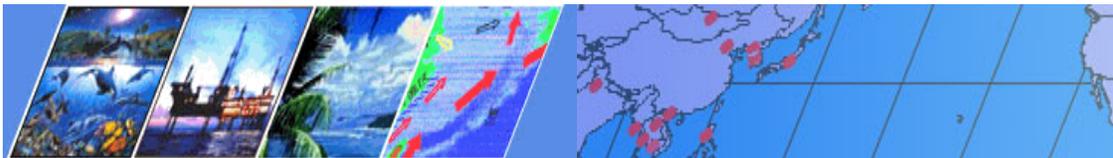
Guidance for development of these themes is provided in separate plans. A large range of training, awareness raising and technical development activities has also been undertaken with the guidance of the GOOS executive bodies and by the GOOS Project Office within the IOC Secretariat, which is part of UNESCO, centred in Paris.



1.2.2 The GOOS Principles

One of the strongest unifying factors in the development of GOOS has been the declaration of the GOOS Principles, which define both the essential features of design of activities intended to become contributions to GOOS and the requirements with which the contributors should expect to comply. The Principles (1), reproduced in Annex 1, have been generally adopted for the large variety of ocean observing activities worldwide that are now considered to be part of GOOS. It is noteworthy that the Principles appear to have been widely accepted without compromising the diverse objectives and operating arrangements of these activities.

1.2.3 Oceanographic Data Exchange Policy



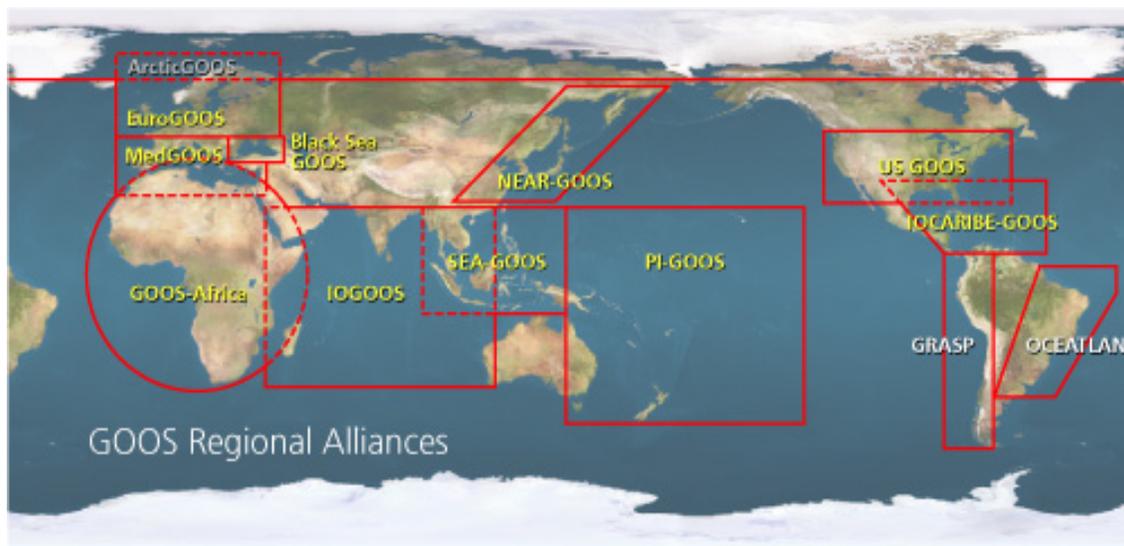
At the 22nd Assembly in June 2003 the IOC resolved (IOC Resolution XXII-6) to adopt a policy for the international exchange of oceanographic data. The Policy (2), set out in Annex 2 in particular states in Clause 1 that ‘Member States shall provide free and unrestricted access to all data, associated metadata and products generated under the auspices of IOC programmes.’ Since IOC is the primary intergovernmental sponsor of GOOS, this clause will apply to all data contributed to the GOOS network. However it should be noted that Clause 4 of the Policy ‘acknowledges the right of Member States [of IOC] and data originators to determine the terms of such exchange [of data from all sources] in a manner consistent with international conventions, where applicable’.

Together with Resolution 40 of the World Meteorological Organization (WMO), which has similar provisions for the exchange of ‘essential data’ and ‘additional data’ for meteorological purposes, the IOC Resolution marks a milestone on the road towards an international system that unites the observation of the seas for the benefit of all nations.

1.2.4 The regional development of GOOS

1.2.4.1 Development of Regional Alliances

The realization of the GOOS is completely dependent on the interest of countries and national agencies and their willingness to contribute part of their ocean observing effort to the GOOS framework of organization. Many international parts of the Oceans and Climate Theme are already underway on a semi-operational basis and meteorological and oceanographic services worldwide are now gaining benefit from the increased coordination provided through the IOC/WMO Joint Commission for Oceanography and Marine Meteorology (J-COMM) as well as the International Oceanographic Data Exchange (IODE) of IOC and its network of Responsible National Oceanographic Data Centres.



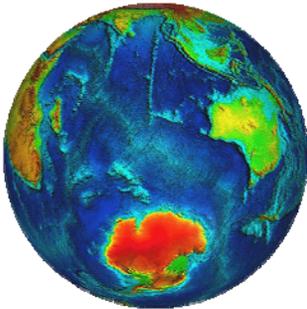
However, a national commitment to the underlying GOOS concept in those observing functions for which there is no pre-existing support, depends first and foremost on a perceived direct benefit to each country concerned. Cooperative benefit is most evident in issues of common concern to a region and this has led to the development of GOOS Regional Alliances (referred to as GRAs), for example, EUROGOOS. The Alliances are seen as a most appropriate and easily implemented means by which groups of countries (and/or their participating agencies) are able both to test their interest in GOOS as a medium of international cooperation and to establish the foundations of regional centres that will gain from the access to greatly increased data and technical resources while raising the capacity of their personnel to apply these resources to issues of national priority.

1.2.4.2 The broad objectives of a Regional Alliance in the Asian region

- Promote implementation of GOOS in Asian coastal oceans;
- Develop operational networks between and within regional organizations;
- Develop pilot/demonstrator projects;

- Adapt existing observing systems and integrate them into a common system;
- Determine regional needs by surveying and interacting with the main users of marine data;
- Encourage the development of a ‘production line’ (end-to-end) approach connecting initial observations to the final products;
- Increase awareness and foster support;
- Build regional capacity.

1.2.4.3 Regional Alliance ‘pilot projects’ or experiments



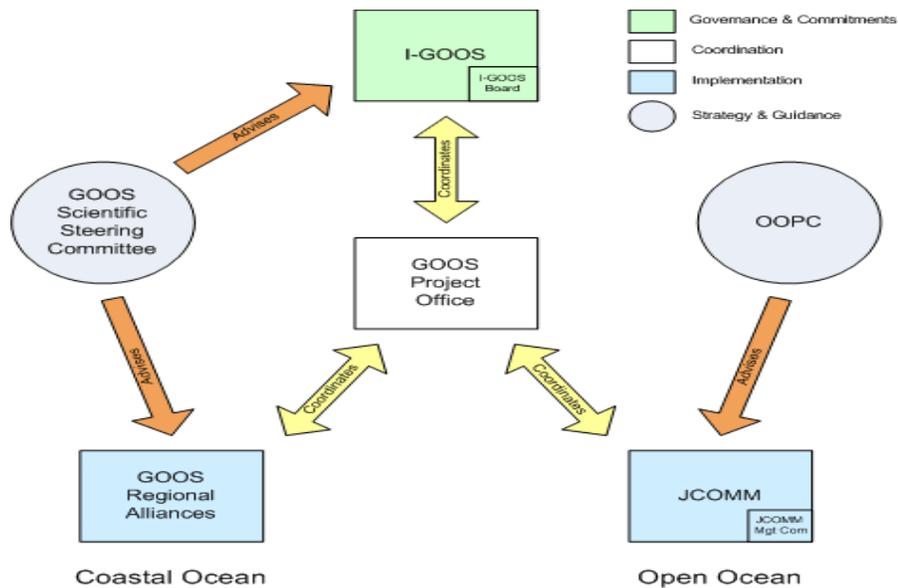
Regional Alliances have taken different forms of governance. However the general approach has been to build from *pilot projects or experiments* of limited scale and duration. The projects have typically developed and adopted new forms of cooperative interaction and agreement on issues such as the use of common, merged datasets, liberalized data exchange and common goals and objectives for the research and technical development that will lead to use of these data as predictive and management tools. As confidence builds in the collaborative approach and more durable foundations of support are gained, it is expected that these pilot projects will ultimately become cornerstones of a sustained, ‘permanent’ observing network.

1.2.4.4 Regional Policy

To guide new initiatives, the Intergovernmental Committee for GOOS (I-GOOS) has recently adopted a Regional Policy (4) that maps out the necessary requirements of alliances to be incorporated into the GOOS framework. However, it is assumed that the partners themselves are best able to determine their working arrangements, the projects needed and how they are to be conducted. This policy therefore does not constrain the composition or functions of such partnerships and alliances, which are effectively autonomous. The GOOS organization is however concerned that those regional initiatives bearing the GOOS label will, to the best degree, preserve the essentials of international cooperative action towards a common GOOS vision, principles, planning, standards, exchange policy and sustainability of the planned activity. It also aims to ensure that such bodies see themselves as part of a wider global framework that confers mutual benefits and obligations. Among the key requirements of the Policy deserving emphasis are:

- The intention to adhere to the stated GOOS Principles, policies and practices;
- Participation, representation and reporting of the GRA activities at the bi-annual sessions of I-GOOS and at GOOS Regional Forums

These requirements are intended to ensure coordinated and coherent development of GOOS at both a global and regional level.



1.3 NEAR-GOOS in its first phase

1.3.1 Establishment

North East Asian Regional GOOS (NEAR-GOOS) is a North-Eastern Asian regional ocean observing initiative being undertaken in partnership between China (PRC), Japan, the Republic of Korea (ROK) and the Russian Federation (RF), in association with the Global Ocean Observing System (GOOS).

NEAR-GOOS was conceived in 1995 and initiated in 1996 upon the formal adoption of the NEAR-GOOS Implementation Plan and Operational Manual by the 29th Executive Council of the Intergovernmental Oceanographic Commission following a recommendation from the WESTPAC Regional Sub commission of IOC earlier in the year. It became one of the first regional pilot projects of GOOS and predated much of the detailed planning and organization of GOOS itself.



1.3.2 Primary aim in the first phase

The primary aim of NEAR-GOOS in its first phase was *to facilitate the sharing of oceanographic data gathered by agencies of the partner countries using the Internet, to support the daily mapping of conditions in the marginal seas bordered by the partner countries* (5). Although it was anticipated that this should eventually lead to improvement in the availability of information and ocean services for all kinds of beneficial purposes (in particular maritime

weather and storm forecasting, fishing operations, pollution monitoring and coastal management), it is important to note that these flow-on outcomes were not specific goals for the first phase.



1.3.3 Implementation

1.3.3.1 Establishment of two types of database

With the primary aim defined in such simple terms and without requiring the planners to consider in detail the downstream applications of the data being gathered, the implementation of NEAR-GOOS was effected with impressive speed. The strategy to achieve the foregoing aim was to establish two types of database, each operationally linked:

1. Real-Time Databases (RTDB), receiving and distributing its data through the WMO Global Telecommunications System (GTS) or by other electronic means;
2. Delayed-Mode Databases (DMDB), to which data accumulated more gradually or by non real-time modes of transmission would be submitted. It was envisaged that whole datasets from the RTDBs would be binned and periodically transferred to the DMDBs to form a permanent archive.

The NEAR-GOOS Regional Real Time Database is operated by the Japan Meteorological Agency (JMA) for the exchange of oceanographical data among the participating institutions in the North-East Asian Regional GOOS (NEAR-GOOS).

Data types were confined to physical data such as temperature, salinity, current and wind-waves, and it was intended to include in-situ data from moored surface buoys, drifting buoys, towers, coastal stations, research vessels and volunteer observing ships. Also, satellite remote-sensed data from geostationary, polar-orbiting satellites and earth-observation satellites were intended for inclusion as this became possible.

1.3.3.2 National and regional custodian agencies

In practice it proved appropriate and necessary for each member country to establish (or identify) its own National RTDB and DMDB within a national custodian agency, each being responsible for periodically transmitting its data holdings to a corresponding NEAR-GOOS Regional RTDB (RRTDB) or NEAR-GOOS Regional DMDB (RDMDB).

In the case of Japan, the National databases also serve as nominated Regional databases. Thus, the NEAR-GOOS RRTDB was established by the Japan Meteorological Agency, which hosts a Regional Telecommunication Hub of the GTS and also serves as a Specialized Oceanographic Centre associated with the Joint IOC/WMO Commission for Oceanography and Marine Meteorology (J-COMM).

The Japan Oceanographic Data Centre undertook to host the NEAR-GOOS RDMDB. This centre is also a National Oceanographic Data Centre of Japan under the framework of International Oceanographic Data Exchange (IODE) network of IOC.

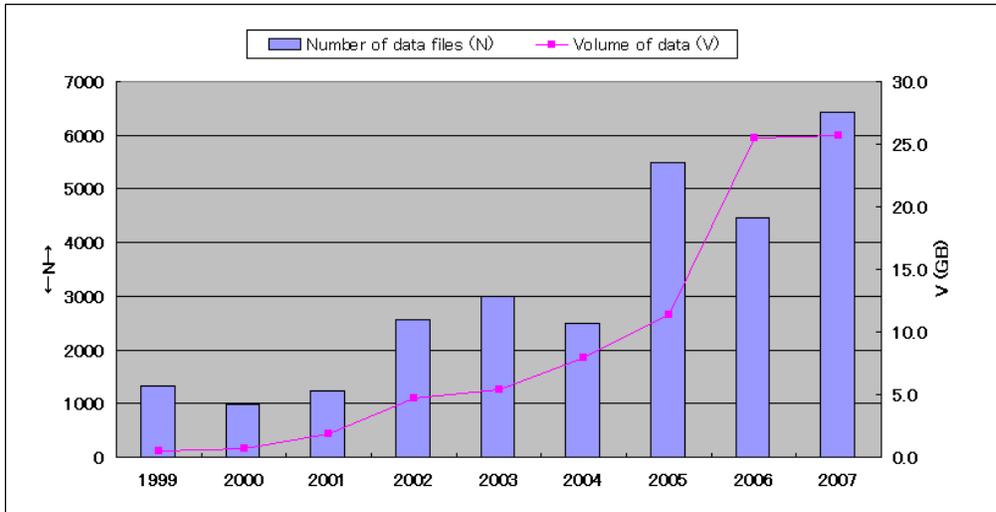
Country	Japan/ i.e. Regional	People's Republic of China	Republic of Korea	Russian Federation
RTDB Host	JMA http://goos.kishou.go.jp/	NMEFC http://neargoos.nmefc.gov.cn	KORDI http://neargoos.kordi.re.kr	FERHRI http://rus.ferhri.ru/Projects/Neargoos
DMDB Host	JODC http://neargoos1.jodc.go.jp/	NMDIS/SOA http://neargoos.coi.gov.cn	NFRDI http://kodc2.nfrdi.re.kr:8001/home/eng/main/projects/near-intro.php	POI http://pacificinfo.ru/near-goos

Table 1: NEAR-GOOS custodian agencies (host organizations)

In order to satisfy national requirements for autonomy, it has been necessary for the national centres to continue to function independently and to provide data at their discretion to the regional databases. While this has been a retreat from the original concept of completely merged data holding, it has in fact facilitated the release and exchange of delayed-mode data, by preserving the autonomy of the National agencies.

By the end of December 2007, the total volume of oceanographic/marine and meteorological data available in RDMDB was about 44.7GB. The volume of downloading data in 2007 was about 25.7GB, The data volume and number of products had steadily increased, and for example now included satellite altimetry available from the RRTDB. Many coastal stations in

China and the Republic of Korea were now contributing in near real time. The construction of a large observatory tower is currently underway in the East China Sea. The Russian database includes the data of historical domestic and foreign observations of temperature and salinity in the Northwest Pacific including NEAR-GOOS seas and the data sets of POI, FERHRI and TINRO Center marine expeditions (hydrology, chemistry, and biology).



In Korea, KODC operating an integrated oceanographic data and information network at the national level as part of its NEAR-GOOS commitment.



1.3.4 Successes

The most important successes of NEAR-GOOS in its first phase have been:

1. The consolidation of a functional two-mode ‘distributed’ Internet-based database structure in the partner countries as a workable model for the enhancement and coordinated handling of oceanographic data at national level;
2. The linking of this structure with two Regional Databases that are responsible for the receipt and merging of data concerning the NEAR-GOOS region as a whole, thus creating a regional database system which is part of GOOS;
3. The adoption and practice of a free and open data exchange policy, predating the formulation of such a policy for GOOS as a whole;

- The implementation of coordinated and approved data exchange management training for regional participants.



1.3.5 Concerns

Success has been tempered by the following factors:

- The range and amount of data submitted to the national databases appears to be limited (although increasing) and does not include data from many of the national ocean observing sources of the region;
- Data is submitted at the discretion of the involved agencies of each country and there is not a uniform vision or plan of what data should be commonly shared for best effect;
- There are sometimes long delays in the exchange of data between Centres;
- There is not uniform national acceptance for the nominated databases to be regarded as part of the international NEAR-GOOS structure and philosophy and NEAR-GOOS is implemented in parallel with other national and international database networks dealing with the same data. In some quarters there appears to be a declining commitment to participation in the structure implemented;
- Processing time for real-time access is sometimes a problem;
- There are not yet systematic protocols in place for the management of data;

7. Strategic planning and operational management roles of the Coordination Committee and national personnel and organizations responsible for the database functions are not clearly separated and delineated;
8. There has not been much action to identify specific applications where improvement in performance (in terms of predictions or ameliorative action, for example) could be the result of the enlargement of the data resource, its integration within NEAR-GOOS or through the stimulation of scientific study. The claims of the benefits of NEAR-GOOS remain largely rhetorical and untested.

1.3.6 Future directions for NEAR-GOOS

As it enters its second phase greater attention needs to be placed on how NEAR-GOOS should be strategically developed to deliver benefit and utility of its ocean data-gathering effort to its member states. This might involve a greater range of data types and the deriving of generic ‘products’ such as model analyses and synthesized maps. For this to be possible, it will also require more direct involvement of the agencies concerned and the recruitment of a wider range of organizations and disciplines.



2. A strategy for the second phase of NEAR-GOOS

2.1 The Vision of NEAR-GOOS

‘Through the coordination of ocean observations and associated research in the North–East Asian regional coasts and seas, NEAR-GOOS will become recognised as a key source of integrated marine information, services and products to support sustainable social and economic development, welfare and safety. The system will be operational in nature, aiming to provide data, products and services on an ongoing basis. It will provide information on the past and present state of the marine and coastal environment, on marine ecosystems and on the role of the ocean in weather and climate variability. It will stimulate international cooperation and the building of the scientific and technical skills of personnel and the capacity of the regional agencies to acquire and use ocean data effectively.’

2.2 The Mission of NEAR-GOOS in its second phase

‘To develop a comprehensive and sustained ocean observing network in the North-East Asian regional seas and coastal regions, especially focussed on observations, monitoring and other activities that cannot be easily implemented by countries acting independently. This network will embrace a wide range of data types and will be accompanied by pilot observing experiments, trials and demonstrations, training and useful products for use by the participating members and as a contribution to the GOOS and other global observing initiatives.’

2.3 Goals of NEAR-GOOS in its second phase

‘Development of a basic integrated ocean observing and operational forecasting system in the NEAR-GOOS area adhering to the GOOS Principles and building on the data management and exchange mechanisms developed in the first phase through the inclusion of additional parameters, increased coverage in space and time, the generation of a generic suite of data products and adequate quality control and quality assurance procedures.’

Specific goals are:

1. To meet the perceived needs of the participating agencies of the Member States for integrated and coordinated collection, processing and archiving of oceanographic and marine observations and data in the seas of the Northeast Asian region and products derived from these data. Particular requirements are given in Annex 5.
2. To facilitate the coordinated and cooperative development of scientific and technological capacity, knowledge and expertise within the Member States.



This will involve the selective implementation of projects in order to acquire, use and interpret these data and data from other sources for the purposes above and any other purposes that are socially, environmentally and economically beneficial to the countries of the region;

3. By publishing and making widely known the purposes and benefits of integrated and coordinated ocean observation within the NEAR-GOOS framework in each of the Member States to:

4. Increase the number of national agencies participating in and contributing to NEAR-GOOS activities, thus compounding the value of the individual marine observing and research efforts of such agencies;

5. Enhance the awareness of the relevant government bodies of the mission of NEAR-GOOS and to encourage their greater commitment to its objectives;

6. On the basis of mutual interest and benefit, strengthen cooperative relationships between NEAR-GOOS projects and other ocean observing activities in the region and throughout the world, especially those linked with GOOS, the Integrated Global Observing Strategy (IGOS) and the North Pacific Marine Science Organisation (PICES).

2.4 Objectives of NEAR-GOOS in its second phase

In accordance with the overall mission and its goals, four major objectives will define the actions and tasks for the coming five years:

- (i) *Restructuring NEAR-GOOS* to provide a more comprehensive and flexible and expandable operational capability appropriate to a phased development from a regional pilot experiment to a durable regional alliance;
- (ii) *Enhancing and consolidating the Database Networks* established in Phase 1, to better equip them to deliver data and useful products for Goal 1 above;
- (iii) *Defining, planning and implementing NEAR-GOOS-labelled Pilot Projects and Experiments*. This will include a reclassification of the present activities and will enhance the range of parameters observed, the spatial coverage, the range of data products and that will consolidate systematic quality assurance, assimilation and usage. Such projects will also be a prime vehicle for the implementation of other joint sub-regional research and development initiatives that bring the greater involvement of research scientists as clients and serve as pilots for more durable international collaboration.
- (iv) *Developing outreach programs* directed towards awareness raising, stakeholder recruitment (including more national agencies and participating experts), training and capacity-building.



2.4.1 Objective (i): Restructuring NEAR-GOOS

To ensure that NEAR-GOOS in its second phase undertakes activities that align with negotiated and agreed priorities for cooperative action between the partners, it is proposed to create a revised two-tier organizational structure in which the Coordinating Committee (CC) with revised Terms of Reference as given in Annex 3, assumes an overall coordination and strategic development role. In particular the CC is charged with the responsibility of strengthening coordination mechanisms. The functions of detailed technical design, planning and implementation of specific initiatives are organized as *NEAR-GOOS Pilot Projects*, carried out on behalf of advisory Working Groups (WGs) whose membership is selected for the purpose. The new structure is illustrated in Figure 1.

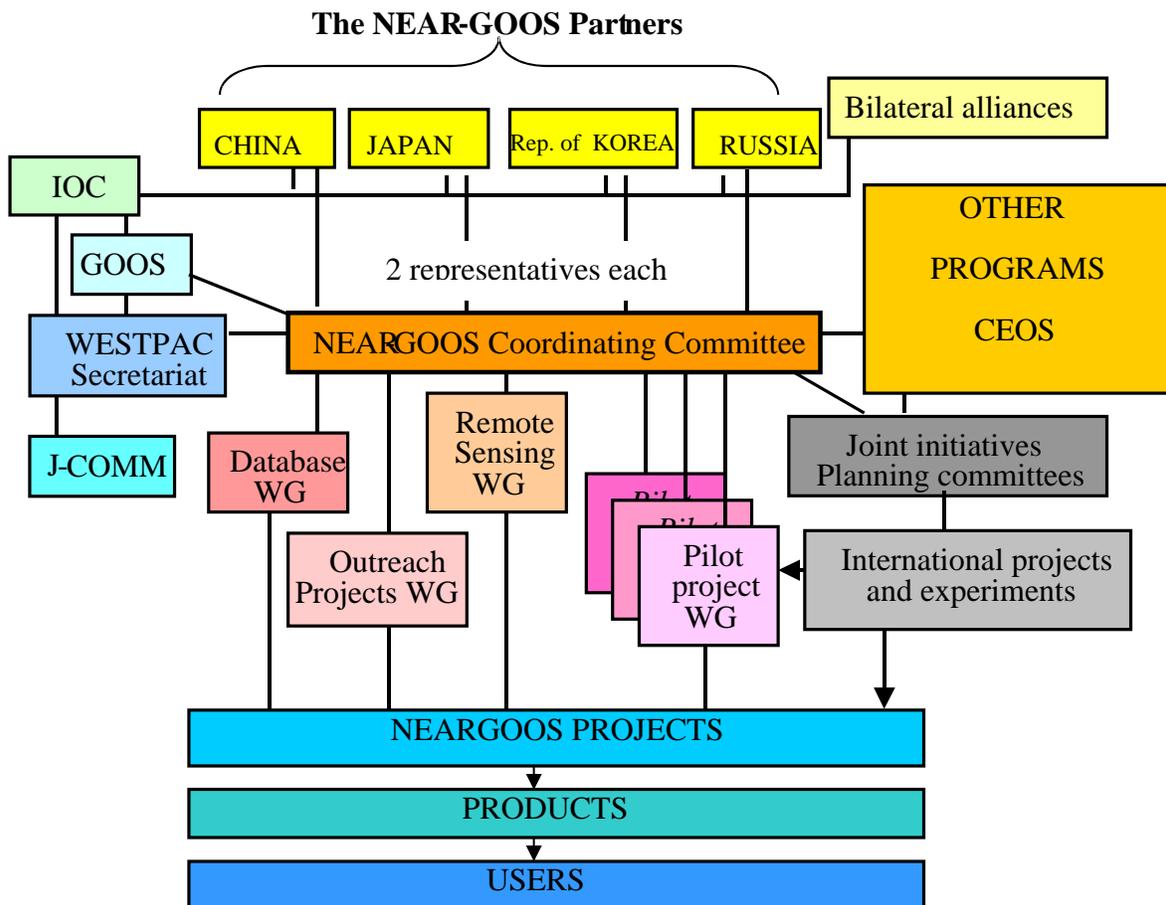


Figure 1: Conceptual Structure of NEAR-GOOS (Second Phase)

By separating the functions of coordination and implementation, the two-tier structure enables the participation of member countries in projects to vary according to the priorities and interest of the participants. In particular, it enables experiments and pilot projects with different objectives and different groups of participating countries to be conducted in the different seas of the region, without requiring each to be commonly mandated by all of the countries of NEAR-GOOS. On the other hand, each of the projects can gain benefit from its association with NEAR-

GOOS, its use of the NEAR-GOOS databases, principles and standards and the international mandate conferred by the intergovernmental status and sponsorship of GOOS.

The proposed structure is easily altered or expanded to accommodate new initiatives and collaboration and to enable projects to be undertaken jointly with other organizations.

2.4.1.1 NEAR-GOOS Coordinating Committee

The NEAR-GOOS Coordinating Committee (CC) will be composed of two designated members from each of the participating countries, who will be senior representatives of relevant participating departments or agencies of the member countries, qualified to advise on the strategic directions of the programme elements of NEAR-GOOS and its relationship with external entities such as those outlined in this plan. The CC will be responsible for advising the sponsoring countries, agencies and international programmes and especially GOOS on the broad strategic directions and themes of NEAR-GOOS, developing strategies for attracting national and international support, cooperative action and a common culture between member countries and for overseeing the development of NEAR-GOOS Projects as designed, supervised and reported by their respective WGs.



NEAR-GOOS-CC-XI, January 2007, Bangkok, Thailand

Terms of reference of the CC, which were decided at the seventh meeting of the Coordination Committee in 2002, are given in Annex 3.

2.4.1.2 Working Groups (WGs) and NEAR-GOOS Pilot Projects

The work of NEAR-GOOS is organized into functionally separate but (where necessary) interacting ‘Projects’ defined by scientific purpose, geographic region or, in the case of the Data Centres, by cross-organizational relevance. Each of these is directed by a separate Working Groups (WGs) composed of appropriate technical expert representatives of each of the participating countries, agencies or programmes. If necessary for reasons of size or differing objectives, projects may be subdivided and provided with separate WGs. Each WG is individually responsible for the design, planning and implementation of its Project and for reporting to the CC. Projects may, depending on their content and objectives, include countries and agencies that are not NEAR-GOOS members and where appropriate, their WGs need not

include all NEAR-GOOS member representatives. However every NEAR-GOOS designated project must have the ongoing endorsement of the NEAR-GOOS CC.

Draft General Terms of reference of the WGs are given in Annex 4.

2.4.2 Objective (ii): Enhancing and Consolidating the Database networks

It is envisaged that the Database framework established in the First Phase of NEAR-GOOS would become the first of the NEAR-GOOS projects identified in 2.4.1 above, perhaps separated into real-time and delayed-mode projects.

Annex 5 lists a number of high-priority strategic tasks for the second phase, identified by the Coordinating Committee at its 7th Session (5). These are, briefly, (i) introduction of new parameters; (ii) increase in spatial and temporal coverage; (iii) data products; and (iv) data Quality Assurance/Quality Control.

It is appropriate to examine the organizational structures needed to address these tasks.

2.4.2.1 Working towards a functionally integrated Database network

The harmonising of procedures within and between participating agencies is essential if the benefits of the global revolution in data generation and access are to be realised nationally, and this can be efficiently brought about through the harmonization and cooperative development of the common functions of data management. The intention is not to substitute for the data-gathering roles of the national agencies but to improve the efficiency and cost-effectiveness of these roles by the concentration of expertise, the integration and quality control of data, the identification of gaps in national data acquisition, products and services and the elimination of duplication. These are all functions that in a ‘distributed system’ can be divided or shared between the participating host agencies. It should also result in an effective interface to international data sharing and exchange mechanisms and access to best practice, and facilitate the application of both national and international data in a cross-disciplinary and holistic approach to important national problems and issues.



As is already the case, the Database Project will function as a ‘Distributed Data Network’ exploiting the Internet and modern technologies, eliminating the need for geographic co-location. Participating agencies will not be required to deposit or reproduce original data in a centralised archive but users would either be able to download merged data and data products from the National Databases or access information about these data (i.e. metadata) and using this information, negotiate with the source agency to gain access to the data itself.

The Database Project will require a focus for liaison between partners, coordination and other functional and administrative activities. It is also important that there is identified coordination of NEAR-GOOS involvement in international activities, such as the coordinated

development and application of standards and protocols (including guidance from international sources such as IODE and J-COMM). Depending upon the resources required it might also take a direct role in the generation of useful products and innovations enhancing the accessibility and usefulness of the data.

The CC should, as one of its initial tasks, address the appropriate organizational mechanism to provide the foregoing functions on behalf of all the NEAR-GOOS Partners. Since some of these functions overlap those of the CC it will be necessary to define the areas of responsibility relative to those of the WG for the project. The roles of the WG are outlined below in 2.4.2.2.

2.4.2.2 A Consolidated NEAR-GOOS Data Management Program

Steps in implementation should be taken during the second phase to move to an ongoing operational status. Its foundations are firmly established and the main initial tasks of the Working Group of the new body would be to:

- Work towards the development of a functionally integrated Database Network;
- Review and if necessary, develop a practical management process;
- Outline the data-gathering and data management objectives to better reflect the individual priorities of the partners while accommodating the goals of NEAR-GOOS;
- Clarify the role and responsibilities of the Regional Databases relative to those of the National Databases and especially to examine the ways these can be combined and integrated to make a whole system that comprehensively serves the member countries and is more than a sum of the parts;
- Explore the resources required to properly distribute key tasks of the project among and between the NEAR-GOOS membership;
- Define and implement pragmatic and workable training programmes to ensure that the databases are managed by, and can hold on to, skilled and dedicated personnel.



Under this project it would also be appropriate to consider enhancements to the databases and incorporate strategies to:

- Recruit national data-generating bodies not presently involved in NEAR-GOOS;
- Expand the range and quantity of data incorporated, especially those appropriate to the new participants and to the needs of joint experiments;
- Address value-adding enhancements and derived products accessible to users, such as fields, maps and climatologies.

2.4.3 Objective (iii): NEAR-GOOS-Labelled Pilot Projects and Experiments

2.4.3.1 NEAR-GOOS-initiated Pilot Projects

The development of a suite of pilot and/or development projects that are complementary to the Database Project (2.4.2) is seen as an essential (and perhaps the only feasible) vehicle for NEAR-GOOS to achieve its goals. It must be borne in mind however that many such activities are additional to the remit of NEAR-GOOS in its first phase and in order to attract support and interest from governments and scientists, they will need to have the following characteristics from the start:

- High relevance to regional problems and needs;
- Relevance to the NEAR-GOOS vision and objectives for the second phase;
- Capacity to recruit new participants (especially scientists);
- Capable of phased development from modest beginnings, with growth dependent on the attraction of new resources;
- Phases of development of limited and defined time span with regular performance review;
- Having foreseeable and quantifiable outcomes and/or 'products';
- Exploiting and building upon already existing interests and skills of the NEAR-GOOS members and/or prospective joint partners.



To expand the scope of possibilities according to these criteria, projects should be undertaken jointly or in collaboration with other bodies or programmes wherever possible.

It is important that projects are not undertaken only on the basis of perceived common interest of a few individuals or of transient opportunity and that the number of projects is restricted and matched to the manpower and financial resources available to sustain progress at

a reasonable rate, especially during start-up. The CC will have an important role in the critical evaluation of proposals and the prioritisation of their implementation.

The adoption of NEAR-GOOS-labelled or NEAR-GOOS-associated projects should follow careful review by the CC. Projects cannot be detailed in this present plan because of the need for evaluation in terms of the foregoing requirements but examples for consideration are summarized in Annex 6.

2.4.3.2 Joint Projects with other bodies

There are strong reasons for developing projects linking NEAR-GOOS ocean observing activities with research. Given that the present NEAR-GOOS agencies are focussed on data

management, one effective vehicle may be through joint alliances with other agencies, under the umbrella of existing external regional programmes and international frameworks of cooperation.

It is important that any programme to which NEAR-GOOS is linked is appropriately labelled.

One criterion for the 'labelling' is the project's ability to add specific value in the region, for example, a project undertaken cooperatively by Member States compared to one done individually (e.g. the Yellow Sea LME which focuses on doing service for the multi-national community).

Possibilities for joint projects that have potential and worthwhile links with NEAR-GOOS are summarized in Annex 7.



**UNDP / GEF Yellow Sea
Large Marine Ecosystem
Project**

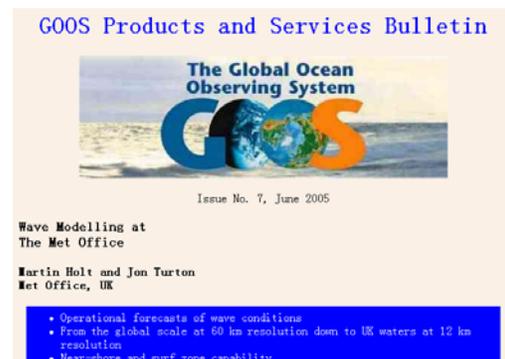
2.4.4 Objective (iv): Outreach programs

2.4.4.1 The Promotion of NEAR-GOOS

2.4.4.1.1 Promotion to the scientific and technical user community

The promotion of NEAR-GOOS in its second phase is important in gaining increased support, participation and sponsorship and should be the subject of a separate implementation plan developed by the appropriate WG. The following are matters for inclusion, based on suggestions arising at recent CC meetings.

- Redesign of the NEAR-GOOS webpage to reflect the new structure, and regular updating of the content, together with semi-popular 'brochure' style material, mounted on the website, that can also be used in vectored distribution during events such as workshops, conferences and exhibitions; an example would be a web publication similar to the GOOS Products Bulletin (see <http://ioc.unesco.org/gpsbulletin/>);



- Preparation of graphical and visual material to explain specific Pilot Projects, including maps, numerical statistics and outcomes and products;
- Publication of the Strategic Plan, translated into several regional languages.

2.4.4.1.2 Recruitment of partners to NEAR-GOOS.

The present participating agencies in NEAR-GOOS are strongly if not exclusively focussed on marine data acquisition and management. This remains a key activity but to enlarge the ambit and achieve the long-term goals, there needs to be participation and commitment to NEAR-

GOOS and respect of its function by a much wider range of national agencies of the region, especially those to which national responsibility falls for implementing the stages of integrating and scientific value-adding (e.g., technology development, modelling, validation, product development). The task has several elements:

- *Raising Awareness.* This might be initiated by visits and informational presentations by NEAR-GOOS Steering Committee members to targeted national organizations that might already be users of NEAR-GOOS data but do not see it as part of a mutually supportive system;
- *Vectored workshops and symposia.* To raise the interest of working scientists, meetings should be arranged at different national venues (the WESTPAC Scientific Symposia are a prime example) on topics that indicate a path to the NEAR-GOOS-labelled Projects (see 2.4.3). NEAR-GOOS should also maintain its participation in GOOS regional forums as a means of informing the ocean observing community.
- *Exploring user needs* from the perspective of project-implementing bodies and scientists to identify observing priorities and critical variables for these bodies to be incorporated in the NEAR-GOOS data suites. This point has particular relevance to Coastal NEAR-GOOS projects.
- *Publications.* It is important to keep the scientific and ocean observing community continually informed of the NEAR-GOOS activities and products. These should be technical and specific in content (see 2.4.4.1.1 above) and capable of incorporation in international lists and inventories.

2.4.4.2 Capacity-building and training

NEAR-GOOS, through its partner agencies, has maintained an active programme of training and information-sharing events. Its major component is IOC/WESTPAC Training Course on NEAR-GOOS Data Management which has been carried out by Japan (JODC) for ten years.

For the second phase, it has been proposed that excepting data management, the scope of training courses could be widened. For example, training could include methods and technology or other fields directly related to NEAR-GOOS activities. Also, NEAR-GOOS workers might benefit from a small-scale workshop related to NEAR-GOOS capacity building.



In general, it appears that the main thrust should be a comprehensive forward action plan for training in the second phase that:

1. Anticipates new needs emerging from the enlarged data management tasks and responsibilities and the demands of new Pilot Projects, including technological advances
2. Evaluates the personnel requirements of the participating national organizations to take on new NEAR-GOOS-related work and builds these requirements into a 'vectored' or focussed series of training courses or workshops
3. Takes account of the basic training needs of new participants and national agencies in NEAR-GOOS and other regional data-gathering and data-using projects (such as might arise from SEAGOOS or Pacific GOOS) and build these needs into introductory courses
4. Identifies suitable training programs from potential partner organizations that may offer the NEAR-GOOS community opportunities to learn about specific aspects pertinent to NEAR-GOOS functioning, to increase the value and effect of the training provided.

The development of such an action plan should be a primary task for the WG for Outreach Projects.

3. Financial Resources

For NEAR-GOOS to expand its scope, resources additional to those committed presently by the participating agencies will be required. The new structure, arranged in terms of ‘pilot projects and experiments’, should assist in attracting sponsors who are interested in specific activities while enabling them to control the extent and duration of their commitment to the overall framework of NEAR-GOOS.

3.1 Consolidating governmental investment in NEAR-GOOS

Of great importance in securing resources for the continuation and expansion from a pilot experiment to an ongoing operational regional system is the interest and confidence of governments. If the benefits of this form of regional coordination and integration are to be realized, governments need to be aware of them and develop national positions concerning their support in the intergovernmental arena and in the pursuit of international conventions and treaties.

There is much current interest (especially in the global change context) paid to the importance of observing systems. This recognition needs to be selectively followed forward where possible toward the advancement of NEAR-GOOS goals. Some feasible approaches are:

- Ensure that the delegations of Partner countries to intergovernmental bodies are kept informed of NEAR-GOOS initiatives and developments. The international GOOS organization can provide complementary action;
- Invite high level governmental representation when holding NEAR-GOOS meetings and symposia;
- Ensure that a brief and up-to-date hand-out sheet outlining the goals and activities of NEAR-GOOS is always available;
- Involve the scientific media at the start of any noteworthy new initiative;
- Using direct personal contact, recruit the interest of the heads of the NEAR-GOOS partner agencies and inform them not only of successes but also of difficulties being encountered.

3.2 Drawing on resources from participating Partner countries

National agency objectives are sometimes necessarily narrowly focussed. To draw resources for any new NEAR-GOOS project, confidence must be won specifically in terms of relevance, feasibility, efficiency and effectiveness.

Commitments will always be made primarily in the national interest, but nevertheless they may be acceptable in terms of NEAR-GOOS providing there is alignment with GOOS Principles such as access and standards of quality. Reciprocal benefit will arise from global information and expertise applied to the solution of local problems.

Project-specific meetings and workshops (to which national specialists and representatives of the targeted user groups or industries are invited) are an effective starting mechanism to

develop understanding and appreciation of how projects can be applied to local and regional problems.

Thus an essential part of the strategy for the implementation of pilot projects should be the convening of such meetings, followed by direct approaches to relevant national agencies and/or industries for commitment. It is appropriate that the WESTPAC Regional Office should be called upon to assist in organising these meetings, and to find international resources where required.

3.3 Assistance by international organizations

The international GOOS infrastructure can assist by supporting the participation of international experts, and during the implementation of the pilot projects by assisting the sharing models, information and techniques. The international community can also assist in training of personnel and capacity building, to yield benefit for the programme overall.



Organizations such as IODE and J-COMM, which are supported by nations through their contributions to the IOC and WMO, can also be called upon as part of their mandate to assist NEAR-GOOS projects and can facilitate the secondment of personnel and the use of national facilities to carry out parts of the projects. The WGs of Pilot Projects should be encouraged to negotiate with these bodies to enlarge the resources for implementation and to gain visibility and standing of the projects in the international arena.



3.4 Industrial support

Industries in many forms (agribusiness, energy, insurance, fisheries, construction, telecommunications and so on) may be not only users of GOOS products and services but also providers of GOOS data, information, products, and services. NEAR-GOOS should welcome their involvement and give attention to their advice and requirements.

Without direct industrial relevance, cash support is unlikely. Efforts to build links to industry should be carefully targeted on selected companies who are major users of marine information in the main sectors: oil and gas; shipping; fisheries;



construction; telecommunications; and insurance.

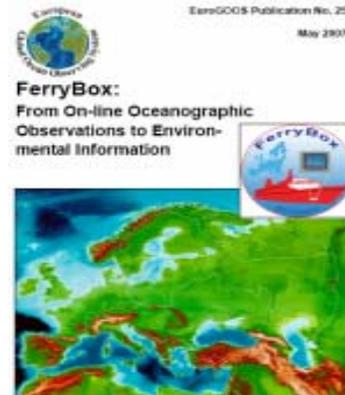
Some industries (fisheries in particular) maintain their own data-gathering networks, A primary goal should be to persuade such industries to contribute their holdings of often highly localised data to NEAR-GOOS databases, which can offer advantages in low-cost archiving and retrieval. In accepting such data NEAR-GOOS centres would seek to ensure that the data were provided along with appropriate metadata (information regarding the collection of the data), appropriate quality assurance, and freedom of distribution.

At present, commercial shipping and fishing operations provide access to ships for the collection of marine information through the J-COMM Ship of Opportunity Programme (SOOP)



and the WMO Voluntary Observing Ship (VOS) programme. Regional industries could in similar fashion contribute at little cost or inconvenience to NEAR-GOOS projects. The Ferry-box project is a good example.

An advantage to service industries and their users in supporting NEAR-GOOS is that this could, with strategic development, provide the basis for the creation of advanced commercial services and products that are beyond present capabilities.



4. References

1. **The GOOS Principles** (last updated 16 January 1999), available: <http://ioc.unesco.org/goos/princip.htm>
2. **IOC Oceanographic Data Exchange policy:** IOC Reports of Governing and Major Subsidiary Bodies, Twenty-second Session of the Assembly, Paris, 24 June – 2 July 2003, (IOC-XXII/3) UNESCO, Annex II, Resolution XXII-6, p7.
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6. **IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS) Eighth Session,** Beijing, People's Republic of China, 8-10 December 2003, Intergovernmental Oceanographic Commission *Reports of Meetings of Experts and Equivalent Bodies* GOOS Report 137, UNESCO
7. **IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS) Ninth Session,** Sendai, Japan, 3-5 November 2004, Intergovernmental Oceanographic Commission *Reports of Meetings of Experts and Equivalent Bodies* GOOS Report 157, UNESCO
8. **IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS) Tenth Session,** Busan, Republic of Korea, 16-18 January 2006, Intergovernmental Oceanographic Commission *Reports of Meetings of Experts and Equivalent Bodies* GOOS Report 158, UNESCO
9. **IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS) Eleventh Session,** Bangkok, Thailand, 18-19 January 2007, Intergovernmental Oceanographic Commission *Reports of Meetings of Experts and Equivalent Bodies* GOOS Report 160, UNESCO

Annex 1: The GOOS Principles

These are detailed and explained in Reference 1

I. Design principles

1. GOOS is based on a plan designed to meet defined objectives on the basis of user needs.
2. The design assumes that contributions to GOOS are long term.
3. The design will be reviewed regularly.
4. The design allows for flexibility of technique.
5. GOOS is directed towards global problems and/or those ubiquitous problems benefiting from global observing systems.
6. The design covers the range from data capture to end products and services.
7. The management, processing and distribution of data will follow a specified data policy.
8. The design takes into account the existence of systems outside GOOS that can contribute to and/or benefit from GOOS.
9. The design takes into account quality assurance procedures.

II. Principles of involvement

1. Contributions to GOOS will be compliant with plans developed and agreed on the basis of the Design Principles.
2. Contributions will be compliant with a defined GOOS data policy.
3. Contributions should reflect intent for sustained observations.
4. Standards of quality will apply to GOOS contributions.
5. Implementation will be effected using existing national and international systems and organizations where appropriate.
6. Implementation will be incremental and progressive, bearing in mind the long-term goals.
7. Participation in GOOS implies an undertaking to help less-developed countries to participate and benefit.
8. Participants will have full autonomy in the management of their contributions to GOOS.
9. Contributing nations and organizations will reserve the right to determine and limit their contributions to GOOS.
10. Use of the GOOS 'label' implies conformity with the relevant principles of GOOS.

Annex 2: The IOC Oceanographic Data Exchange Policy

(Endorsed at the twenty-second Session of the IOC Assembly, Paris, July 2003, see Ref 2)

Preamble

The timely, free and unrestricted international exchange of oceanographic data is essential for the efficient acquisition, integration and use of ocean observations gathered by the countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes on the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible.

Recognizing the vital importance of these purposes to all humankind and the important role of IOC and its programmes in this regard, the Member States of the Intergovernmental Oceanographic Commission **agree** that the following clauses shall define their policy for the international exchange of oceanographic data and its associated metadata.

Clause 1

Member States shall provide timely, free and unrestricted access to all data, associated metadata and products generated under the auspices of IOC programmes.

Clause 2

Member States are encouraged to provide timely, free and unrestricted access to data and associated metadata from non-IOC programmes that are essential for application to the preservation of life, beneficial public use and protection of the ocean environment, the forecasting of weather, the operational forecasting of the marine environment, the monitoring and modelling of climate and sustainable development in the marine environment.

Clause 3

Member States are encouraged to provide timely, free and unrestricted access to oceanographic data and associated metadata, as referred to in 1 and 2 above, for non-commercial use by the research and education communities, provided that any products or results of such use shall be published in the open literature without delay or restriction.

Clause 4

With the objective of encouraging the participation of governmental and non-governmental marine data gathering bodies in international oceanographic data exchange and maximizing the contribution of oceanographic data from all sources, this Policy acknowledges the right of Member States and data originators to determine the terms of such exchange, in a manner consistent with international conventions, where applicable.

Clause 5

Member States shall, to the best practicable degree, use data centres linked to IODE's NODC and WDC network as long-term repositories for oceanographic data and associated metadata.

IOC programmes will cooperate with data contributors to ensure that data can be accepted into the appropriate systems and can meet quality requirements.

Clause 6

Member States shall enhance the capacity in developing countries to obtain and manage oceanographic data and information and assist them to benefit fully from the exchange of oceanographic data, associated metadata and products. This shall be achieved through the non-discriminatory transfer of technology and knowledge using appropriate means, including IOC's Training Education and Mutual Assistance (TEMA) programme and through other relevant IOC programmes.

Definitions

'Free and unrestricted' means non-discriminatory and without charge. "Without charge", in the context of this resolution means at no more than the cost of reproduction and delivery, without charge for the data and products themselves.

'Data' consists of oceanographic observation data, derived data and gridded fields.

'Metadata' is "data about data" describing the content, quality, condition, and other characteristics of data.

'Non-commercial' means not conducted for profit, cost-recovery or re-sale.

'Timely' in this context means the distribution of data and/or products, sufficiently rapidly to be of value for a given application

'Product' means a value-added enhancement of data applied to a particular application.

Annex 3: Terms of Reference for the NEAR-GOOS Coordinating Committee

These terms of reference were affirmed at the seventh meeting of the Coordinating Committee (Vladivostok, 2002, Ref 5), Resolution SC-WESTPAC-NEAR-GOOS-VII.1

REVISED TERMS OF REFERENCE

As part of the revised organizational structure for NEAR-GOOS in its second phase, the NEAR-GOOS Coordinating Committee will operate with the following general Terms of Reference:

Composition:

The Committee shall consist of representatives of all member countries. Each country shall designate two members, preferably with one person coming from the operational meteorological/oceanographic community. The Committee shall elect a Chairperson among the members. The Chairperson of the Coordinating Committee will act as NEAR-GOOS Coordinator. The Committee shall meet to the extent possible in regular annual sessions at the expense of the participating countries. Other countries and appropriately affiliated organizations can attend the sessions as observers.

In case a Member is unable to attend, his or her government will try to send a suitable replacement, so that there is continuity of representation.

Responsibilities:

- a) Coordinate the development of applications in operational oceanography that demonstrate the usefulness of regional collaboration;
- b) Encourage the increase the volume of quality-controlled data available to the NEAR-GOOS Community through the respective national and regional databases, where possible with the smallest time delay possible;
- c) Inventory and analyse existing activities relevant to NEAR-GOOS including operational systems and programmes, organizations, scientific programmes, services and products, commercial interests, and training and capacity building;
- d) Coordinate to produce integrated comprehensive data sets and data products that conform to the principle of end-to-end data management;
- e) Prepare a NEAR-GOOS Strategic Plan that highlights the direction of NEAR-GOOS over the next five years that incorporates the economic, social and environmental protection needs of the region with a clear approach to enhancing the coordinating mechanism of NEAR-GOOS;
- f) Publicise and disseminate NEAR-GOOS plans and information to regional governments and the general public;

- g) Recommend scientific and technical activities to support NEAR-GOOS implementation by coordinating new pilot projects and providing linkages to existing projects and programmes;
- h) Produce guiding documents for the near real time data collection and exchange in the NEAR-GOOS region;
- i) Advise and consider sources of funding for pilot project development with various funding agencies and in consultation with pilot project leaders;
- j) Liaison with national NEAR-GOOS committees, J-COMM, GOOS Project Office and other GOOS-related bodies as appropriate;
- k) Develop linkages with existing relevant organizations, programmes and projects in the region.

Annex 4: Draft General Terms of Reference for Project Working Groups (WGs)

As part of the revised organizational structure for NEAR-GOOS in its second phase, a WG will be created for each Pilot Project or Experiment to provide leadership and technical guidance in its implementation. To facilitate the preparation of a proposal to develop a NEAR-GOOS project, a WG may be created in advance of implementation.

The following are the general Terms of Reference for the WGs. These may be adapted or refined for the specific requirements with the approval of the NEAR-GOOS Coordinating Committee.

Composition:

Representatives of one or more of the participating agencies or organizations selected for their technical expertise in the subject area and/or mandated authority to represent each organization concerned. Membership may change by consensus and representatives need not be members of the participating agencies

Chair:

A chairperson, selected from the representatives by consensus, for a term mutually agreed, who will be responsible for representing the Sub-committee and reporting to the CC.

Responsibilities:

- (i) Develop and maintain detailed design, implementation and action plans for the project, as required.
- (ii) Facilitate negotiation between the participating bodies, as required.
- (iii) Determine resource requirements and propose plans to gain resources
- (iv) Organize meetings and workshops to develop common plans and goals and to recruit partners.
- (v) Advise the CC as required on the project, including resourcing and difficulties and recommend actions to facilitate progress

Annex 5: Specific Objectives of the Database Pilot Project

- a) Seek optimal monitoring and observation strategies in terms of spatial and temporal coverage (platform location and frequency) through coordination at the national level and international level, and the introduction of innovative methods of data gathering (e.g. new sensors, joint platforms, ferry boat monitoring, modelled data, remote sensing and automated buoy systems or an integrated approach);
- b) Assess the feasibility of the inclusion of critical environmental and ecosystem parameters for operational purposes; establish demonstration projects in these fields;
- c) Provide ground truthing data for operational remote sensing to the extent possible;
- d) Establish a coordinating mechanism or platform to facilitate the development of generic suite of basic data products, including inter alia:
 - encouraging the creation of NEAR-GOOS-labelled projects directed to the generation of specific value-adding data services and/or specialist products and introducing and promoting the use of new methods and technology;
- e) Stimulate the use of Quality Assurance/Quality Control standards and protocols, preferably through harmonization of existing technologies, joint development of new standards, and calibration exercises;
- f) Providing a focus for data and information preservation and archiving;
- g) Further develop and improve as required the existing data exchange mechanism introducing the concept of merged and combined data sets, including version control;
- h) Pursue end-to-end data management with particular emphasis on (near-) real-time processing of data for operational applications;
- i) (attempt) to reduce the delay in data transmission from data collection to their use in specific applications;
- j) Where possible, encourage the use of a meta data standard, giving insight in the quality assurance procedures used, data sampling, long term data availability and other necessary elements to enable interdisciplinary use of data among the data providers taking into account IODE initiatives;
- k) Conduct a needs assessment for capacity building in NEAR-GOOS and develop the future capacity building programmes suitable for those needs.
- l) Provide, on behalf of the participating agencies, a centralised, effective and balanced response to national and international bodies on data management issues; and,
- m) Provide unified feedback and reporting in I-GOOS and other international forums on behalf of the NEAR-GOOS members.

Annex 6: Representative NEAR-GOOS Pilot Projects

1. Data and Information Management Projects

IOC established the Global Oceanographic Data Archaeology and Rescue (GODAR) Project in 1993. GODAR seeks to increase the volume of historical oceanographic data available to climate change and other researchers by locating ocean profile and plankton data sets not yet in digital form, digitising these data and ensuring their submission to national data centres, and the world Data Centre System.

The importance of promoting the GODAR program in the region was recognized at the International Conference for the International Data & Information Exchange in the WESTPAC region 1999 (ICIWP'99) held in Langkawi, Malaysia, Nov. 1999 and the IODE Committee approved the GODAR-WESTPAC as a regional sub-project of the GODAR at its 16th Session of the IODE Committee in Lisbon, Portugal, November 2000.

JODC has been acting as a coordinating agency for this project. The 3rd International Workshop for GODAR-WESTPAC held in Tokyo, Japan, 4 to 6 December 2006 appreciated the achievements made on GODAR-WESTPAC, and recognized the need to continue the rescue activity. The workshop encouraged the member states continue its effort to rescue and archive historical oceanographic data. A follow-up activity to the GODAR-WESTPAC project was suggested as one of the activities of a pilot project of Ocean Data and Information Network for the Western Pacific region (ODIN-WESTPAC). The decision of the NEAR-GOOS CC members at its 11th Session was to request the IOC/WESTPAC Secretariat to take necessary action for adoption of the ODIN-WESTPAC pilot project proposal and to invite all NEAR-GOOS participating member states to take part in the pilot project when approved.



2. Satellite remote sensing

During the last decade, satellite measurements of sea surface temperature have matured considerably and several instruments provide unprecedented daily views of the structure and dynamics of the ocean surface with astonishing accuracy. New microwave instruments are now entering service, providing global measurements that are free from the corrupting influence of clouds and stratospheric aerosols (contaminants that have perpetually frustrated infrared measurements from space). Global networks of moored and drifting buoys report in situ sea surface temperature in real time via



satellite link and the Global Telecommunications System. In situ radiometer systems, providing precise measurements of the surface skin temperature, capable of autonomous deployment aboard commercial ships for extended periods are emerging, promising for the first time, the possibility of an extensive data resource for the proper validation of sea surface temperatures from infrared satellite sensors.

While the measurement of even such a basic variable as sea surface temperature, fundamental challenges remain. Satellite sea surface temperature products are of varied heritage, assembled using many different approaches and algorithms, often with considerable duplication of effort in different countries. Extensive data sets are derived from multiple sensors, sampling at different times of the day and thus introducing regional and temporal biases associated with diurnal stratification of the upper ocean. In some cases, precessing satellite orbits compound this problem, although little progress has been made to address these effects. In practice, the accuracy, sensitivity, and sampling resolution of global sea surface temperature products is far from optimal.

All these issues present worthwhile challenges for scientific development in the NEAR-GOOS context.

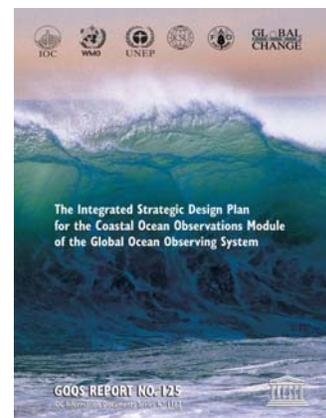
An Ocean Remote Sensing Programme (ORSP: Programme Leader, H. Kawamura) has been established as one of the science programmes in the WESTPAC-V in August 2002, and two-projects are now active under the ORSP. New Generation Sea Surface Temperature Project (NGSST-P: Project Leader, H. Kawamura) is one of the projects and its goal is to generate new SST products responding to the above-mentioned regional needs. A better combination of remote sensing measurements and regional in situ observation systems need to be investigated to achieve sustainable generation of the new SST products. A strategic design plan and implementation procedure were discussed and determined by the initial members in early 2003.

During the second phase an opportunity exists for this programme to be complemented by, or combined with a NEAR-GOOS Pilot project that brings in researchers from the Partner agencies.

3. Coastal NEAR-GOOS

GOOS has recently released the 'Integrated Strategic Design Plan for the Coastal Observations Module of the Global Ocean Observing System' (IOC Information Documents Series No 1183, 2003). This addresses the difficult task of defining the approach to integrated and systematic observations in the coastal zone. It acknowledges the key role that GOOS Regional Alliances such as NEAR-GOOS will have in ensuring both the regional relevance of observations and their incorporation in an integrated system.

It is not appropriate here to reproduce the content of the document, but to mention some salient concepts. The approach is focussed on *in situ* observations with stress on the complementary use of satellite remote sensing and hence indicates a relationship to the IGOS projects foreshadowed in Annex 7. From a list of variables that make possible the



detection of state and the prediction of change in the coastal zone, it describes a procedure for ranking of these in relation to particular purposes or functions that are specific to a region.

Such a ranking exercise could be a worthwhile exercise for NEAR-GOOS with the participation of all members, as an essential preliminary for the coordination of coastal observations. This would aid common appreciation of the priorities and a multi-national ‘ownership’ of the projects subsequently chosen.

The plan goes on to discuss the linking of observations with models, which is an essential step in the fulfilment of the goals of NEAR-GOOS. It examines the kinds of models required for different applications and addresses the organizational implications in bringing an ‘observations/models’ system to an operational status.

As part of a ‘scoping’ exercise for a coastal project, NEAR-GOOS would need to undertake an analysis of this step in terms of the prospectively feasible data types and the technical and scientific capabilities of the Partners.

4. Sub-regional seas projects

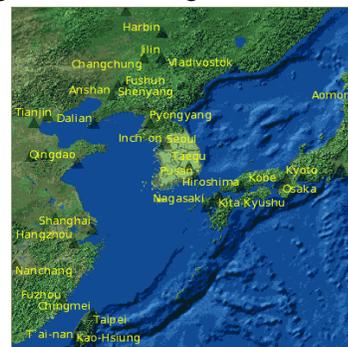
These would be collaborative projects for data collection, such as ferry boxes or jointly operated buoys or drifter programmes. The deployment of offshore monitoring platforms or buoys is expensive, yet necessary to ‘ground truth’ remote sensing applications, and to calibrate and validate many models. Such types of observations could well be implemented as joint collaborative pilot experiments in which the countries share in the cost and burden for the operation of the platforms.

The initiation of collaborative offshore ocean data gathering projects through the cooperation of the participating countries could form an essential and new contribution to GOOS. For geopolitical and practical reasons, it may be desirable to create separate projects, each with its own WG, for the specific marine regions, for example, the Yellow Sea Large Marine Ecosystem Project:

This project has commenced with the participating countries China and the Republic of Korea, and is directed to better understand how to sustain the ecosystem. Under the programme, the DPR Korea will have a national component. At this stage it is not recognised as a NEAR-GOOS project

Three meetings will be held this year organized by the CKJORC that aim at establishing an operational oceanographic capacity in the Yellow Sea.

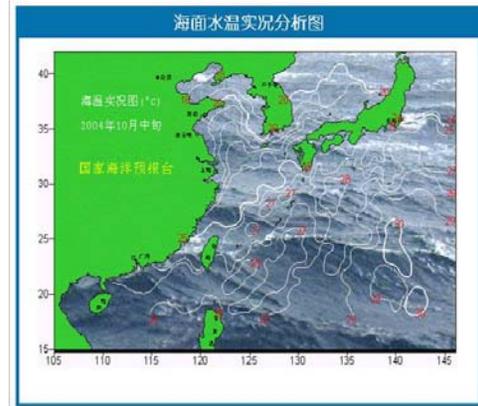
Following the establishment of the project office and hiring of the Programme Director, drafting will commence on Strategic Action Programme.



5. Project towards operational forecasting

Such a project could be directed to the evolution of activities that in the first five years, demonstrate the value of operational oceanography and, for the next phase, will become tools for an operational capability in the NEAR-GOOS region. They could include:

- *Circulation modelling and forecasting.* This is still largely in a research phase, and there is a definite need for more and especially good data sets from across the region. Recognizing the defined role for NEAR-GOOS in regional coordination, the initial focus could be on basin-scale circulation models for the marginal seas, with contributions from each member state as appropriate. The time scale of forecasting will depend on what is realistically feasible;
- *Ecosystem modelling.* Not much progress has yet been made in the development of GOOS initiatives worldwide, but it is important to the strategic development of NEAR-GOOS to incorporate at least one project directed to the acquisition and use of ecologically relevant variables.



Important considerations when prioritising activities are the ultimate utility of the product, and the ways by which the NEAR-GOOS community can obtain and deliver good data sets.

An issue requiring resolution by the CC is whether NEAR-GOOS should focus on the delivery of forecasting products or on the delivery of good data sets. Several observers have indicated a preference for forecasting products in view of the regional emphasis and a need to focus on outcomes that depend on cooperative action between the partners, which NEAR-GOOS is uniquely designed to provide. In principle NEAR-GOOS should follow the concept of an end-to-end system and therefore it is necessary to have a clear understanding of the potential users. Ideally, NEAR-GOOS would yield generic products at the intermediate level that can be adapted, modified and packaged for specific uses by relevant agencies and institutions (including for commercial purposes) as appropriate.

Annex 7: Projects with other programs and organizations

The following are representative of the possible frameworks for joint projects with other organizations.

1. North Pacific Marine Science Organization (PICES)



The formal relationship between the ICES Science Board and GOOS has resulted in an identified need to develop GOOS-type activities in the North Atlantic in collaboration with ICES (International Council for the Exploration of the Sea). ICES and GOOS are both interested in expanding the set of 'pilot' projects to other locations in the world, in particular to the North Pacific and PICES. An obvious candidate partner is NEAR-GOOS.

Of all the international marine organizations operating in the region, PICES is probably the most multi-faceted and active potential user of NEAR-GOOS capability. It also has among its membership, all of the NEAR-GOOS member countries. There is therefore a strong justification for developing joint projects that exploit the respective strengths of both. For some time mutual interests have been stressed by PICES. Noteworthy PICES activities are the Technical Committee on Monitoring, Technical Committee on Data Exchange and Committee on Physical Oceanography and Climate. It should be borne in mind that the focus of PICES is on an ecosystem approach applied to the survival and health of the ecosystems in the North Pacific region under the pressure of global change. To this end PICES is a co-sponsor of the PICES/GLOBEC Climate Change and Capacity Program and conducts a very active programme of workshops, conferences and publications. In October 2005 an Advisory Panel for CREAMS/PICES was established to initiate and oversee a program to study the hydrography, circulation, and biology and their variability in East Asian Marginal Seas, effect of climate and long-term changes in the abiotic and biotic environments of this region, and to facilitate the establishment of permanent regional observation and data exchange networks. PICES has a strong intention to support development of GOOS in the North Pacific. For example, in the report of PICES Study Group on GOOS in 2006 it is recommended that PICES would provide a forum for representatives of the existing North Pacific observing systems in which would be developed cross-GRA (international) observing projects, observing technologies, and data and information sharing.

NEAR-GOOS is well equipped to commence a study of the climatology and variability of the physical dynamics of these seas, using the existing capabilities of the Database host Agencies. With PICES as a scientifically oriented partner, there is potential both to focus on the dynamics of closest relevance to the ecosystems, to stimulate investigations using remote-sensed data which is (or could be) handled by the national and regional DB's and to define additional non-physical variables that have the highest priority for inclusion in the NEAR-GOOS suite of collected data.

2. Integrated Global Observing Strategy (IGOS)



IGOS is a conceptual framework for the worldwide coordination of organizations and programs directed to improving and gaining maximum benefit from the observation of the Earth. A particular advantage of involvement is the link it enables between in-situ observation systems and satellite observing systems, with the objective of optimizing both systems.

IGOS is organized into 'Themes'. The first of these created is the 'Oceans Theme', formulated in 1999. The Team Membership for this theme includes several of the major national space agencies and GOOS, which represents the in-situ ocean observing system elements, while J-COMM is responsible for in-situ implementation. The Theme has already achieved success in developing the transition between research and operational monitoring, with several of the space agencies committing to support the continuation of precision ocean altimetry following the Jason-1 mission.

Recently, IGOS has initiated a Coastal Theme in partnership with GOOS, the Global Terrestrial Observing System (GTOS) and the International Geosphere-Biosphere Program (IGBP), and is seeking to integrate and coordinate observing activities in the coastal zone.

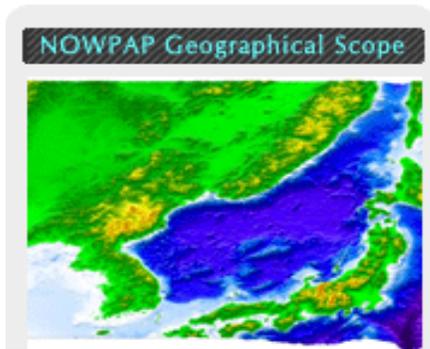
Both of these themes provide an opportunity for NEAR-GOOS to develop projects that will open doors to collaboration with the space agencies and regional observing programmes. During the second phase, workshops and other forums should explore the possibilities for expanding NEAR-GOOS roles to include selected projects that exploit new capacities for remote sensing of vulnerable regional coastal areas.

3. Northwest Pacific Action Plan (NOWPAP)



The Northwest Pacific Action Plan was established in 1994 by UNEP as a component of the Regional Seas Programme with the purpose of guiding the use and development of the marine environment and coastal zones of (what became) the member countries of NEAR-GOOS. Among its objectives (see <http://www.nowpap.org>) were:

- i) 'coordinating and integrating monitoring and data-gathering systems on a regional basis...'
and
- ii) 'To collate and record environmental data and information to form a comprehensive database and information management system....'



In particular the objectives of NOWPAP Data & Information Network Regional Activity Centre (DINRAC) are to establish a region-wide data and information system, comprehensive databases, and to promote regional information exchange on marine and coastal environment. While main activities of NOWPAP Special Monitoring & Coastal Environmental Assessment RAC includes developing of new monitoring tools using remote sensing. These objectives

appear to link NOWPAP with NEAR-GOOS implicitly but directly.

Cooperation between NOWPAP and NEAR-GOOS would be expected through the contributions of NEAR-GOOS in the scientific inputs to NOWPAP activities, enrichment of oceanographic observation data such as marine pollution data, real time sea surface data (currents, wind and temperature) for oil spill forecasting, and in situ data for remote sensing (Chlorophyll-a, Suspended Solid (SS) and Colored Dissolved Organic Matter (CDOM)). In turn, the contributions from NOWPAP could be made in information databases or portal sites of DINRAC and CEARAC, getting access of NEAR-GOOS to the Remote Sensing database of Marine Environmental Watch Project, and the provision of training course on remote sensing. Of interest is the financial aspects of NOWPAP from which NEAR-GOOS may draw some ideas in relation to attracting sources to fund its activities e.g. meetings and projects.

4. Joint WMO/IOC Commission for Oceanography and Marine Meteorology (J-COMM)

J-COMM deals with intergovernmental coordination, regulation and management of operational marine meteorology and oceanography, integrated operational ocean observing system and data management, and new products and services. It is an implementation mechanism for global GOOS. But it needs strong regional interactions and support. NEAR-GOOS should remain alert to opportunities for collaboration and for strategic involvement in the J-COMM management bodies.

5. UN Development Programme/Global Environment Facility



The Global Environment Facility and the United Nations Development Programme have been launched Large Marine Ecosystem (LME) project for the Yellow Sea and there are plans for similar project covering northern area of the NEAR-GOOS. The five year Yellow Sea LME project aims to protect marine environment and sustainable use of marine and coastal resources, through preparation and development of the Transboundary Diagnostic Analysis (TDA), Strategic Action Programme (SAP), and pilot implementation of SAP. In this



process, data and information on fisheries, biodiversity, pollutants and ecosystem structure and function should be collected in a special database to provide the baseline assessment of Yellow Sea ecosystem status. In this case NEAR-GOOS could serve as a major provider of basic data for YSLME members to develop their specific information products, while YSLME Database, through the link to NEAR-GOOS, would provide data and metadata on the Yellow Sea and East China Sea. Formal cooperation with YSLME project had been established through a Memorandum of Understanding (MoU), which was signed at the Third Meeting of Project Steering Committee of YSLME on 23 November 2006. The MoU states that cooperation on the data and information link was agreed upon as one of the areas of common interests.





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