Ocean Biogeographic Information System (OBIS) Infrastructure coordination meeting

INCOIS, Hyderabad, India
2–4 March 2011
Ocean Biogeographic Information System (OBIS) Infrastructure coordination meeting

INCOIS, Hyderabad, India
2–4 March 2011
Figure 1: Participants in the meeting

For bibliographic purposes this document should be cited as follows:


(IOC/2011/WR/240)
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>CONTRIBUTION OF INDIA</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>OBIS DEVELOPMENT CONSORTIUM</td>
<td>2</td>
</tr>
</tbody>
</table>

## ANNEXES

I. AGENDA OF THE MEETING
II. LIST OF PARTICIPANTS
III. TEXT OF WRAP-UP PRESENTATION
The Intergovernmental Oceanographic Commission (IOC) of UNESCO celebrates its 50th anniversary in 2010. Since taking the lead in coordinating the International Indian Ocean Expedition in 1960, the IOC has worked to promote marine research, protection of the ocean, and international cooperation. Today the Commission is also developing marine services and capacity building, and is instrumental in monitoring the ocean through the Global Ocean Observing System (GOOS) and developing marine-hazards warning systems in vulnerable regions. Recognized as the UN focal point and mechanism for global cooperation in the study of the ocean, a key climate driver, IOC is a key player in the study of climate change. Through promoting international cooperation, the IOC assists Member States in their decisions towards improved management, sustainable development, and protection of the marine environment.
1. INTRODUCTION

In response to IOC Circular Letter 2333 (ESTABLISHMENT OF A MULTISOURCE TRUST FUND FOR THE SUPPORT OF THE OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM (OBIS) (16/02/10)), requesting IOC Member States to contribute to assist in the maintenance and further development of the Ocean Biogeographic Information System, several organizations expressed their willingness to assist with support in kind:

- Rutgers University, New Brunswick, New Jersey, USA, expressed their willingness to host the OBIS Project Office, following conditions as spelled out in document IOC/INF-1193;
- The Indian Government offered to host a special data centre for OBIS at the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, India;
- The Flanders Marine Institute, Oostende, Belgium, offered to assist with various data management and IT-related tasks;
- The Marine Geospatial Ecology Laboratory (MGEL) of Duke University, Durham, North Carolina, USA, offered to continue assisting in the development of the OBIS IT infrastructure, and with data analysis and visualization;
- The Centre for Marine Biodiversity of the University Simon Bolivar (USB), Caracas, Venezuela, offered to continue assisting in the development of the OBIS IT infrastructure, and with statistical analysis of OBIS data.

More information on the precise nature of the offers for assistance in kind is part of Annex III, the text of the wrap-up presentation. This meeting, kindly hosted by INCOIS, was needed to coordinate these different offers for support in kind, and to discuss how to share the workload between the different institutes.

The list of participants to the meeting is attached as Annex I. MGEL and USB were not present at the meeting, but were able to provide input to the meeting through Dr Vanden Berghe. Apart from Rutgers University, INCOIS, VLIZ and IODE, several participants from India represented institutes that house OBIS-related activities.

The first part of the meeting was dedicated to a series of presentations, offering all participants an opportunity to inform the meeting on their OBIS-relevant activities. The second part of the meeting was devoted to discussions on how to organize the collaboration, and how to share the workload between the institutes that offered to assist OBIS. The agenda of the meeting is attached as Annex II.

2. CONTRIBUTION OF INDIA

It was noted that the Indian Government will play an active role in OBIS on two levels. The Indian Ocean Regional OBIS Node (IndOBIS) will be hosted by the Centre for Marine Living Resources and Ecology (CMLRE) based in Kochi. Through INCOIS, the Indian Government will also contribute to the international activities of OBIS.
3. **OBIS DEVELOPMENT CONSORTIUM**

In order to coordinate the collaboration, it was suggested to create a list of activities in which OBIS is engaged, and try and match these activities with the expertise and the offers for support of the institutes. In Annex III, a preliminary list of activities, categorized in five broad groups, is listed. For some of these activities, a further specification is given, listing concrete ‘tasks’. These tasks were seen as the basic unit to share the development; they should be a single, well-defined activity, which can be either temporary (e.g. the development of a new tool) or continuous (e.g. the maintenance of a server). The description of a task will contain the person responsible and the team carrying out the work; an implementation plan with deliverables and deadlines; prerequisites. The description of a task should be made available to the OBIS community (through the Steering Group) before implementation starts. The lead institution will make a formal commitment towards the completion of the task, as described below.

The group of five institutes will be referred to as the **OBIS Development Consortium**. Each of the institutes will be invited to sign a Memorandum of Understanding with IOC. Descriptions of the tasks to which the institute has committed itself will be appended as annexes to this MOU.

It was stressed that membership of the OBIS Development Consortium is open; any institute that is willing to make a firm commitment to the development of the OBIS infrastructure is welcome to join the Consortium. Such commitment should be communicated with IOC through a letter to the IOC Executive Secretary.

In order to start the development process, a technical workshop needs to be organized as soon as possible. During this workshop, representatives of Rutgers, MGEL and USB will present the existing infrastructure and suggest further development. VLIZ, INCOIS and possibly others should attend and suggest further developments; they will also be expected to take on some commitments.

Some of the highest priorities for technical developments in OBIS are, from highest to less high:

- Moving OBIS servers out of the Amazon cloud, and on servers that are owned by partners of the OBIS consortium.
- Installing mirror servers, and procedures to keep separate OBIS installations in sync
- Automating, as far as possible, data acquisition and data quality control

Institutes that are member of the OBIS Development Consortium should be member of the IODE Steering Group for OBIS. Presently, this is not the case for USB and INCOIS. It was also suggested that staff members of institutes forming the Development Consortium might want to contact their National IOC representatives about participation in the proposed Group of Experts for OBIS.

It was stressed that the mandate of the Development Consortium is to implement, not to decide on the direction of the development – the latter is the mandate of the Steering Group.
ANNEX I

AGENDA OF THE MEETING

02 March 2011

1430 – 1435 hrs  Welcome remarks by Dr. S.S.C. Shenoi, Director, INCOIS

1430 – 1435 hrs  Opening remarks by Dr. Shailesh Nayak, Secretary, Ministry of Earth
Sciences (MoES), Govt. of India

1445 – 1500 hrs  Opening remarks by Mr. Peter Pissierssens, Head, IOC Project Office
for IODE, Oostende, Belgium

1500 – 1800 hrs  Presentation on OBIS/IODE by Mr. Peter Pissierssens, Head, IOC
Project Office for IODE, Oostende, Belgium

Presentation on OBIS by Dr. Edward Vanden Berghe, OBIS Executive
Director, Rutgers University, USA

Presentation by Mr. Francisco Hernandez, Head, Data Centre and
EurOBIS Node Host, VLIZ, Belgium

Presentation by Mr. E. Pattabhi Rama Rao, Head, Data and
information Management Group (DMG), INCOIS

1900 – 2100 hrs  Dinner hosted by Director, INCOIS

03 March 2011

0930 – 1030 hrs  Presentation by Dr. V. Sanjeevan, Director, Centre for Marine Living
Resources and Ecology (CMLRE), Kochi, India

Presentation by Dr. Baban Ingole, Scientist-F, National Institute of
Oceanography (NIO), Goa, India

1030-1100 hrs  Tea Break

1100 – 1300 hrs  Presentation by National Institute of Ocean Technology (NIOT),
Chennai, India

Presentation by National Centre for Antarctic and Ocean Research
(NCAOR), Goa, India

Presentation by Project Directorate, Integrated Coastal Marine Area
Management (ICMAM), MoES, Chennai, India

1300-1400 hrs  Lunch Break

1400 – 1530 hrs  Visit to INCOIS Labs

1530-1600 hrs  Tea Break

1600 – 1730 hrs  Discussions and formulation of the project document
04 March 2011

1000 – 1300 hrs  Discussions and formulation of the project document
1300 – 1400 hrs  Lunch Break
1400 – 1730 hrs  Tour to city
ANNEX II

LIST OF PARTICIPANTS

INCOIS (India)

Dr. S.S.C. Shenoi
Director
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, INDIA
E-mail: shenoi@incois.gov.in

Mr. E. Pattabhi Rama Rao
Head, Data and Information Management Group (DMG)
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, INDIA
E-mail: pattabhi@incois.gov.in

Mr. T.V.S. Udaya Bhaskar
Scientist-D, Data Management Group (DMG)
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, INDIA
E-mail: uday@incois.gov.in

Mr. Venkat Shesu
Scientist-B, Data Management Group (DMG)
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, INDIA
E-mail: venkat@incois.gov.in

Mr. B.V. Satyanarayana
Head, Computational Facilities and Web-based Services Group (CWG)
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, India

Mr. N. Kiran Kumar
Scientist-B, Computational Facilities and Web-based Services Group (CWG)
Indian National Centre for Ocean Information Services (INCOIS)
Ministry of Earth Sciences
Ocean Valley, P.B. No:21
IDA Jeedimetla (PO)
Hyderabad-500055, India
E-mail: kirankumar@incois.gov.in

NIO (India)

Dr. Baban Ingole
Scientist-F
National Institute of Oceanography (NIO)
Dona-Paula
Goa, India
E-mail: baban.ingole@gmail.com

Dr. Mohideen Wafar
Retd. Scientist from NIO
Member, IO-CoML
Goa, India
E-mail: mwafar@gmail.com

CMLRE (India)

Dr. N. Saravanane
Scientist-D
Centre for Marine Living Resources and Ecology (CMLRE)
Ministry of Earth Sciences
C-Block, 6th Floor, Kendriya Bhawan
CSEZ P.O., P.B. NO 5415, Kochi-682037, India
E-mail: n_saravanane@yahoo.com
ANNEX III

TEXT OF THE SLIDES USED DURING THE WRAP-UP DISCUSSIONS

OBIS Resources

- Funding for Project Officer and Data Manager at Rutgers for 2011
  - A bit of funding will spill over in 2012
  - Resources available through IODE
- A home for the Project Office
  - In a university – possible student projects
- 'Offers in Kind'
  - Formal: INCOIS, MGEL, USB, VLIZ
  - Informal through discussions in Oostende
  - Pending project proposals

Available

- Rutgers
  - Host of international OBIS Secretariat
- Duke/MGEL
  - Mapping and Visualisation team of CoML
  - Thematic centre (Tetrapoda, Tracking data)
- University Simon Bolivar
  - CoML Synthesis
  - Regional centre (Caribbean)
- VLIZ
  - Regional Centre (Europe)
- WoRMS
- INCOIS
  - Physical oceanography
  - IT infrastructure

Possible contributions

- Rutgers
  - Hosting project office, including office space and facilities, and 1 FTE (1/2 FTE=data manager)
  - Networking with international organisations, and international data providers
  - Final data integration and QC
  - Further development of data structures, data exchange formats, information products
- MGEL
  - Systems administration: Amazon, Ubuntu
  - Web site development: GeoServer, OpenLayers
  - Data analysis: GIS, remote sensing
  - Data visualisations
  - (in the framework of GOBI) international networking
  - Networking with US organisations such as NOAA and Navy
  - Thematic centre (Tetrapoda, Tracking data)
- USB
  - Systems administration: Drupal, Ubuntu
  - Data analysis: r, remote sensing
  - Regional Networking
– Spanish translation of the web site; dealing with Spanish feedback
– Regional centre (Caribbean)
– Indian organisations (led by INCOIS)
– Hosting and maintenance of data centre (including backup and archival) – either as the Public Web-site or Mirror Site
– Invest in hardware, software, manpower that are necessary for hosting and maintenance of the data center
– Partner with other organizations of OBIS community in data management, development of tools for automatic data assimilation, integration and QC and Analysis
– Provide expertise in designing appropriate data products and visualization
– Networking with IOGOOS, SIBER, ISA in promoting OBIS
– Any other requirements related to the automation of procedure or development of new tools for generation of data products or QC tools in future

• Vlaams Instituut voor de Zee
– Development and maintenance of the OBIS data system
– Development and maintenance of the OBIS website
– Development and maintenance of the OBIS data interfaces to other networks (CBIFC, EOSO, DP, Seadatanet, EMODNET, ...)
– Better integration of the WORMS-OBIS datasystems
– Long-term hosting, regular updates essential for security and performance of these systems
– High speed internet connection (1 GBit)
– Professional support by IT-staff, data managers and biologist

Categories of activities

• Infrastructure
• Data management
• Usage
  – Applications, use cases
  – Networking of the non-IT kind
  – Governance

Activities: Infrastructure

• Host database, GeoServer and website, system management, backups, usage reporting
  – Now Duke, iOBIS; future also VLIZ, INCOIS and others
  – See below: how to split up this abstract ‘concept’ in several well-defined tasks, with time line and responsibilities
• Host and maintain DiGIR and IPT web services for data transport to GBIF; other web services towards ODP and others
  – Now iOBIS; future VLIZ and others
• Web site development
  – Now Duke, Simon B; future all
• Additional expertise with web developments, tools for data analysis and visualisation
  – Now Duke; future Duke, INCOIS, VLIZ, ScarMarbin

Activities: Data Management

• Capture data from data providers
  – Nodes
• Integrate data in local database
  – Nodes
• Standardize and quality control the data (step I)
  – Nodes
• Generate metadata (step I)
  – Nodes, iOBI
• Synchronise data with iOBI
  – Now iOBI; future Nodes
• Capture data from Nodes
  – iOBI
• Integrate data in central database
  – iOBI
• Standardize and quality control the data (step 2)
  – iOBI
• Generate metadata (step 2)
  – iOBI, GCMD
• Synchronise data with GBIF, EOL (others?)
  – Now iOBI, GBIF; future Nodes
• Tools for data assimilation, integration and QC
• Tools for data synchronization
  – Now iOBI, too much ad-hoc
  – Future VLIZ, INCOIS
• Needs description of the data flow to clarify terminology
• Needs splitting in ‘tasks’

Activities: Usage/Applications

• Generate species distribution maps
  – Now Aquamaps, KU; future ??
• Link species distributions to environmental data
  – Now iOBI; future INCOIS, WDC
• Tools for data products generation
  – Now iOBI; future INCOIS, all
• Data products generation
  – Now iOBI; future all, Nodes

Activities: Networking

• Networking with local data providers and users
  – Nodes
• Networking with regional data initiatives (SeaDataNet, LifeWatch, IOGOOS, SIBER)
  – Nodes, INCOIS, VLIZ
• Networking with global data initiatives (GBIF, EOL, Barcode of Life); networking with international organisations (FAO, CBD)
  – iOBI; assisted by others where appropriate (eg ISA through INCOIS)

Activities: Governance

• Participation to SG-OBIS
  – Now Nodes, iBIS; future also INCOIS
• Participation to GE-OBIS
  – individual experts; need for Duke and Simon Bolivar to get included
• Participation to IODE assembly
  – VLIZ, INCOIS; iOBIS ex-officio

Infrastructure

• Host database, GeoServer and website, system management, backups, usage reporting
  – Now Duke, iOBIS; future also VLIZ, INCOIS and others
  – See below: how to split up this abstract ‘concept’ in several well-defined tasks, with time line and responsibilities
• Host and maintain DiGIR and IPT web services for data transport to GBIF; other web services towards ODP and others
  – Now iOBIS; future VLIZ and others
• Web site development
  – Now Duke, Simon B; future all
• Additional expertise with web developments, tools for data analysis and visualisation
  – Now Duke; future Duke, INCOIS, VLIZ, ScarMarbin

Possible tasks

• Host database, GeoServer and website, system management, backups, usage reporting
  – Archive; WDC is deep archive
  • Task: develop procedures; what is archived when?
  • Task: implement procedures; develop scripts to automate
  – Host database, GeoServer and web site
  • Task: set up servers, install operating system, develop back-up procedures; develop sysadmin plan
  • Choice of Operating System, specifications of machines
  • Sys admin plan: users, authentication…
  • Prerequisites: commitment for uptime and life time
  • Deadline
  • Who will do the work, oversee, sign off
  • Task: install Apache, Tomcat, Geoserver, php… Configure software; develop web admin plan (logging, log file admin)
  • Task: install Postgres, PostGIS; configure; develop db admin plan…
  – …

What is a ‘task’

• A well-defined activity, either temporary or permanent (continuous)
• Needs someone in charge, a set of people to implement
• Needs a plan and an implementation
• Needs a deadline and clear deliverables
• Prerequisites have to be acknowledged and spelled out
• Needs an (institutional) commitment
• Needs to be visible within the OBIS community from the planning phase
Way forward

- Establishment of tasks/task teams?
  - This meeting:
- Establishment of the process to create tasks & task teams
- Deal with some urgent tasks
- Has to be open and transparent
- Technical workshop
  - Rutgers, Duke and USB: present existing infrastructure and suggest further development
  - VLIZ, INCOIS and others: attend and suggest further developments; commitment of resources
- Scientific workshop
  - Identify scientific questions that can be addressed with OBIS data.
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Languages No.</th>
<th>Title</th>
<th>Languages No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CCOP-IOC, 1974, Metallogenesis, Hydrocarbons and Tectonic Processes in the Arabian Gulf region (Report of the IDOE Workshop on), Bangkok, Thailand, 23-24 September 1973</td>
<td>5</td>
<td>UNDP (CCOP)</td>
<td>40</td>
</tr>
<tr>
<td>10</td>
<td>IOC/WMO FAO Workshop on Regional Co-operation in Marine Pollution; Monaco, 19-21 January 1976.</td>
<td>28</td>
<td>IOC/UNESCO International Workshop on Marine Pollution in the Mediterranean: Monte Carlo, 9-14 September 1975</td>
<td>40</td>
</tr>
<tr>
<td>16</td>
<td>Workshop on the Western Pacific, Tokyo, 19-20 February 1979.</td>
<td>34</td>
<td>IOC/UNESCO International Workshop on Marine Pollution in the Mediterranean: Monte Carlo, 9-14 September 1975</td>
<td>40</td>
</tr>
<tr>
<td>No.</td>
<td>Title</td>
<td>Languages</td>
<td>No.</td>
<td>Title</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
<td>-----------</td>
<td>-----</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>211</td>
<td>Ocean Surface pCO₂ Data Integration and Database Development (IOCCP Reports, 2), Tsukuba, Japan, 14–17 January 2004</td>
<td>E (electronic copy only)</td>
<td>236</td>
<td>First Session of the IODE Steering Group for the IODE OceanDataPortal (SG-ODP-I) 20–22 September 2010, Ostend, Belgium</td>
</tr>
<tr>
<td>212</td>
<td>International Ocean Carbon Stakeholders Meeting, Paris, France, 6–7 December 2004</td>
<td>E (electronic copy only)</td>
<td>237</td>
<td>In preparation</td>
</tr>
<tr>
<td>213</td>
<td>International Repeat Hydrography and Carbon Workshop (IOCCP Reports, 3), Shonan Village, Japan, 14–16 November 2005</td>
<td>E (electronic copy only)</td>
<td>238</td>
<td>In preparation</td>
</tr>
<tr>
<td>214</td>
<td>Initial Atlantic Ocean Carbon Synthesis Meeting (IOCCP Reports, 4), Shonan Village, Japan, 14–16 November 2005</td>
<td>E (electronic copy only)</td>
<td>239</td>
<td>Ocean Biogeographic Information System (OBIS) Infrastructure Meeting, INSS, Shonan Village, Japan, 2–4 March 2011.</td>
</tr>
<tr>
<td>215</td>
<td>Number Ocean Variability and Vulnerability Workshop (IOCCP Reports, 5), Laugavatn, Iceland, 28–30 June 2006</td>
<td>E (electronic copy only)</td>
<td>240</td>
<td>In preparation</td>
</tr>
<tr>
<td>217</td>
<td>Changing Times: An International Ocean Biogeochronological Time-Series Workshop (IOCCP Reports, 6), La Jolla, California, USA, 5–7 November 2008</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>218</td>
<td>Second Joint GOSUD/SAMOS Workshop, Seattle, Washington, USA, 10–12 June 2009</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>219</td>
<td>International Conference on Marine Data Management and Information Systems (MSDIS), Athens, Greece, 31 March–2 April 2006</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td>Geo-marine Research on the Mediterranean and European-Atlantic Margins: International Conference and TTR-17 Post-cruise Meeting of the Training-through-research Programme, Granada, Spain, 2–5 February 2009</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>221</td>
<td>Surface Ocean CO₂ Atlas Project Pacific Regional Workshop, Tsukuba, Japan, 18–20 March, 2009 (IOCCP Report Number 12)</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>223</td>
<td>Advisory Workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges, Indian Institute of Technology (IIT), New Delhi, India, 14–17 July 2008</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>225</td>
<td>Reunión subregional de planificación de ODINCARSA (Red de Datos e Información Oceanográficos para las Regiones del Caribe y América del Sur); ODINCARSA (Ocean Data and Information Network for the Caribbean and South America region) Latin America sub-regional Planning Meeting, Universidad Autónoma de Baja California (UABC), Ensenada (México), 7-10 December 2009, 2010</td>
<td>E/S (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>226</td>
<td>OBIS (Ocean Biogeographic Information System) Stakeholder and Work plan Meeting, IOC Project Office for IODE, Ostend, Belgium, 18–20 November 2009</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>227</td>
<td>ODINAFRICA-V:Project Steering Committee, First Session, Ostend, Belgium, 20–22 January 2010</td>
<td>In preparation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>228</td>
<td>First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>229</td>
<td>First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections, IOC Project Office for IODE, Ostend, Belgium, 8–11 February 2010 (IOCCP Report Number 18)</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230</td>
<td>IODC/IOOE-MBL/HWHO Library Workshop on Data Publication, Paris, France, 6–10 April 2010</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>231</td>
<td>First ODINAFRICA Coastal and Marine Atlases Planning Meeting, Ostend, Belgium, 12–14 October 2009</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>232</td>
<td>Eleventh International Workshop on Wave Hindcasting and Forecasing and Second Coastal Hazard Symposium, Halifax, Canada, 18–23 October 2009</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>233</td>
<td>2010 Meeting of the Joint IODE-JCOMM Steering Group on the Global Temperature-Salinity Profile Programme, Ostend, Belgium, 5–7 May 2010</td>
<td>E (electronic copy only)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Intergovernmental Oceanographic Commission (IOC)

United Nations Educational, Scientific and Cultural Organization (UNESCO)
1, rue Miollis, 75732 Paris Cedex 15, France
Tel: +33 1 45 68 39 83
Fax: +33 1 45 68 58 12
http://ioc.unesco.org

IOC Project Office for IODE
Wandelaarkaai 7
8400 Oostende, Belgium
Tel: +32 59 34 21 34
Fax: +32 59 34 01 52
http://www.iode.org