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Workshop Report No. 236

First Session of the IODE Steering Group for the IODE Ocean Data Portal (SG-ODP-I)

IOC Project Office for IODE, Ostend, Belgium
20–22 September 2010

UNESCO

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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.

(IOC/2010/WR/236)

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1. OPENING OF THE SESSION

1.1 Welcome

Mr Greg Reed, IODE Co-Chair welcomed participants to this First Session of the IODE Steering Group for the IODE Ocean Data Portal. Mr Reed was requested to Chair the Meeting.

He referred the participants to the web page http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=713 for the agenda and working documents.

The agenda of the meeting is included as Annex I.

1.2 Introduction of Participants

The participants were invited to introduce themselves. The list of participants is included as Annex II.

2. INTRODUCTION TO THE IODE OCEAN DATA PORTAL

Dr Sergey Belov provided a general introduction on the IODE Ocean Data Portal. His PowerPoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5929

Timely access to quality data is essential for the understanding of marine processes. The International Oceanographic Data and Information Exchange (IODE) programme, through its distributed network of National Oceanographic Data Centres (NODCs), is developing the Ocean Data Portal (ODP) to facilitate seamless access to oceanographic data and to promote the exchange and dissemination of marine data and services. The ODP provides the full range of processes including data discovery, evaluation and access, and delivers a standards-based infrastructure that provides integration of marine data and information across the NODC network.

The key principle behind the ODP is its interoperability with existing systems and resources and the IODE is working closely with the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) to ensure the ODP is interoperable with the WMO Information System (WIS) that will provide access to marine meteorological and oceanographic data and information to serve a number of applications, including climate. Following the IODE-XX recommendations high priority has been assigned to the interaction with the SeaDataNet infrastructure (SDN).

The ODP web site is available at www.oceandataportal.org. This site provides background information on the project, software, documentation and training materials in addition to assistance to users on how to use ODP and how to become ODP data providers. The ODP data access is available at http://data.oceandataportal.org .

2.1 The ODP architecture and functionality

The architecture of the Ocean Data Portal consists of three basic software components: Data Provider, Integration Server and ODP Services.

2.1.1 The Data Provider

The Data Provider processes the local data sets and in a semi-automated way generates the discovery metadata and transport data files on Integration Server requests or time-scheduling manner. These services are based on the OpenDAP data (point, profile and grid) structures and specific metadata model based on ISO 19115.

Current ODP metadata have a number of metadata class extensions as compared with the ISO 19115 and are not fully compatible with ISO. The SDN parameter (BODC) dictionary and other dictionaries are used. The ODP developers are planning to provide the full interoperability with ISO/OGC standards with the next version of ODP.

When the Data Provider is installed in the local data system and local data sets are registered, the latter becomes a data source for the ODP distributed data system.

The Data Provider can cover such local data systems as:

- SQL-oriented databases (ranging from MS Access to Oracle);
- CSV-like structured data files (CSV, TSV and derivatives);
- Any unstructured data files (or unrecognizable by ODP services) – multimedia, documents, archives, etc.

A recent addition to the Data Provider software is the Light Data Provider function which offers remote registration of local datasets using ASCII-type inventory files or XML CDI, WIS and MCP metadata records and allows deployment of the ODP system without the need to install software by the data provider.

The Data Provider has the possibility to support various types of the data granularity, i.e. it is possible to create discovery metadata, search and deliver full datasets or specified data pieces (logical data units) of datasets - single cruise or data profile, single buoy or single coastal station data - and etc. The data granularity level is adjusted in the process of the local dataset registration.

2.1.2 The Integration Server and distributed data system support

The Integration Server provides registration and operation status monitoring of the distributed data sources, harvesting of the discovery metadata in coordination with Data Provider, management of the common codes/dictionaries and access to distributed data sources by ODP services. The Integration Server also interacts with other systems (portals) by means of discovery metadata exchange.

The Ocean Data Portal supports geographically distributed data system based on communication between Integration Server and Data Provider. Recently this ODP function was improved by web-service creation which provides existing request-response communication both with fault-tolerant processing and error catch, recognition and logging. Communication across the ODP distributed data system consists of two processes:

- Metadata harvesting by the Integration Server from the Data Providers. These data descriptions are exposed to a harvester, which is part of the Integration Server. This software regularly (at any set frequency) checks all data centres for new data descriptions and download these as necessary. These descriptions are added to a central repository that covers all data centres connected to the distributed system.
- Request on data. Requests are transmitted by HTTP in encoded form. HTTP-connection between the Integration Server and Data Provider are active during processing and the Data Provider requests acceptance, validation, execution and response return. Communication based on web-services provides transactional and fault-tolerant mode.

The Ocean Data Portal supports geographically distributed marine data infrastructure operations that can publish and disseminate technical guides and reports to IODE data centres and other participating centres. Dissemination of information about the status of all ODP partners will ensure coordination and cross-communication and provide remote software installations and documentation access. Communication will also allow ODP partner groups to discuss and resolve ongoing development issues.

The technical aspects include the provision of metadata and services for a distributed marine data infrastructure enabling the interactions among data providers, service providers and the end-users.

The system allows data interaction whilst avoiding data reformatting and delocalization so the data always remains within the data provider's infrastructure. ODP allows adjustment of services invoking online request/response processes and other operations and also allows chaining of services into more complex ones. The system supports "subscription" type services and standing orders (e.g. oil spill monitoring and alerting) and allows the easy identification of, and access to, requested services and data, with progress follow-up until completion. The integration of data and services from multiple domains is possible to facilitate exploitation of main synergies and service and data providers can register, provide and promote their products to other thematic or regional portals.

The ODP supports "caching" (e.g. for historical data, data from slow servers, etc.), so all requests will be immediately executed and no long queries will be run.

2.1.3 The ODP services

The ODP Services have responsibility for administration, discovery, viewing, analysis and download. The Ocean Data Portal includes a GIS-based user interface, metadata and data search, data download and visualisation components. The ODP services include a number of W3C and OGC web-services.

Discovery service disseminates a data source catalogue with descriptions of resources in the form of XML files. The metadata record is based on ISO 19115. The ODP service provides user interfaces for data and product search supported by the catalogue. The data source catalogue can be accessed from external systems directly or alternatively by reformatting into other metadata structures.

Viewing service is based on web-based applications accessible via the web browser. The services provided include:

- data search that defines the sampling criteria using a spatial region, time period, phenomena, platform, etc.
- access to remote data sources via the Integration Server including request status monitoring; and
- processing of transport data files and tabular-graphic and map visualization of data using standard forms.

Analysis service has been developed to provide near real-time GIS-layer generation from distributed datasets both with interactive and fast presentation of multidisciplinary data and products on a map. It also includes Web Map Services (WMS) as a viewing service for data representation on a map. The user can adjust the composition of the map layers, the number of maps for viewing and other specifications. The mapping service enables a joint analysis of data to provide a view of the spatial variability of marine processes. ODP renders maps generated by the analysis service using Open Layers and MapServer.

Download service allows the user to download selected data to the local computer after viewing. If time scheduling is required to download data, the user can register the site for downloading, the list of required datasets and the sampling criteria. The transport data file formats that are available are:

- NetCDF - E2E structure
- ASCII
- XML

Selected data can be either downloaded in a single zip-file or viewed using the ODP result viewing service.

The Meeting noted that a number of the current ODP data providers are also providing data through SeaDataNet and specific attention should be given to the interoperability between the two systems. It was noted that the data policy of SeaDataNet is quite different from the policy used by ODP. The ODP data policy follows the IOC data policy aiming at free and open access, whereas SeaDataNet requires user registration to download data and allows restrictions on data access. It was further noted that there are substantial differences in granularity between SeaDataNet and ODP. SeaDataNet considers each profile as a separate data set. ODP allows flexible setting of granularity (e.g. a cruise, map, product, profile, etc, can all be a data set).

Participants involved in both SeaDataNet and ODP called for a single software application that can be used to register data in either system.

The meeting noted that if portals such as ODP and SeaDataNet are populated the problem of duplication will become a serious issue.

3. USING ODP AT THE NATIONAL AND INTERNATIONAL LEVEL

This agenda item was introduced by Dr Nikolay Maikhaylov. His PowerPoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5936 . A video recording of his presentation is available through http://www.vimeo.com/15152281

Dr Mikhaylov recalled that the role of the IODE Ocean Data Portal (ODP) is to provide a modern infrastructure: (i) to promote the exchange of and access to all marine data and information to support international scientific and operational marine programmes of IOC and WMO; and (ii) to assist IOC Member States in acquiring the necessary capacity to manage marine data and services at the national level and become partners in the IODE network.

The potential uses can be defined as follows:

- The IODE network, consisting of NODC/DNA's and WDCs, and also ODINs
- Operational data systems to meet the needs of traditional clients, as well as GOOS (global and GRA), GCOS and CLIVAR managed by joint IOC/WMO JCOMM
- Data exchange and access under other IOC programmes such as GOOS, HAB, Tsunami warning systems, ICAM, AoA
- Data management capacity of IOC Member States
- Interaction with systems of non-IOC programmes such as WIS-WIGOS, GEO/GEOSS, ICES, SeaDataNet and others.

The architecture of ODP v.1 is very simple: one centralized node which is based at the IOC Project Office for IODE, Oostende, Belgium and a number of data provider nodes. In addition there is the possibility to "connect" some external systems (e.g. WIS, SeaDataNet,…). This architecture is shown in Figure 2.

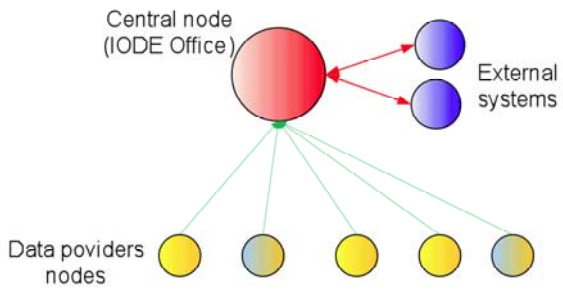

Figure 1: ODP v.1 architecture

The architecture of the next generation of ODP (v.2) will have a more complex architecture, similar to that of the WMO Information System (WIS) and will allow a multi-level network of nodes:

- a node is a set of the ODP components with various functions (Data Provider, Integration Server, Portal, AAA, Security, Management and other
- nodes and components interact with each other in an interoperability environment
- a node may have different sets of components depending on its role and responsibility
- a node can operate on only compatibility with the ODP interoperability specifications (without using any ODP software components).

This architecture allows also multiple levels of national and international structures as shown in Figure 3.

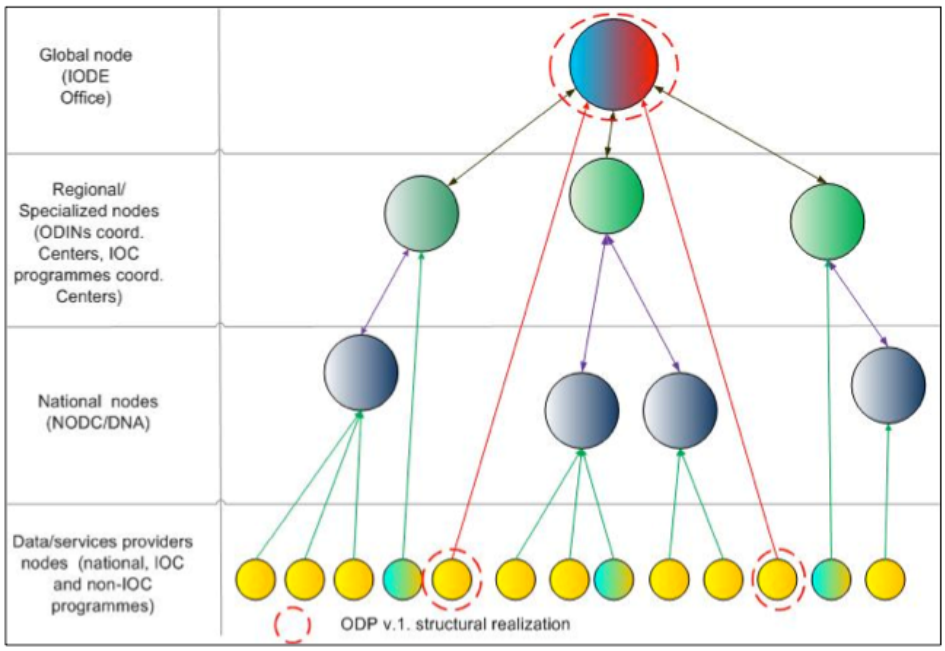

Figure 2: Structural levels of ODP v.2

If we consider this bearing in mind the IODE regional ODIN structural model as well as other partner systems then this could give rise to Figure 4.

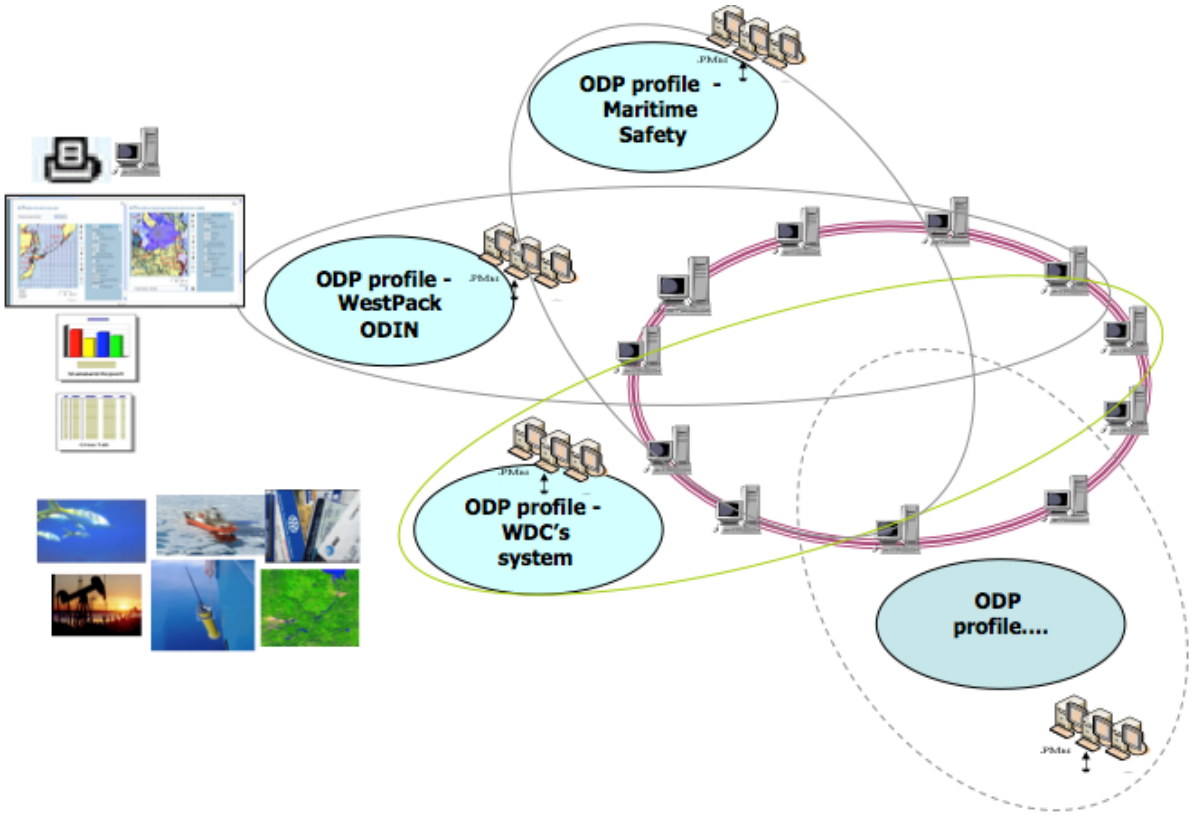

Figure 3: IODE ODP v.2 : looking forward

4. OPTIONS TO PROVIDE DATA THROUGH ODP

This agenda item was introduced by Mr Sergey Sukhonosov. His PowerPoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5932

A video recording of his presentation is available through http://www.vimeo.com/15153779

The ODP technology is considered as a distributed data system that comprises local data systems managed by IODE data centres and provides "transparent" access to the metadata, data and products (resources) generated by these local data systems.

The ODP technology includes the following components:

- Technical specifications defining the namespace and structures of metadata and data records, data exchange protocol, etc. for data exchange based on a distributed data sources network;
- Data Provider (software) providing the access to the local data system of participating centres. As soon as the Data Provider is installed as a "wrapper" of the local data system, this system becomes a data source for the ODP distributed data system;

Integration Server (software) provides the management and use of the data sources network via interaction with Data Providers.

The data centre that agrees to be the ODP data provider should provide:

- the appropriate middleware for communications: web server and application server;
- installation of the ODP Data Provider software to connect the local data system with ODP Integration Server;
- registration of the data source and its resources, support of the local data system

4.1 Data Provider requirements

4.1.1 Technical requirements

The software and hardware requirements to install and use the ODP Data Provider software are listed here.

The hardware

To install and operate the ODP Data Provider, it is recommended to use a computer with the following minimum characteristics: CPU 1GHz or more, 1 GB RAM, 300 Mb hard disk space. It is recommended to use a dedicated computer for Data Provider installation.

The middleware

The following is required to install and operate the ODP Data Provider:

- Operational System – Windows or Unix-based (have been tested on Windows XP, Windows 2003 Server, Windows 2007 server, RedHat, openSUSE).
- Web Server. It can be any web server that supports PHP. Apache or Microsoft's IIS (this is preferable to Apache 2.2.x). Web server Apache with PHP is needed only if database is planned to use.
- PHP is a cross-platform web scripting language. Centres providing data should have a PHP interpreter (version 4.4.4 or later).

The PHP and Apache software can be obtained from the Ocean Data Portal site along with the Data Provider software.

A description of the Data Provider installation process is given in the document "Data Provider user guide - installation and setup" that is available at http://www.oceandataportal.org/index.php?option=com_content&task=view&id=24&Itemid=67&catid=9

4.1.2 Functional requirements

The local data administrator should provide:

- design of resources;
- data source registration;
- resource's registration;
- provision of data

The design of resources

This work can be done before or at once after the Data Provider installation and includes the following actions:

- analysis of local data system(s) structure, data ordering, key elements, data storage type and other specifications and resolving:
- assessment of resource contents (in other words deciding which part of the data of the local system will be presented as a resource);
- resources type (single or serial);
- key elements to provide the data granularity if resource is serial;
- resource titles and other reference information according the sections of E2ESearchMD;
- analysis and comparing the concept XML-schema (accessible from ETDMP web-site) with parameter list of local data system and expanding the concept XML-schema by additional parameters (if it is needed) in contact with E2E developers;
- preparation of the code lists used in local data and the comparing this lists with system codes accessible from Data Provider user interface, making decisions on code conversions from local codes to system codes.

The Data Provider installation and the data source registration

This work is carried out by the local system administrator according to the "Data Provider user guide - installation and setup".

During installation the registration of the data source is provided using the Data Provider web-form and recommendations of the document "Data Provider - Registration and Maintenance of Resources under the Distributed Data Source System".

The estimated time for the Data Provider installation is one working day. The ETDMP plans to make the Data Provider installation easier by providing software for a controlled installation process.

The registration of resources

This work should be based on results of the resource design using the Data Provider user interfaces (web-forms). For each resource the following should be provided:

- description of the resource;
- registration of the resource interface with local data system and local codes.

The all work is controlled by the Data Provider web-forms or services. The estimated time for one resource registration is 2-3 hours for first user session and is usually about 1 hour for subsequent ones.

The preparation of the description of the resource instances with DBMS/data files types is provided automatically by the special function of the Data Provider starting from the registration web-form.

To prepare the description of resource instances with object file types the Data Provider web-form provides the possibility to copy the existing description to use as a template for describing other instances (with appropriate editing).

The provision of the resource life-cycle.

To provide the resource life-cycle the local data administrator should:

- define the schedule for updating of the resource description (time in seconds reflecting update period – minute, hour, day, month and etc) in the appropriate string of the web-form for resource registration;
- check the local data (connection and actual description) from time to time using the report (appropriated screen table) submitted by the Data Provider;
- take the needed actions to provide the resource actuality – check the physical data source address etc according the recommendations of Data Provider User Guide".

4.1.3 The support requirements

To test and operate the Data Provider it is recommended to designate a person who will be responsible for the ODP technology use at the data centre.

4.2 Using ODP Data Provider software in data centre

4.2.1 ODP Data Provider installation.

The data centre source is made available to the ODP system by the Data Provider software which is placed in the data center telecommunication node and generates the resources of the ODP distributed data system interacting with the local data system(s). The data source operates on the basis of the following rules:

- local data system(s) of a data centre can have various storage types: DBMS or(and) data files (structured/formatted) or (and) object files (non-structured - jpeg, shape-files, png, etc. or software applications);
- local system administrator at the data centre installs the Data Provider software which provides access of ODP technology services to all local data irrespective of number of local data systems and their storage types. The ratio “one data centre - one (or many) local data systems - one ODP data source” is supported.
- local system administrator provides the registration of a data source (identifier, physical addresses and etc.) using the Data Provider web-form;
- local system administrator provides the technical support of the Data Provider operations in contact with ODP developers if it is needed.

4.2.2 The information resource and resource instances

The information resource is a data (metadata) set (or software application) submitted by the data centre to ODP distributed data system.

To provide effective search, access and delivery processes the resource must contain data with homogeneous properties according to the following rules:

- resource must contain data of one category: observation data, derived (climatic) data, forecast data, analysis data, etc.;
- resource must contain data with unique space-time resolution (irregular observation data, fixed point data, monthly data, etc.);
- resource must belong to one type of local system storage (DBMS or data files or object data files).

To reflect all of the above-mentioned data properties there are appropriate elements in the resource description structure (E2ESearchMD).

The resource can be presented as a single unit (called a single resource) or as a set of resource instances (called a serial resource) reflecting the local data granularity of the local data system.

4.2.3 The resource’s registration

The resource’s registration is provided by the local data system administrator and the registration process includes two stages:

- resource design;
- resource registration.

Resource design

The resource design is carried out taking in account of the specifics of the local data system (contents, data ordering, coding used, etc.) including:

- decisions concerning the resource type (single or serial), resource content and granularity for splitting the resource into resource instances (for serial resource) are accepted for the local data system being made available to the ODP distributed data system;
- decisions about needs for conversions of the local codes to system codes are determined.

Resource registration

This is provided through the special web-form, given by Data Provider and having the following sections:

- Identification and reference information;
- Time, space and vertical data extent;
- Data content and granularity;
- Processing and quality level;
- Platforms, instruments and methods
- Data distribution information.

The single resource registration is carried out once through the Data Provider web-forms. The serial resource registration is fulfilled in the following way:

- local data administrator provides the root resource description using web-forms;
- for local system storage types: DBMS and data files – the descriptions of the resource instances are created automatically by the Data Provider service based on the granularity of the data described in the section "Data content and granularity" of the root resource description;
- for local system storage type: object files – the description of resource instances are provided in a similar fashion to the root resource description, i.e. using web-forms of Data Provider service.

The Data Provider implements:

- automatic use of the controlled code-lists and dictionaries through the interaction with the Integration Server which provides the management and use of the metadata;
- quality control of the resource (or resource instances) elements as described in metadata input.

Physically the resource descriptions are stored in XML-files in the format of the E2ESeachMD record. Depending on the chosen granularity scheme the resource description can be presented in one or several E2ESeachMD records:

- a single resource description is stored in one E2ESearchMD record;
- serial resource descriptions are stored in several E2ESearchMD records (N+1, where N is the number of resource instances).
- During resource registration the description of the resource interface with the local data system is also provided:
- DBMS type - assignment of table and attribute names of the database which will be used for resource generation;
- data file types - the description of data file elements which will be submitted in a resource (in current version E2E – only with flat (non-hierarchical) structures).

The description of the resource interface includes also filling a cross-mapping table for conversions of local codes to system codes.

All of the above-mentioned operations for setting the resource interfaces are provided by special Data Provider web-form and services.

Operational provision of resource descriptions

It is important to have resource descriptions available on-line (if local data system was changed) to permit data search and access. This process is dependent on the system storage type:

- DBMS/data files - resource (single or serial) metadata updating is provided automatically by the data centre according to a schedule set by the local data administrator or on a harvesting request from the Integration Server;
- object files – resource metadata (or adding new resource instances) is supported by the local data administrator who must update the resource (resource instances) descriptions using the Data Provider web-forms.

The update schedule (one time in minute, hour, day, month, year and etc.) of the resource description is controlled by local data administrator by means of assessment of the appropriate web-form element in the process of resource registration. The specification of this element depends on the update frequency of the local data system and it can be changed at any time.

4.3 Using of remote Data Provider software (v. 1.5.5)

Data centres which can't install Data Provider can use another Data Provider software in remote mode. In this case the owner of the Data Provider must create new user with login and password and provide this information to remote user. This functionality provides mechanisms of registering data sources placed at HTTP or FTP servers available for the remote Data Provider. Data source should be represented as structured files with separator ";" or "," and be available for downloading for remote Data Provider.

Data centres can use remote Data Provider for providing catalogs of data to ODP distributed system. There are several requirements for representing this type of interaction:

- one inventory file corresponds to one dataset description;
- inventory file should be registered at Data Provider and contain information about data files which a located at FTP(HTTP) server;
- inventory file must contains URLs to data files;
- data files should be placed at the same FTP (HTTP) server as inventory file.

Inventory file is used during creating dataset description using Data Provider software. You should make one-to-one mapping between system data elements and fields of inventory file. After this procedure Data Provider will use the mapping to register metadata description for data files automatically. If new data files will be put to FTP (HTTP) server, Data Provider will download and analyze inventory file by scheduler mechanism and register new metadata in the ODP distributed data system.

The number of parameters inside inventory file can be different for different dataset descriptions. It is allowed to specify parameters in any order inside inventory file. The position of each parameter will be specified at mapping section of dataset description. Mandatory parameter "Transport file URL" must be fully qualified URL or FTP address which contains not only filename, but also full path to data file including protocol name, login and password if needed.

An example of inventory file mapping is shown on figure 1. Example inventory file contains parameters date and time, latitude, longitude, platform identifier and data file URL.

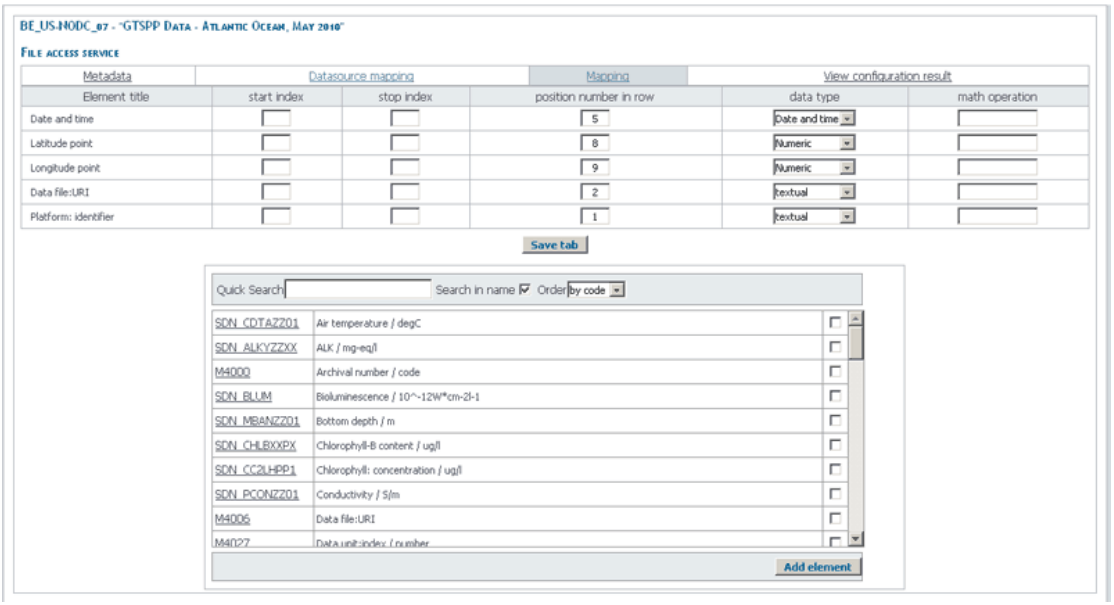

Figure 4: Example of mapping inventory file

The process of information resource registration is the same as for structured data file. In case of using remote Data Provider you should set up ip address, login and password of your data storage instead of local filesystem. Then the life-cycle of information resource registered using remote Data Provider is following:

- Data Provider synchronizes inventory file via downloading it from remote destination to the server;
- Process the data, based on hierarchy settings, dividing data into instances if needed;
- Create metadata for each instance or for all data if there are no instances. Put URL of all data files which corresponds to current metadata description. E.g. if hierarchy has been constructed to divide data by platform name, then all links to the data files concerned with this platform will be put in one instance metadata description.
- Update dataset description with actual temporal and geographic extents calculated during analyzing extents of all instances.

5. THE ODP DATA POLICY

This agenda item was introduced by Dr. N. Mikhaylov.

The Meeting stated clearly that the IODE Ocean Data Portal will NOT have its own data policy but will fully comply with the IOC Oceanographic Data Exchange Policy (http://www.iode.org/policy). However it was recognized that not all data can be made available freely and openly immediately after collection so specific procedures will need to be agreed upon.

A sessional working group was established to discuss this matter in more detail. It was agreed that a document should be prepared entitled "IODE Ocean Data Portal Guidelines and Procedures" for submission to IODE-XXI for approval.

The document will include technical requirements to host an ODP node, full description of the IODE Ocean Data Portal objectives and technical implementation. The IOC Oceanographic Data Exchange Policy will be attached as an annex. It may be appropriate to split the document into 2 parts.

The Meeting adopted the outline structure of the document (see Annex III) and requested the Chair ETDMP (N. Mikhaylov), IODE Co-Chair (G. Reed), Ms. Margarita Gregg, Ms L. Buga, Mr A. Troisi to jointly prepare the document by 15 December 2010. A preliminary draft should be prepared for the Third Meeting of the Joint Steering Group for the IODE Ocean Data Portal and the WIGOS Pilot Project for JCOMM (1-3 November 2010).

6. THE ODP USER INTERFACE: ASSESSMENT AND SUGGESTIONS FOR IMPROVEMENT

This agenda item was introduced by Dr Sergey Belov. His PowerPoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5934 . The video recording of his presentation is available through http://www.vimeo.com/15155803

The ODP provides the following functionality:

- distributed marine data infrastructure generation and operation;
- data discovery and access;
- data provision to end-users;
- user management; and
- system monitoring and reporting

The technical aspects include the provision of metadata and services for a distributed marine data infrastructure enabling the interactions among data providers, service providers and the end-users. The system allows data interaction whilst avoiding data reformatting and delocalization so the data always remains within the data provider's infrastructure. ODP allows adjustment of services invoking online request/response processes and other operations and also allows chaining of services into more complex ones. The system supports "subscription" type services and standing orders (e.g. oil spill monitoring and alerting) and allows the easy identification of, and access to, requested services and data, with progress follow-up until completion. The integration of data and services from multiple domains is possible to facilitate exploitation of main synergies and service and data providers can register, provide and promote their products to other thematic or regional portals. ODP is built using open standards which provides the capability to interact with other data portals which minimizes the investment required by data and service providers to build on open standards. The ODP provides data and product dissemination services, which are divided into ***Discovery, Viewing, Analysis*** **and** ***Download.***

6.1 Discovery service

This service disseminates a data source catalogue with descriptions of resources in the form of XML files. The metadata record is based on ISO 19115. The ODP service provides user interfaces for data and product search supported by the catalogue. The data source catalogue can be accessed from external systems directly or alternatively by reformatting into other metadata structures.

Figure 5: IODE ODP portal homepage

6.2 The Viewing service

This service is based on web-based application accessible via the web browser and provides:

- data search that defines the sampling criteria using a spatial region, time period, phenomena, platform, etc.;
- access to remote data sources via the Integration Server including request status monitoring; and
- processing of transport data files and tabular-graphic and map visualization of data using standard forms.

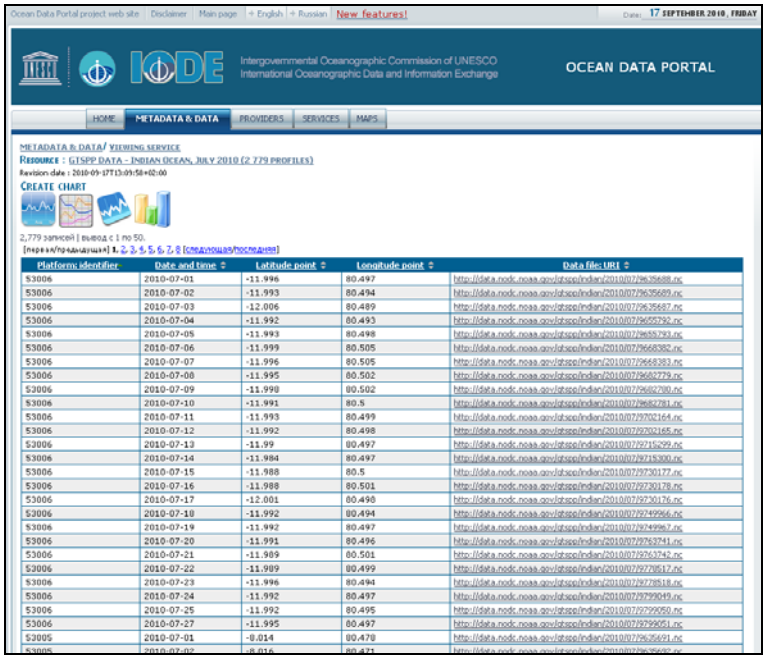

Figure 6: ODP data search result page

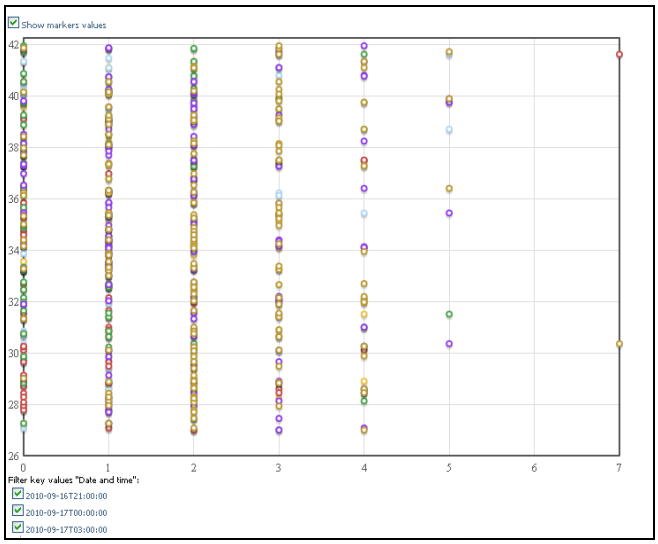

Figure 7: ODP plot example

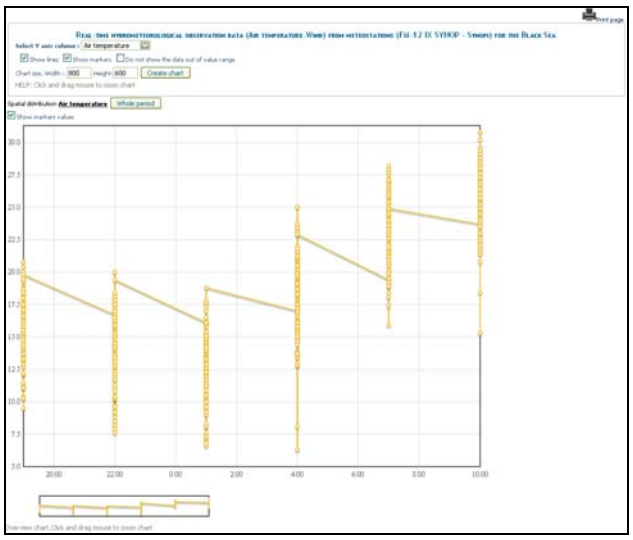

Figure 8: ODP plot example

6.3 Analysis service

This service has been developed to provide near real-time GIS-layer generation from distributed datasets both with interactive and fast presentation of multidisciplinary data and products on a map. It also includes Web Map Services (WMS) as a viewing service for data representation on a map. The user can adjust the composition of the map layers, the number of maps for viewing and other specifications. The mapping service enables a joint analysis of data to provide a view of the spatial variability of marine processes. ODP renders maps generated by the analysis service using Open Layers and MapServer.

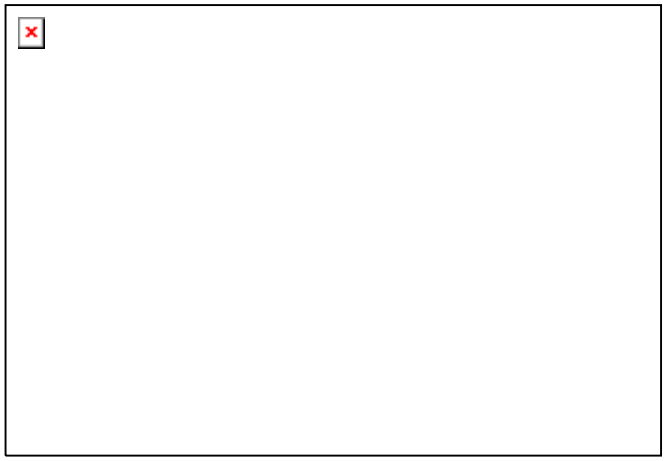

Figure 9: mapping example (bathymetry)

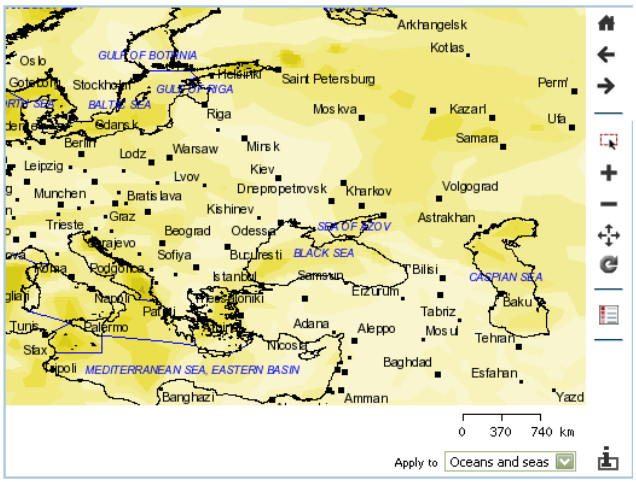

Figure 10: mapping example (wind speed map)

6.4 Download service

This service allows the user to download selected data to the local computer after viewing. If time scheduling is required to download data, the user can register the site for downloading, the list of required datasets and the sampling criteria. The transport data file formats that are available are:

- NetCDF - E2E convention (JCOMM, 2008)
- ASCII
- XML
- PDF
- CSV

Selected data can be either downloaded in a single zip-file or viewed using the ODP result viewing service.

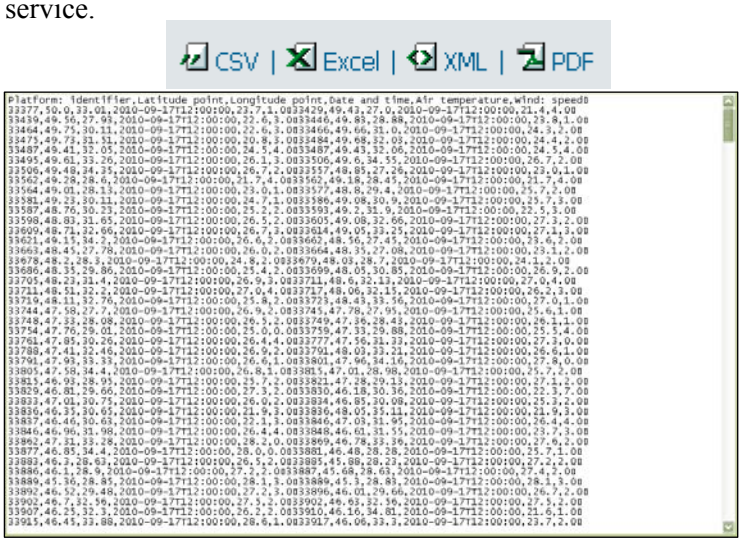

Figure 11: data download view

6.5 What's New in Ocean Data Portal v.1.1

Quick search topics

Ocean Data Portal 1.1: use quick search icons .

Users can quickly search metadata simply by clicking categorized thumbnails. Each thumbnail corresponds to some topic or a group of phenomena. For now Ocean Data Portal has several topics: Real Time Ocean Data (coming from GTS streams), Global Temperature and Salinity Profile Program (GTSPP) data, Surf and Marine Weather Forecasts (from Hydrometeorological Centre of Russia, Moscow), Satellite images (Black sea) and Secchi disk data.

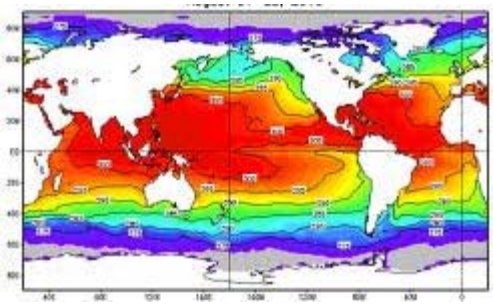

Figure 12: homepage GTSPP icon

Zipped result data:

- **Download obtained data files as single compressed file (ZIP)**.
  On user request Ocean Data Portal returns either a number of NetCDF files or original files (JPG,PDF, etc.). For every NetCDF Ocean Data Portal provides conversion into the ASCII-representation. After that both ASCII and NetCDF files will be packed into the single compressed file (ZIP) with CRC user can download and use for own purposes.

Figure 13: ZIP download icon

Charts

- **Build chart using obtained data**.
  If user has queried a structured data and response has returned a number of NetCDF files, he can build a number of charts:
  - Spatial distribution of parameter;
  - Scatter plot or line plot filtered by some key field;
  - Scatter plot or line plot;
  - Bar chart;

Figure 14: chart options

Query cart and tracking

- **Track down queries on single page**.
  After user has posted his query on one or single resources there is no need to keep this page opened as request can be processed some time (from several seconds to dozens of minutes depending on data volume and request options). User can find query bar below the advanced search panel. Query bar hold information like a shopping cart on total requests processed during current session, number of running and completed data requests. Clicking on 'Details...' link on the query bar user can track down all user requests on single page. This page will be refreshed automatically every 5 seconds or user can do it manually.

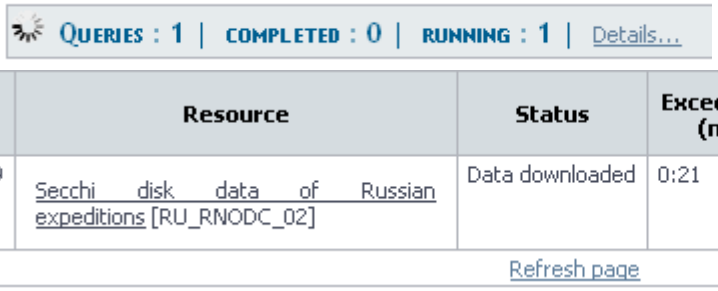

Figure 15: track option

Result table export (CSV, Excel, XML, PDF)

- **Save obtained data as CVS, Excel, XML or PDF files**.
  Using Ocean Data Portal Viewing Service user can now only display resulted data in a tabular mode, but also export it as CSV (http://en.wikipedia.org/wiki/Comma-separated_values), Excel format, XML or PDF file. Export panel is located in the bottom of the data table.

Figure 16: export options

Multilingual support

- **Switch interface language between English or Russian**.
  Ocean Data Portal supports multilingual approach. At present moment English and Russian languages are supported in user interface. Other languages will be included soon. Other languages can be simply included by translating following phrase-files on custom language.

7. INTEROPERABILITY ISSUES

This agenda item was introduced by Dr Nikolay Mikhaylov. His Powerpoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5935

Dr Mikhaylov recalled that the key principle of the ODP will be interoperability with existing systems and resources. Participating centres will need to accept and implement a set of agreed interoperable arrangements of information and Web-services interfaces. Interoperability specifications are environment for interactions between properly ODP components – Data Provider, Integration Server, Portal services, Security and other.

> *"Interoperability – ability of two and more systems or components to exchange information and to use information that has been exchanged"* IEEE Computer Dictionary

7.1 Interoperability categories

Four catagories of interoperability can be identified (Figure

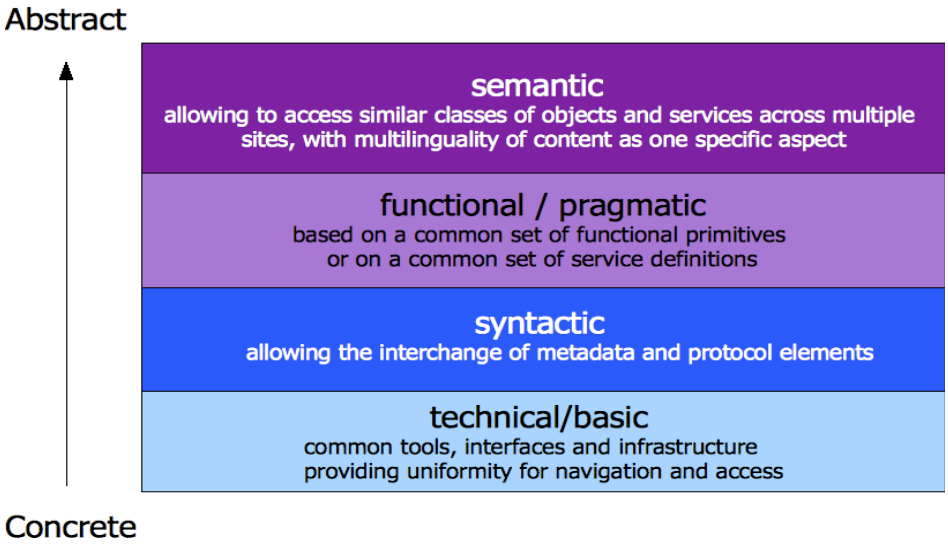

Figure 17: interoperability categories

Semantic interoperability:

- Common dictionary of parameters: Systems use different name and other characteristics of parameters. Controlled name, description, unit, method and reflection of other properties of parameters need to be adopted;
- Common vocabularies/ontologies: Controlled keywords (standardised topic names) and controlled vocabularies (standardised technical terminology) need to be adopted;
- Other common dictionaries: The same situation exists with dictionaries of organization, projects, observation platforms, methods, instruments and etc.;
- Data identification: To avoid data duplication and provide understanding of the data it is necessary to provide "data life monitoring" on the basis of the unique identification of data sets;
- Metadata identification: See above: respectively metadata records describing the data, users and etc.;
- Data granularity: Systems use a different data model and rules to aggregate data for exchange. For example: SeaDataNet uses profile approach, WIS use the GTS bulletin approach;
- User role: The data sets managed by systems can have constraints for data access and use basis of own role matrix;

- Metadata attributes: There are a number of metadata attributes (classes) from ISO 19115/19139 for which values can be assigned in various ways: bounding boxes, temporal extent, etc. It is required to have common rules for such attributes.

Sintactic interoperability

- Notification, request/response protocols: Various mechanisms, rules and structures (methods) are used by web-services;
- Web services: The distributed network of oceanographic data centres will provide access to existing datasets in an interoperable environment using web services. These standards should include the specifications of use WMS, WFS and WCS;
- Metadata: The ODP system uses a fully metadata-driven approach using a series of metadata structures describing ODP components, data and services, users and its subscriptions, etc. It is important to use a unified XML schema for structured all metadata types;
- Formats for data delivery: At present there are many data formats and more are created as required. There is no "universal" data structure, although there is evidence of a slow convergence to a small number of self-described data structures such as NetCDF, XML and OGC compliant web service output. It is required to use an agreed data model accepting traditional and spatial data.
- Data parsing protocol means formats for data delivery.

7.2 IODE Ocean Data Portal versions

It was agreed that two versions of the ODP portal would be developed:

- version 1 - with initial capabilities operating on the basis of the E2EDM technology
- version 2 - with full capabilities which should be fully based on ISO/OGC interoperability standards and tools

ODP (version 1) has been launched in 2009/2010: (http://www.oceandataportal.org).

8. ODP V.2 INTRODUCTION

This agenda item was introduced by Dr Sergey Belov. His PowerPoint presentation is available through http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=5858

A video recording of his presentation is available through http://www.vimeo.com/15183875

8.1 DATA PROVIDER SOFTWARE VERSION 1.5.5

The changes in functionality of Data Provider v.1.5.5 can be summarized as follows:

1. Web-service communication between Data Provider and Integration Server
2. Integration Server notification about new data and metadata at Data Provider
3. Log files for data request and actualization processes for each information resource
4. New rule in registering new information resource – scheduler is mandatory if cache mechanism is on
5. Validation of information resource data content – if temporal extent doesn't correspond to data update frequency Data Provider marks resource description in web-interface and provide status to Integration Server.

6. Registration data catalogues from HTTP, FTP servers. Using remote Data Provider to register catalogues.

8.2 REVIEW OF DATA PROVIDERS

Table 1 shows the current Data Providers and information resources status.

Data Centre	Data Provider	Information resource count	Problems
Marine Information Research Center (MIRC)	v.1.1.4	19	Need to update system elements
US National Oceanographic Data Center(NODC)	v.1.5.5 (remote)	13	
All-Russia Research Institute of Hydrometeorological Information - World Data Centre (RIHMI-WDC)	NODC/RIHMI-WDC v.1.5.5	7	
Marine Hydrophysical Institute National Academy of Sciences of Ukraine (MHI)	MEIT/MHI v.1.1.4	3	
Bulgarian National Oceanographic Data Centre (BGODC/IO-BAS)	BGODC/IO-BAS v.1.1.4	2	Unstable network connection between DP and IS
Institute of Biology of the Southern Seas National Academy of Sciences of Ukraine (IBSS)	LaMIS/IBSS v.1.1.4	2	
National Institute for Marine Research and Development (NODEC/NIMRD)	NIMRD	0	Installed, no information resources registered
Intergovernmental Oceanographic Commission Project Office for International Oceanographic Data and Information Exchange Committee	UTAS	0	Installation in progress
Tbilisi State University, Georgian DNA(GDNA)	GDNA v.1.1.4	0	Update to v.1.5, technical problems

Table 1: current Data Providers and information resources status

9. PARALLEL SESSIONS 1: ACTIVE DATA PROVIDERS

This group reviewed the data sets that should be provided to WIGOS.

As part of its contribution to the JCOMM Pilot Project for WIGOS (http://www.wmo.int/pages/prog/www/wigos/marine_pp.html), key datasets have been identified which will be provided by ODP. Potential partners and specific ocean datasets that will contribute to the JCOMM Pilot Project are:

1. World Ocean Atlas
2. SeaDataNet
3. Argo
4. Data extracted from ESIMO (RNODC)
5. High Resolution Sea Surface Temperature from GHRSST
6. Temperature profiles (XBT)
7. Blended-quality climatology products (ICOADS monthly summaries)
8. Marine Climatological Summaries and Global Collecting Centres (GCC)
9. META-T, ODASMS
10. Global Temperature and Salinity Profiles from the GTSPP
11. Surface vector winds
12. 12.Surface currents from HF radar

The group reviewed the current status of the provision of these datasets to ODP and discussed the organization/person responsible for providing the data.

1. Ms. M. Gregg advised that the World Ocean Atlas will provided by USNODC (contact is Kenneth Casey). These data should be available on ODP by November.

2. Dr Mikhaylov is in discussion with D. Schaap to provide a list of SDN datasets; however no agreement has been reached. Dr Mikhaylov will again raise this with D. Schaap. The priority should be (i) data from Russian nodes through SDN; (ii) GLOSS data; (iii) data from Black Sea.

3. Mr Ouellet agreed to contact the GDAC at US GODAE to find out if they can contribute real-time Argo data (from the last 30 days). It was agreed that Argo is a significant data stream and should be part of ODP. If data cannot be provided from the GDAC then the RNODC will provide their data from the GTS. It is expected that Argo data will be available on ODP by November. Margarita explained that delayed-mode Argo data, as well as delayed-mode GTSPP, is available in the WOD after 6 months so only the near real-time data streams should be provided by Argo (and GTSPP).

4. Dr Mikhaylov will coordinate the data from RNODC/ESIMO and this should be available to ODP by November.

5. GRHSST data will be provided by USNODC (contact is Ken Casey) and this dataset should be available to ODP by November. GRHSST data will be provided as level 3 processed data and will be updated daily.

6. XBT temperature data will be provided by AODN (contact is Greg Reed). There have been some technical issues which have delayed the setting up the ODP data provider but it is expected that these data will be available to ODP by November.

7. ICOADS. Contact is Scott Woodruff and Greg will contact Scott to discuss providing these data.

8. GCC. Discussions have been held with Nicola Scott (Met Office) regarding approval to provide data to ODP. The current status is not known or whether the data will be provided by Exeter or Edinburgh. Sergey will contact Nicola.

9. META-T, ODASMS. Contact for META-T is Derrick Snowden from US IOOS. Greg will contact Derrick to find out the current status. The ODP developers will visit China in October to install the DP and will request the ODASMS be one of the datasets to be published by the node in China. It is expected that ODASMS will be available by the end of October.

10. GTSPP: Contact is Charles Sun. GTSPP data is now available on ODP.

11. Surface vector winds. Kenneth Casey will liaise with Paul Cheng. Current status is not known.

12. HF Radar. Margarita will discuss this with Derrick Snowden. Current status is not known.

The group agreed that the goal is to have at least 50% of these data online through ODP by November 2010.

10. PARALLEL SESSION 2: POTENTIAL ODP DATA PROVIDERS

The sessional group that brought together potential data providers agreed to prepare a work plan to becoming an ODP data provider.

Mr Troisi reported that this matter is now being discussed at the national level by a special commission, taking into account the desire of Argentina to establish a national distributed data system. Reference was made to the participation of Mr De Bruin (Netherlands) to a meeting of the national committee. Special attention was given to SeaDataNet as a potential solution for the national network. Regarding ODP some technical questions were formulated by the national committee, which had been answered by Dr Belov. A decision is now awaited from the national committee.

As several experts from Latin America as well as other regions were participating in the OceanTeacher Academy Course on Basic Data Management it was decided to organize a brief presentation on ODP for this group.

Regarding Africa, Mr Ong'anda reported interest from the SWIOFP (South West Indian Ocean Fisheries project) but that data could only be released publicly at the end of the project in 2013. Nevertheless metadata could be prepared and made available.

Mr Deneudt, representing VLIZ, expressed interest in joining ODP. Further discussions should be organized to identify data resources that could be provided through ODP (and bearing in mind the need to avoid duplication with SeaDataNet). Reference was also made to VLIZ's role as leader of the EMODNET Biological lot and its hosting of EurOBIS.

The Meeting requested Mr Reed and Mr Pissierssens to discuss with the GLOSS and Tsunami secretariats the possibility of making available sea level data to ODP (which are currently provided through http://www.selavelstation.net).

Mr Odido informed the Meeting that the ACLME is interested in participating in ODP as a separate node. This will be further discussed.

Mr Diallo (Senegal) informed the Meeting that Senegal will shortly install the ODP data provider software.

The Meeting recommended that special attention should be given to establish regional nodes through the ODIN projects.

11. OUTREACH AND MARKETING

The Meeting recognized the importance of effective outreach and marketing of ODP.

The Meeting concluded that two marketing leaflets are required: one for prospective data providers and one for users. It will be necessary to clearly identify the benefits of ODP to these two audiences and to focus on the benefits in the leaflets. A thematic approach was suggested. It was agreed that the leaflets should be disseminated as widely as possible at various occasions (conferences, meetings, etc). They should be made available in English, French, Spanish and Russian (possibly also in other languages as relevant to the available ODP node). In this regard the necessity to make available also the data.oceandataportal.org and www.oceandataportal.org in multiple languages was mentioned.

The Meeting further agreed on the need to redesign the web site home page to make it more eye catching and informative. It was agreed that this will be implemented by the end of October 2010.

The Meeting requested Mr Greg Reed and Mr Peter Pissierssens to work on drafts for the leaflets and to share these with the members of the Steering Group for comments. The leaflets should be available by IODE-XXI and the IODE-50 conference.

The Meeting requested the development of a standard ODP PowerPoint presentation. This should be professionally developed. This should be used at the 2011 Session of the IOC Assembly where an ODP Presentation should be scheduled.

The Meeting stated the need for a more clear indication of the volume of data included in ODP. The current reference to “resources” and “data providers” creates the perception of minimal content, whereas ODP currently contains nearly 1 million profiles. Also the growth of ODP should be displayed.

The Meeting requested the ODP technical team to develop a real-time monitoring table and/or graph that shows the growth of ODP. This should be included in the data.oceandataportal.org and www.oceandataportal.org site homepages. **The Meeting requested the ODP technical team to implement this functionality by the end of 2010 or early 2011 at the latest**.

The Meeting further requested the development of an ODP mailing list for users and data providers to be used to announce new data providers, new data sets, new functionality etc.

12. WORK PLAN 2011-2013

The Meeting discussed and adopted the following work plan for 2010-2011.

Action	Task	Deadline	Action by whom
1 Requirements and documents			
1.1	Ocean Data Portal V2 technical specification whitepaper (final)	Sep 2010	S. Belov, N. Mikhaylov
1.2	Updated ODP booklets (user oriented, data provider oriented) + leaflet + PPT template	Feb 2011	IODE PO and contractors
1.3	Document on migration of the ODP metadata into the ISO 19139	Nov 2010	S. Belov
1.4	Technical specifications on ODP V1 – WIS interoperability	Nov 2010	S. Belov, N. Mikhaylov, S. Sukhonosov
1.5	Technical specifications on ODP V1 – SeaDataNet interoperability	Dec 2010	S. Belov, N. Mikhaylov, S. Sukhonosov
1.6	IODE ODP guidelines and procedures	Dec 2010	N. Mikhaylov G. Reed M. Gregg A. Troisi L. Buga
1.7	Coordination with GE-BICH, OBIS	Start November 2010	S. Belov T. Suzuki G. Moncoiffé E. Vanden Berghe K. Deneudt
1.8	Revised technical documentation on the ODP components (Wiki, documentation on Integration Server, Data Provider & Light Data Provider)	Dec 2010	S. Belov et al
2 ODP Data Providers			
2.1	NMDIS/SOA (China) Data Provider + regional node installation	Oct 2010	
2.2	VLIZ (Sea level data)	End 2010	K. Deneudt, S. Sukhonosov (Greg and PP to contact GLOSS and Tsunami Secretariats)

2.3	ODINBlackSea regional node installation	Dec 2010 – Jan 2011	S. Sukhonosov, S. Belov V. Vladymyrov
2.4	WIGOS data sets *1) WOA -* *2) SeaDataNet -,* *3) Argo –* *4) RNODC/DB* *5) GHRSST-* *6) XBT -* *7) ICOADS -* *8) GCCs -* *9) META-T, ODASMS -* *10) GTSPP -* *11) Virtual const SVW -* *12) HF Radars*	Oct 2010	 1) K. Casey 2) N. M and D. Schaap 3) M. Ouellet 4) N. Mikhaylov 5) K. Casey 6) G. Reed/aodn 7) S. Woodruff 8) N. Scott 9) D. Snowdon 10) K. Casey 11) P. Chang 12) D. Snowdon
2.5	Senegal	Dec 2010 – Jan 2011	A. Diallo
2.6	Kenya	Jan 2010	H. Ong'anda
2.7	Argentina	?	A. Troisi
2.8	SeaDataNet data sets involvement (ODP ODINBlackSea countries + sea level + others)	Beginning 2011	V. Vladymyrov, D. Schaap
2.9	*ODINAfrica*	2nd half 2011-2012	M. Odido
2.10	*ODINCARSA LA*	2011 *	A. Troisi
2.11	*ODINWESTPAC (see also 2.1)*	2011 -…	NMDIS/SOA (tbd)
3 ODP V1 tools			
3.1	ODP UI improvement	Beg Nov 2010	S. Belov
3.2	ODP indicator module + image tools	Feb 2011	S. Belov
3.3	ODP Geonetwork, THREDDS implication	Feb – Mar 2011	S. Belov S. Sukhonosov
3.4	ODP Service Bus, ODP Services updates	March 2011	K. Belova S. Belov S. Sukhonosov
4 ODP V2			
4.1	Technical specifications on ODP V2	Feb 2011; update half 2011	S. Belov N. Mikhaylov
4.1	ODP V2 metadata service (ISO 19xxx, FGDC, MCP, SDN, etc.)	Mid 2011	Russian NODC, IMOS (tbd)

4.2	ODP V2 Portal toolkit (alpha)	Sep 2011	S. Belov, Russian NODC
4.3	ODP V2 toolbox	Mid 2012	S. Belov, Russian NODC
5. Interoperability components			
5.1	Joint ODP – SDN communication service	Mid 2011	S. Sukhonosov, SDN (Arjen de Korte)
5.2	ODP – WIS communication service	Beg 2011	S. Belov, E. Christian H. Knottenberg S. Belov
5.3	ODP – OBIS communication service*	End 2011	E. Vanden Berghe S. Belov

13. CLOSING OF THE MEETING

The Chair of the Meeting, Mr Greg Reed closed the meeting. He noted that the Meeting had come up with a comprehensive work plan which is quite ambitious but that it should be possible to meet the deadlines. ODP Version 2 will provide a lot more functionality and in terms of interoperability it will be a great leap forward. Focus should be placed on gathering more data providers at the NODC level, and at the regional level. A plan has now been prepared to achieve these goals. Outreach is also important for ODP. Mr Reed encouraged the members of the Steering Group to promote ODP so it is more widely known and used.

ANNEX I

AGENDA OF THE MEETING

1. OPENING OF THE SESSION
   - 1.1 WELCOME
   - 1.2 INTRODUCTION OF PARTICIPANTS

2. INTRODUCTION TO THE IODE OCEAN DATA PORTAL
   - 2.1 THE ODP ARCHITECTURE AND FUNCTIONALITY
     - 2.1.1 THE DATA PROVIDER
     - 2.1.2 THE INTEGRATION SERVER AND DISTRIBUTED DATA SYSTEM SUPPORT
     - 2.1.3 THE ODP SERVICES

3. USING ODP AT THE NATIONAL AND INTERNATIONAL LEVEL

4. OPTIONS TO PROVIDE DATA THROUGH ODP
   - 4.1 DATA PROVIDER REQUIREMENTS
     - 4.1.1 TECHNICAL REQUIREMENTS
     - 4.1.2 FUNCTIONAL REQUIREMENTS
     - 4.1.3 THE SUPPORT REQUIREMENTS
   - 4.2 USING ODP DATA PROVIDER SOFTWARE IN DATA CENTRE
     - 4.2.1 ODP DATA PROVIDER INSTALLATION.
     - 4.2.2 THE INFORMATION RESOURCE AND RESOURCE INSTANCES
     - 4.2.3 THE RESOURCE'S REGISTRATION
   - 4.3 USING OF REMOTE DATA PROVIDER SOFTWARE (V. 1.5.5)

5. THE ODP DATA POLICY

6. THE ODP USER INTERFACE: ASSESSMENT AND SUGGESTIONS FOR IMPROVEMENT
   - 6.1 DISCOVERY SERVICE
   - 6.2 THE VIEWING SERVICE
   - 6.3 ANALYSIS SERVICE
   - 6.4 DOWNLOAD SERVICE
   - 6.5 WHAT'S NEW IN OCEAN DATA PORTAL V.1.1

7. INTEROPERABILITY ISSUES
   - 7.1 INTEROPERABILITY CATEGORIES
   - 7.2 IODE OCEAN DATA PORTAL VERSIONS

8. ODP V.2 INTRODUCTION
   - 8.1 DATA PROVIDER SOFTWARE VERSION 1.5.5
   - 8.2 REVIEW OF DATA PROVIDERS

9. PARALLEL SESSIONS 1: ACTIVE DATA PROVIDERS
10. PARALLEL SESSION 2: POTENTIAL ODP DATA PROVIDERS
11. OUTREACH AND MARKETING
12. WORK PLAN 2011-2013
13. CLOSING OF THE MEETING

ANNEX II

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[1] Mr Ouellet was unable to participate physically but joined the meeting part-time by video conference

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ANNEX III

The IODE Ocean Data Portal: Guidelines and Procedures

(Outline)

Introduction

Purpose of document

Goal and role of ODP for IODE (as new integrating technology) and other IOC programmes, interaction with external systems, ODP end-users – very shortly (2 – 3 para's). not copies of the IODE doc and ODP concept paper.

References on IOC strategic plan for data and information management, IOC, IODE and JCOMM docs (resolutions and recommendations) relevant to ODP, technical documentation on ODP.

Who should follows these guidelines.

2. Requirements to ODP

Which services should be provided by ODP – not concept declarations but well-formulated statements. Can be based on Technical Design of ODP v.2. (enterprise view point).

ODP performance indicators.

3. Benefits from ODP implementation

Benefits from using ODP: 1) as new data integration and access system for IODE and other IOC programmes realization, not replacing existing systems but integrating its; 2) as tool for interaction with other system outside IOC; 3) for end-users (scientists, marines, decision-makers, population, etc)

4. Key statements

Basic declarations how is realized submission, integration, data access, conditions of data access for user,….

5. ODP technical specifications

5.1. Interoperability specifications

Shortly about interfaces technical solutions

5.2. ODP node components

Shortly about software components of ODP – Data Provider, Integration Server, …..… ODP v.2.

6. ODP organization

6.1. Organizational structure of ODP

Global (coordinating), regional, specialized, national ODP nodes with explanation of mapping on organizational structure of IODE – definitions and area of responsibility. Possible it can be used term "ODP center" as in WIS and in this case "ODP node" will mean the tools to support the ODP centers work.

6.2. Interaction amiong ODP nodes (centres)

General scheme of interaction - what and how node provides for other nodes to arrange the reliable ODP implementation.

6.3. Designation procedures for OGP nodes (centres)

What and how should be done to became the ODP nodes (centres) – global, regional, specialized, national with assurance that data flows and services provided by ODP nodes network fully satisfies requirements for completeness, security, authenticity, and reliability.

6.4. ODP performance indicators

Categories (list??) of indicators, how indicators is counted and disseminated.

7. ODP implementation

7.1. Data submission

How become data providers to ODP with categorization: IODE centres, IOC programme focal points, external systems.

7.2. Data integration

How is provided the management of ODP distributed data system taking account security and reliability. Recovering and archiving data, e.g. in case of node failure or if node stopped to operate, project finished, etc.

7.3. Data access

How end-users or external systems can receive the data from ODP satisfying requirements for security and authenticity. .

Data access procedures in depend on data categories- IOC programme data and data from non-IOC programmes external systems) assigned as "free accessible" (e.g. WMO resolution 40 - "essential data") and data from non-IOC programmes assigned as "accessible on conditions defined by data provider" (e.g. WMO resolution 40 - "additional data").

7.4. Monitoring operations

How is provided the reliable work of ODP on different levels.

8. ODP applications

8.1. ODP and Global Ocean Observing system
8.2. ODP and Global Climate Observing system
8.3. ODP and IOC ocean science programmes
HAB, Biodiversity, Fertilizations, …..

8.4. ODP and Tsunami systems
8.5. ODP and World Data Centres system
8.6. ODP and WIS
8.7. ODP and GEOSS
8.8. Interaction other systems to ODP

Annex A List of abbreviations

Annex B Definitions

Annex C. Selected IOC and WMO documents relevant to ODP

Annex d. ODP technical documentations

[end]

IOC Workshop Reports

The Scientific Workshops of the Intergovernmental Oceanographic Commission are sometimes jointly sponsored with other intergovernmental or non-governmental bodies. In most cases, IOC assures responsibility for printing, and copies may be requested from:

Intergovernmental Oceanographic Commission – UNESCO
1, rue Miollis, 75732 Paris Cedex 15, France

No.	Title	Languages
1	CCOP-IOC, 1974, Metallogenesis, Hydrocarbons and Tectonic Patterns in Eastern Asia (Report of the IDOE Workshop on); Bangkok, Thailand, 24-29 September 1973 UNDP (CCOP),	E (out of stock)
2	CICAR Ichthyoplankton Workshop, Mexico City, 16-27 July 1974 (UNESCO Technical Paper in Marine Sciences, No. 20).	E (out of stock) S (out of stock)
3	Report of the IOC/GFCM/ICSEM International Workshop on Marine Pollution in the Mediterranean; Monte Carlo, 9-14 September 1974.	E,F E (out of stock)
4	Report of the Workshop on the Phenomenon known as 'El Niño'; Guayaquil, Ecuador, 4-12 December 1974.	E (out of stock) S (out of stock)
5	IDOE International Workshop on Marine Geology and Geophysics of the Caribbean Region and its Resources; Kingston, Jamaica, 17-22 February 1975	E (out of stock) S
6	Report of the CCOP/SOPAC-IOC IDOE International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Suva, Fiji, 1-6 September 1975.	E
7	Report of the Scientific Workshop to Initiate Planning for a Co-operative Investigation in the North and Central Western Indian Ocean, organized within the IDOE under the sponsorship of IOC/FAO (IOFC)/UNESCO/ EAC; Nairobi, Kenya, 25 March-2 April 1976.	E, F,S, R
8	Joint IOC/FAO (IPFC)/UNEP International Workshop on Marine Pollution in East Asian Waters; Penang, 7-13 April 1976	E (out of stock)
9	IOC/CMG/SCOR Second International Workshop on Marine Geoscience; Mauritius 9-13 August 1976.	E, F, S, R
10	IOC/WMO Second Workshop on Marine Pollution (Petroleum) Monitoring; Monaco, 14-18 June 1976	E, F E (out of stock) R
11	Report of the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976.	E, S (out of stock)
11 Suppl.	Collected contributions of invited lecturers and authors to the IOC/FAO/UNEP International Workshop on Marine Pollution in the Caribbean and Adjacent Regions; Port of Spain, Trinidad, 13-17 December 1976	E (out of stock), S
12	Report of the IOCARIBE Interdisciplinary Workshop on Scientific Programmes in Support of Fisheries Projects; Fort-de-France, Martinique, 28 November-2 December 1977.	E, F, S
13	Report of the IOCARIBE Workshop on Environmental Geology of the Caribbean Coastal Area; Port of Spain, Trinidad, 16-18 January 1978.	E, S
14	IOC/FAO/WHO/UNEP International Workshop on Marine Pollution in the Gulf of Guinea and Adjacent Areas; Abidjan, Côte d'Ivoire, 2-9 May 1978	E, F
15	CPPS/FAO/IOC/UNEP International Workshop on Marine Pollution in the South-East Pacific; Santiago de Chile, 6-10 November 1978.	E (out of stock)
16	Workshop on the Western Pacific, Tokyo, 19-20 February 1979.	E, F, R
17	Joint IOC/WMO Workshop on Oceanographic Products and the IGOSS Data Processing and Services System (IDPSS); Moscow, 9-11 April 1979.	E
17 suppl.	Papers submitted to the Joint IOC/WMO Seminar on Oceano-graphic Products and the IGOSS Data Processing and Services System; Moscow, 2-6 April 1979.	E
18	IOC/UNESCO Workshop on Syllabus for Training Marine Technicians; Miami, U.S.A., 22-26 May 1978 (UNESCO reports in marine sciences, No. 4 published by the Division of Marine Sciences, UNESCO).	E (out of stock), F, S (out of tock), R
19	IOC Workshop on Marine Science Syllabus for Secondary Schools; Llantwit Major, Wales, U.K., 5-9 June 1978 (UNESCO reports in marine sciences, No. 5, published by the Division of Marine Sciences, UNESCO).	E (out of stock), S, R, Ar
20	Second CCOP-IOC Workshop on IDOE Studies of East Asia Tectonics and Resources; Bandung, Indonesia, 17-21 October 1978	E
21	Second IDOE Symposium on Turbulence in the Ocean; Liège, Belgium, 7-18 May 1979.	E, F, S, R
22	Third IOC/WMO Workshop on Marine Pollution Monitoring; New Delhi, 11-15 February 1980.	E, F, S, R
23	WESTPAC Workshop on the Marine Geology and Geophysics of the North-West Pacific; Tokyo, 27-31 March 1980.	E, R
24	WESTPAC Workshop on Coastal Transport of Pollutants; Tokyo, Japan, 27-31 March 1980.	E (out of stock)
25	Workshop on the Inter-calibration of Sampling Procedures of the IOC/ WMO UNEP Pilot Project on Monitoring Background Levels of Selected Pollutants in Open-Ocean Waters; Bermuda, 11-26 January 1980.	E (Superseded by IOC Technical Series No.22)
26	IOC Workshop on Coastal Area Management in the Caribbean Region; Mexico City, 24 September- 5 October 1979.	E, S
27	CCOP/SOPAC-IOC Second International Workshop on Geology, Mineral Resources and Geophysics of the South Pacific; Nouméa, New Caledonia, 9-15 October 1980.	E
28	FAO/IOC Workshop on the effects of environmental variation on the survival of larval pelagic fishes. Lima, 20 April-5 May 1980.	E
29	WESTPAC Workshop on Marine Biological Methodology; Tokyo, 9-14 February 1981.	E
30	International Workshop on Marine Pollution in the South-West Atlantic; Montevideo, 10-14 November 1980.	E (out of stock) S
31	Third International Workshop on Marine Geoscience; Heidelberg, 19-24 July 1982.	E, F, S
32	UNU/IOC/UNESCO Workshop on International Co-operation in the Development of Marine Science and the Transfer of Technology in the context of the New Ocean Regime; Paris, France, 27 September-1 October 1982.	E, F, S
32 Suppl.	Papers submitted to the UNU/IOC/ UNESCO Workshop on International Co-operation in the Development of Marine Science and the Transfer of Technology in the Context of the New Ocean Regime; Paris, France, 27 September-1 October 1982.	E
33	Workshop on the IREP Component of the IOC Programme on Ocean Science in Relation to Living Resources (OSLR); Halifax, 26-30 September 1963.	E
34	IOC Workshop on Regional Co-operation in Marine Science in the Central Eastern Atlantic (Western Africa); Tenerife, 12-17 December 1963.	E, F, S
35	CCOP/SOPAC-IOC-UNU Workshop on Basic Geo-scientific Marine Research Required for Assessment of Minerals and Hydrocarbons in the South Pacific; Suva, Fiji, 3-7 October 1983.	E
36	IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, Portugal, 28 May-2 June 1984.	E
36 Suppl.	Papers submitted to the IOC/FAO Workshop on the Improved Uses of Research Vessels; Lisbon, 28 May-2 June 1984	E
37	IOC/UNESCO Workshop on Regional Co-operation in Marine Science in the Central Indian Ocean and Adjacent Seas and Gulfs; Colombo, 8-13 July 1985.	E
38	IOC/ROPME/UNEP Symposium on Fate and Fluxes of Oil Pollutants in the Kuwait Action Plan Region; Basrah, Iraq, 8-12 January 1984.	E
39	CCOP (SOPAC)-IOC-IFREMER-ORSTOM Workshop on the Uses of Submersibles and Remotely Operated Vehicles in the South Pacific; Suva, Fiji, 24-29 September 1985.	E
40	IOC Workshop on the Technical Aspects of Tsunami Analysis, Prediction and Communications; Sidney, B.C., Canada, 29-31 July 1985.	E
40 Suppl.	First International Tsunami Workshop on Tsunami Analysis, Prediction and Communications, Submitted Papers; Sidney, B.C., Canada, 29 July-1 August 1985.	E
41	First Workshop of Participants in the Joint FAO/IOC/WHO/IAEA/UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region (WACAF/2); Dakar, Senegal, 28 October- 1 November 1985.	E
43	IOC Workshop on the Results of MEDALPEX and Future Oceano-graphic Programmes in the Western Mediterranean; Venice, Italy, 23-25 October 1985.	E
44	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E (out of stock) S
44 Suppl.	IOC-FAO Workshop on Recruitment in Tropical Coastal Demersal Communities, Submitted Papers; Ciudad del Carmen, Campeche, Mexico, 21-25 April 1986.	E
45	IOCARIBE Workshop on Physical Oceanography and Climate; Cartagena, Colombia, 19-22 August 1986.	E
46	Reunión de Trabajo para Desarrollo del Programa "Ciencia Oceánica en Relación a los Recursos No Vivos en la Región del Atlántico Sud-occidental"; Porto Alegre, Brasil, 7-11 de abril de 1986.	S
47	IOC Symposium on Marine Science in the Western Pacific: The Indo-Pacific Convergence; Townsville, 1-6 December 1966	E
48	IOCARIBE Mini-Symposium for the Regional Development of the IOC-UN (OETB) Programme on 'Ocean Science in Relation to Non-Living Resources (OSNLR)'; Havana, Cuba, 4-7 December 1986.	E, S
49	AGU-IOC-WMO-CPPS Chapman Conference: An International Symposium on 'El Niño'; Guayaquil, Ecuador, 27-31 October 1986.	E
50	CCALR-IOC Scientific Seminar on Antarctic Ocean Variability and its Influence on Marine Living Resources, particularly Krill (organized in collaboration with SCAR and SCOR); Paris, France, 2-6 June 1987.	E
51	CCOP/SOPAC-IOC Workshop on Coastal Processes in the South Pacific Island Nations; Lae, Papua-New Guinea, 1-8 October 1987.	E
52	SCOR-IOC-UNESCO Symposium on Vertical Motion in the Equatorial Upper Ocean and its Effects upon Living Resources and the Atmosphere; Paris, France, 6-10 May 1985.	E
53	IOC Workshop on the Biological Effects of Pollutants; Oslo, 11-29 August 1986.	E
54	Workshop on Sea-Level Measurements in Hostile Conditions; Bidston, UK, 28-31 March 1988.	E
55	IBCCA Workshop on Data Sources and Compilation, Boulder, Colorado, 18-19 July 1988.	E
56	IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Cleveland, Australia, 24-30 July 1988.	E
57	IOC Workshop on International Co-operation in the Study of Red Tides and Ocean Blooms; Takamatsu, Japan, 16-17 November 1987.	E
58	International Workshop on the Technical Aspects of the Tsunami Warning System; Novosibirsk, USSR, 4-5 August 1989.	E
58 Suppl.	Second International Workshop on the Technical Aspects of Tsunami Warning Systems, Tsunami Analysis, Preparedness,	E

No.	Title	Languages
	Observation and Instrumentation. Submitted Papers; Novosibirsk, USSR, 4-5 August 1989.	
59	IOC-UNEP Regional Workshop to Review Priorities for Marine Pollution Monitoring Research, Control and Abatement in the Wider Caribbean; San José, Costa Rica, 24-30 August 1989.	E, F, S
60	IOC Workshop to Define IOCARIBE-TRODERP proposals; Caracas, Venezuela, 12-16 September 1989.	E
61	Second IOC Workshop on the Biological Effects of Pollutants; Bermuda, 10 September-2 October 1988.	E
62	Second Workshop of Participants in the Joint FAO-IOC-WHO-IAEA-UNEP Project on Monitoring of Pollution in the Marine Environment of the West and Central African Region; Accra, Ghana, 13-17 June 1988.	E
63	IOC/WESTPAC Workshop on Co-operative Study of the Continental Shelf Circulation in the Western Pacific; Bangkok, Thailand, 31 October-3 November 1989.	E
64	Second IOC-FAO Workshop on Recruitment of Penaeid Prawns in the Indo-West Pacific Region (PREP); Phuket, Thailand, 25-31 September 1989.	E
65	Second IOC Workshop on Sardine/Anchovy Recruitment Project (SARP) in the Southwest Atlantic; Montevideo, Uruguay, 21-23 August 1989.	E
66	IOC ad hoc Expert Consultation on Sardine/ Anchovy Recruitment Programme; La Jolla, California, U.S.A., 1989	E
67	Interdisciplinary Seminar on Research Problems in the IOCARIBE Region; Caracas, Venezuela, 28 November-1 December 1989.	E (out of stock)
68	International Workshop on Marine Acoustics; Beijing, China, 26-30 March 1990.	E
69	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Leningrad, USSR, 28-31 May 1990.	E
69 Suppl.	IOC-SCAR Workshop on Sea-Level Measurements in the Antarctica; Submitted Papers; Leningrad, USSR, 28-31 May 1990.	E
70	IOC-SAREC-UNEP-FAO-IAEA-WHO Workshop on Regional Aspects of Marine Pollution; Mauritius, 29 October - 9 November 1990.	E
71	IOC-FAO Workshop on the Identification of Penaeid Prawn Larvae and Postlarvae; Cleveland, Australia, 23-28 September 1990.	E
72	IOC/WESTPAC Scientific Steering Group Meeting on Co-Operative Study of the Continental Shelf Circulation in the Western Pacific; Kuala Lumpur; Malaysia, 9-11 October 1990.	E
73	Expert Consultation for the IOC Programme on Coastal Ocean Advanced Science and Technology Study; Liège, Belgium, 11-13 May 1991.	E
74	IOC-UNEP Review Meeting on Oceanographic Processes of Transport and Distribution of Pollutants in the Sea; Zagreb, Yugoslavia, 15-18 May 1989.	E
75	IOC-SCOR Workshop on Global Ocean Ecosystem Dynamics; Solomons, Maryland, U.S.A., 29 April-2 May 1991.	E
76	IOC/WESTPAC Scientific Symposium on Marine Science and Management of Marine Areas of the Western Pacific; Penang, Malaysia, 2-6 December 1991.	E
77	IOC-SAREC-KMFRI Regional Workshop on Causes and Consequences of Sea-Level Changes on the Western Indian Ocean Coasts and Islands; Mombasa, Kenya, 24-28 June 1991.	E
78	IOC-CEC-ICES-WMO-ICSU Ocean Climate Data Workshop Goddard Space Flight Center; Greenbelt, Maryland, U.S.A., 18-21 February 1992.	E
79	IOC/WESTPAC Workshop on River Inputs of Nutrients to the Marine Environment in the WESTPAC Region; Penang, Malaysia, 26-29 November 1991.	E
80	IOC-SCOR Workshop on Programme Development for Harmful Algae Blooms; Newport, U.S.A. 2-3 November 1991.	E
81	Joint IAPSO-IOC Workshop on Sea Level Measurements and Quality Control; Paris, France, 12-13 October 1992.	E
82	BORDOMER 92: International Convention on Rational Use of Coastal Zones. A Preparatory Meeting for the Organization of an International Conference on Coastal Change; Bordeaux, France, 30 September-2 October 1992.	E
83	IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 12-13 October 1992.	E
84	Workshop on Atlantic Ocean Climate Variability; Moscow, Russian Federation, 13-17 July 1992	E
85	IOC Workshop on Coastal Oceanography in Relation to Integrated Coastal Zone Management; Kona, Hawaii, 1-5 June 1992.	E
86	International Workshop on the Black Sea; Varna, Bulgaria, 30 September – 4 October 1991	E
87	Taller de trabajo sobre efectos biológicos del fenómeno «El Niño» en ecosistemas costeros del Pacífico Sudeste; Santa Cruz, Galápagos, Ecuador, 5-14 de octubre de 1989.	S only (summary in E, F, S)
88	IOC-CEC-ICSU-ICES Regional Workshop for Member States of Eastern and Northern Europe (GODAR Project); Obninsk, Russia, 17-20 May 1993.	E
89	IOC-ICSEM Workshop on Ocean Sciences in Non-Living Resources; Perpignan, France, 15-20 October 1990.	E
90	IOC Seminar on Integrated Coastal Management; New Orleans, U.S.A., 17-18 July 1993.	E
91	Hydroblack'91 CTD Intercalibration Workshop; Woods Hole, U.S.A., 1-10 December 1991.	E
92	Réunion de travail IOCEA-OSNLR sur le Projet « Budgets sédimentaires le long de la côte occidentale d'Afrique » Abidjan, côte d'Ivoire, 26-28 juin 1991.	E
93	IOC-UNEP Workshop on Impacts of Sea-Level Rise due to Global Warming. Dhaka, Bangladesh, 16-19 November 1992.	E
94	BMTC-IOC-POLARMAR International Workshop on Training Requirements in the Field of Eutrophication in Semi-enclosed Seas and Harmful Algal Blooms, Bremerhaven, Germany, 29 September-3 October 1992.	E
95	SAREC-IOC Workshop on Donor Collaboration in the Development of Marine Scientific Research Capabilities in the Western Indian Ocean Region; Brussels, Belgium, 23-25 November 1993.	E
96	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Zanzibar, United Republic of Tanzania, 17-21 January 1994.	E
96 Suppl.	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 1. Coastal Erosion; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E
96 Suppl	IOC-UNEP-WMO-SAREC Planning Workshop on an Integrated Approach to Coastal Erosion, Sea Level Changes and their Impacts; Submitted Papers 2. Sea Level; Zanzibar, United Republic of Tanzania 17-21 January 1994.	E
97	IOC Workshop on Small Island Oceanography in Relation to Sustainable Economic Development and Coastal Area Management of Small Island Development States; Fort-de-France, Martinique, 8-10 November, 1993.	E
98	CoMSBlack '92A Physical and Chemical Intercalibration Workshop; Erdemli, Turkey, 15-29 January 1993.	E
99	IOC-SAREC Field Study Exercise on Nutrients in Tropical Marine Waters; Mombasa, Kenya, 5-15 April 1994.	E
100	IOC-SOA-NOAA Regional Workshop for Member States of the Western Pacific - GODAR-II (Global Oceanographic Data Archeology and Rescue Project); Tianjin, China, 8-11 March 1994.	E
101	IOC Regional Science Planning Workshop on Harmful Algal Blooms; Montevideo, Uruguay, 15-17 June 1994.	E
102	First IOC Workshop on Coastal Ocean Advanced Science and Technology Study (COASTS); Liège, Belgium, 5-9 May 1994.	E
103	IOC Workshop on GIS Applications in the Coastal Zone Management of Small Island Developing States; Barbados, 20-22 April 1994.	E
104	Workshop on Integrated Coastal Management; Dartmouth, Canada, 19-20 September 1994.	E
105	BORDOMER 95: Conference on Coastal Change; Bordeaux, France, 6-10 February 1995.	E
105 Suppl.	Conference on Coastal Change: Proceedings; Bordeaux, France, 6-10 February 1995	E
106	IOC/WESTPAC Workshop on the Paleographic Map; Bali, Indonesia, 20-21 October 1994.	E
107	IOC-ICSU-NIO-NOAA Regional Workshop for Member States of the Indian Ocean - GODAR-III; Dona Paula, Goa, India, 6-9 December 1994.	E
108	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Paris, France, 9-12 May 1995.	E
108 Suppl.	UNESCO-IHP-IOC-IAEA Workshop on Sea-Level Rise and the Multidisciplinary Studies of Environmental Processes in the Caspian Sea Region; Submitted Papers; Paris, France, 9-12 May 1995.	E
109	First IOC-UNEP CEPPOL Symposium; San José, Costa Rica, 14-15 April 1993.	E
110	IOC-ICSU-CEC regional Workshop for Member States of the Mediterranean - GODAR-IV (Global Oceanographic Data Archeology and Rescue Project) Foundation for International Studies, University of Malta, Valletta, Malta, 25-28 April 1995.	E
111	Chapman Conference on the Circulation of the Intra-Americas Sea; La Parguera, Puerto Rico, 22-26 January 1995.	E
112	IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials (GESREM) Workshop; Miami, U.S.A., 7-8 December 1993.	E
113	IOC Regional Workshop on Marine Debris and Waste Management in the Gulf of Guinea; Lagos, Nigeria, 14-16 December 1994.	E
114	International Workshop on Integrated Coastal Zone Management (ICZM) Karachi, Pakistan; 10-14 October 1994.	E
115	IOC/GLOSS-IAPSO Workshop on Sea Level Variability and Southern Ocean Dynamics; Bordeaux, France, 31 January 1995	E
116	IOC/WESTPAC International Scientific Symposium on Sustainability of Marine Environment: Review of the WESTPAC Programme, with Particular Reference to ICAM, Bali, Indonesia, 22-26 November 1994.	E
117	Joint IOC-CIDA-Sida (SAREC) Workshop on the Benefits of Improved Relationships between International Development Agencies, the IOC and other Multilateral Inter-governmental Organizations in the Delivery of Ocean, Marine Affairs and Fisheries Programmes; Sidney B.C., Canada, 26-28 September 1995.	E
118	IOC-UNEP-NOAA-Sea Grant Fourth Caribbean Marine Debris Workshop; La Romana, Santo Domingo, 21-24 August 1995.	E
119	IOC Workshop on Ocean Colour Data Requirements and Utilization; Sydney B.C., Canada, 21-22 September 1995.	E
120	International Training Workshop on Integrated Coastal Management; Tampa, Florida, U.S.A., 15-17 July 1995.	E
121	Atelier régional IOC-CERESCOR sur la gestion intégrée des zones littorales (ICAM), Conakry, Guinée, 18–22 décembre 1995	F
122	IOC-EU-BSH-NOAA-(WDC-A) International Workshop on Oceanographic Biological and Chemical Data Management, Hamburg, Germany, 20-23 May 1996	E
123	Second IOC Regional Science Planning Workshop on Harmful Algal Blooms in South America; Mar del Plata, Argentina, 30 October–1 November 1995.	E, S
124	GLOBEC-IOC-SAHFOS-MBA Workshop on the Analysis of Time Series with Particular Reference to the Continuous Plankton Recorder Survey; Plymouth, U.K.,4-7 May 1993.	E
125	Atelier sous-régional de la COI sur les ressources marines vivantes du Golfe de Guinée ; Cotonou, Bénin, 1-4 juillet 1996.	E

No.	Title	Languages
126	IOC-UNEP-PERSGA-ACOPS-IUCN Workshop on Oceanographic Input to Integrated Coastal Zone Management in the Red Sea and Gulf of Aden. Jeddah, Saudi Arabia, 8 October 1995.	E
127	IOC Regional Workshop for Member States of the Caribbean and South America GODAR-V (Global Oceanographic Data Archeology and Rescue Project); Cartagena de Indias, Colombia, 8-11 October 1996.	E
128	Atelier IOC-Banque Mondiale-Sida/SAREC-ONE sur la Gestion Intégrée des Zones Côtières ; Nosy Bé, Madagascar, 14-18 octobre 1996.	E
129	Gas and Fluids in Marine Sediments, Amsterdam, the Netherlands; 27-29 January 1997.	E
130	Atelier régional de la COI sur l'océanographie côtière et la gestion de la zone côtière ;Moroni, RFI des Comores, 16-19 décembre 1996.	E
131	GOOS Coastal Module Planning Workshop; Miami, USA, 24-28 February 1997	E
132	Third IOC-FANSA Workshop; Punta-Arenas, Chile, 28-30 July 1997	S/E
133	Joint IOC-CIESM Training Workshop on Sea-level Observations and Analysis for the Countries of the Mediterranean and Black Seas; Birkenhead, U.K., 16-27 June 1997.	E
134	IOC/WESTPAC-CCOP Workshop on Paleogeographic Mapping (Holocene Optimum); Shanghai, China, 27-29 May 1997.	E
135	Regional Workshop on Integrated Coastal Zone Management; Chabahar, Iran; February 1996.	E
136	IOC Regional Workshop for Member States of Western Africa (GODAR-VI); Accra, Ghana, 22-25 April 1997.	E
137	GOOS Planning Workshop for Living Marine Resources, Dartmouth, USA; 1-5 March 1996.	E
138	Gestión de Sistemas Oceanográficos del Pacífico Oriental; Concepción, Chile, 9-16 de abril de 1996.	S
139	Sistemas Oceanográficos del Atlántico Sudoccidental, Taller, TEMA;Furg, Rio Grande, Brasil, 3-11 de noviembre de 1997	S
140	IOC Workshop on GOOS Capacity Building for the Mediterranean Region; Valletta, Malta, 26-29 November 1997.	E
141	IOC/WESTPAC Workshop on Co-operative Study in the Gulf of Thailand: A Science Plan; Bangkok, Thailand, 25-28 February 1997.	E
142	Pelagic Biogeography ICoPB II. Proceedings of the 2nd International Conference. Final Report of SCOR/IOC Working Group 93; Noordwijkerhout, The Netherlands, 9-14 July 1995.	E
143	Geosphere-biosphere coupling: Carbonate Mud Mounds and Cold Water Reefs; Gent, Belgium, 7–11 February 1998.	E
144	IOC-SOPAC Workshop Report on Pacific Regional Global Ocean Observing Systems; Suva, Fiji, 13-17 February 1998.	E
145	IOC-Black Sea Regional Committee Workshop: 'Black Sea Fluxes' Istanbul, Turkey, 10-12 June 1997.	E
146	Taller Internacional sobre Formacíon de Capacidades para el Manejo de las Costas y los Oéanos en le Gran Caribe, La Habana, – Cuba, 7–10 de Julio de 1998 / International Workshop on Management Capacity-Building for Coasts and Oceans in the Wider Caribbean, Havana, Cuba, 7–10 July 1998	S/E
147	IOC-SOA International Training Workshop on the Intregration of Marine Sciences into the Process of Integrated Coastal Management, Dalian, China, 19-24 May 1997.	E
148	IOC/WESTPAC International Scientific Symposium – Role of Ocean Sciences for Sustainable Development Okinawa, Japan, 2-7 February 1998.	E
149	Workshops on Marine Debris & Waste Management in the Gulf of Guinea, 1995-97.	E
150	First IOCARIBE-ANCA Workshop Havana, Cuba, 29 June-1 July 1998.	E
151	Taller Pluridisciplinario TEMA sobre Redes del Gran Caribe en Gestión Integrada de Áreas Costeras Cartagena de Indias, Colombia, 7-12 de septiembre de 1998.	S
152	Workshop on Data for Sustainable Integrated Coastal Management (SICOM) Maputo, Mozambique, 18-22 July 1998	E
153	IOC/WESTPAC-Sida (SAREC)	E
154	IOC-Sida-Flanders-SFRI Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA project) Capetown, South Africa, 30 November-11 December 1998.	E
155	Science of the Mediterranean Sea and its applications UNESCO, Paris 29-31 July 1997	E
156	IOC-LUC-KMFRI Workshop on RECOSCIX-WIO in the Year 2000 and Beyond, Mombasa, Kenya, 12-16 April 1999	E
157	'98 IOC-KMI International Workshop on Integrated Coastal Management (ICM), Seoul, Republic of Korea 16-18 April 1998	E
158	The IOCARIBE Users and the Global Ocean Observing System (GOOS) Capacity Building Workshop, San José, Costa Rica, 22-24 April 1999	E
159	Oceanic Fronts and Related Phenomena (Konstantin Fedorov Memorial Symposium) – Proceedings, Pushkin, Russian Federation, 18-22 May 1998	E
160	Under preparation	
161	Under preparation	
162	Workshop report on the Transports and Linkages of the Intra-americas Sea (IAS), Cozumel, Mexico, 1-5 November 1997	E
163	Under preparation	
164	IOC-Sida-Flanders-MCM Third Workshop on Ocean Data Management in the IOCINCWIO Region (ODINEA Project), Cape Town, South Africa, 29 November – 11 December 1999	E
165	An African Conference on Sustainable Integrated Management; Proceedings of the Workshops. An Integrated Approach, (PACSICOM), Maputo, Mozambique, 18 –25 July 1998	E, F
166	IOC-SOA International Workshop on Coastal Megacities: Challenges of Growing Urbanization of the World's Coastal Areas; Hangzhou, P.R. China, 27 –30 September 1999	E
167	IOC-Flanders First ODINAFRICA-II Planning Workshop, Dakar, Senegal, 2-4 May 2000	E
168	Geological Processes on European Continental Margins; International Conference and Eight Post-cruise Meeting of the Training-Through-Research Programme, Granada, Spain, 31 January – 3 February 2000	E
169	International Conference on the International Oceanographic Data & Information Exchange in the Western Pacific (IODE-WESTPAC) 1999, ICIWP '99, Langkawi, Malaysia, 1-4 November 1999	E ***(electronic copy only)***
170	IOCARIBE-GODAR-I Cartagenas, Colombia, February 2000	***under preparation***
171	Ocean Circulation Science derived from the Atlantic, Indian and Arctic Sea Level Networks, Toulouse, France, 10-11 May 1999	E
172	(*Under preparation*)	
173	The Benefits of the Implementation of the GOOS in the Mediterranean Region, Rabat, Morocco, 1-3 November 1999	E, F
174	IOC-SOPAC Regional Workshop on Coastal Global Ocean Observing System (GOOS) for the Pacific Region, Apia, Samoa, 16-17 August 2000	E
175	Geological Processes on Deep-water European Margins, Moscow-Mozhenka, 28 Jan.-2 Feb. 2001	E
176	MedGLOSS Workshop and Coordination Meeting for the Pilot Monitoring Network System of Systematic Sea Level Measurements in the Mediterranean and Black Seas, Haifa, Israel, 15-17 May 2000	E
177	*(Under preparation)*	
178	*(Under preparation)*	
179	*(Under preparation)*	
180	Abstracts of Presentations at Workshops during the 7th session of the IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Honolulu, USA, 23-27 April 2001	E
181	*(Under preparation)*	
182	*(Under preparation)*	
183	Geosphere/Biosphere/Hydrosphere Coupling Process, Fluid Escape Structures and Tectonics at Continental Margins and Ocean Ridges, International Conference & Tenth Post-cruise Meeting of the Training-through-Research Programme, Aveiro, Portugal, 30 January-2 February 2002	E
184	*(Under preparation)*	
185	*(Under preparation)*	
186	*(Under preparation)*	
186	*(Under preparation)*	
187	Geological and Biological Processes at deep-sea European Margins and Oceanic Basins, Bologna, Italy, 2–6 February 2003	E
188	Proceedings of 'The Ocean Colour Data' Symposium, Brussels, Belgium, 25-27 November 2002	E
189	Workshop for the Formulation of a Draft Project on Integrated Coastal Management (ICM) in Latin America and the Caribbean (LAC), Cartagena, Colombia, 23–25 October 2003	E F ***(electronic copy only)***
	Taller de Formulación de un Anteproyecto de Manejo Costero Integrado (MCI) en América Latina y el Caribe (ALC), Cartagena, Colombia, 23–25 de Octubre de 2003	
190	First ODINCARSA Planning Workshop for Caribbean Islands, Christchurch, Barbados, 15–18 December 2003	E ***(electronic copy only)***
191	North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes — International Conference and Twelfth Post-cruise Meeting of the Training-through-research Programme, Copenhagen, Denmark, 29–31 January 2004	E
192	Regional Workshop on Coral Reefs Monitoring and Management in the ROPME Sea Area, Iran I.R., 14–17 December 2003	E ***(under preparation)***
193	Workshop on New Technical Developments in Sea and Land Level Observing Systems, Paris, France, 14–16 October 2003	E ***(electronic copy only)***
194	IOC/ROPME Planning Meeting for the Ocean Data and Information Network for the Central Indian Ocean Region	***(under preparation)***
195	Workshop on Indicators of Stress in the Marine Benthos, Torregrande-Oristano, Italy, 8–9 October 2004	E
196	International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean within a Global Framework, Paris, France, 3–8 March 2005	E
197	Geosphere-Biosphere Coupling Processes: The TTR Interdisciplinary Approach Towards Studies of the European and North African Margins; International Conference and Post-cruise Meeting of the Training-Through-Research Programme, Morocco, 2-5 February 2005	E
198	Second International Coordination Meeting for the Development of a Tsunami Warning and Mitigation System for the Indian Ocean, Grand Baie, Mauritius, 14–16 April 2005	E
199	International Conference for the Establishment of a Tsunami and Coastal Hazards Warning System for the Caribbean and Adjacent Regions, Mexico, 1–3 June 2005	E
200	Lagoons and Coastal Wetlands in the Global Change Context: Impacts and Management Issues — Proceedings of the International Conference, Venice, 26–28 April 2004 (*ICAM Dossier N° 3*)	E
201	Geological processes on deep-water European margins - International Conference and 15th Anniversary Post-cruise Meeting of the Training-Through-Research Programme, Moscow/Zvenigorod, Russian Federation, 29 January–4 February 2006	E
202	Proceedings of 'Ocean Biodiversity Informatics': an international conference on marine biodiversity data management Hamburg, Germany, 29 November–1 December 2004	E
203	IOC-Flanders Planning Workshop for the formulation of a regional Pilot Project on Integrated Coastal Area Management in Latin America, Cartagena de Indias, Colombia, 16–18 January 2007	*E* ***(electronic copy only)***
204	Geo-marine Research along European Continental Margins, International Conference and Post-cruise Meeting of the Training-through-research Programme, Bremen, Germany, 29 January–1 February 2007	E
205	IODE/ICAM Workshop on the development of the Caribbean marine atlas (CMA), United Nations House, Bridgetown, Barbados, 8–10 October 2007	E ***(electronic copy only)***
206	IODE/JCOMM Forum on Oceanographic Data Management and Exchange Standards, Ostend, Belgium, 21–25 January 2008	*(Under preparation)*
207	SCOR/IODE Workshop on Data Publishing, Ostend, Belgium, 17–18 June 2008	*(Under preparation)*
208	JCOMM Technical Workshop on Wave Measurements from Buoys, New York, USA, 2–3 October 2008 (IOC-WMO publication)	*(Under preparation)*

No.	Title	Languages
209	Collaboration between IOC and OBIS towards the Long-term Management Archival and Accessibility of Ocean Biogeographic Data, Ostend, Belgium, 24–26 November 2008	*(Under preparation)*
210	Ocean Carbon Observations from Ships of Opportunity and Repeat Hydrographic Sections (IOCCP Reports, 1), Paris, France, 13–15 January 2003	E ***(electronic copy only)***
211	Ocean Surface pCO_2 Data Integration and Database Development (IOCCP Reports, 2), Tsukuba, Japan, 14–17 January 2004	E ***(electronic copy only)***
212	International Ocean Carbon Stakeholders' Meeting, Paris, France, 6–7 December 2004	E ***(electronic copy only)***
213	International Repeat Hydrography and Carbon Workshop (IOCCP Reports, 4), Shonan Village, Japan, 14–16 November 2005	E ***(electronic copy only)***
214	Initial Atlantic Ocean Carbon Synthesis Meeting (IOCCP Reports, 5), Laugavatn, Iceland, 28–30 June 2006	E ***(electronic copy only)***
215	Surface Ocean Variability and Vulnerability Workshop (IOCCP Reports, 7), Paris, France, 11–14 April 2007	E ***(electronic copy only)***
216	Surface Ocean CO2 Atlas Project (SOCAT) 2nd Technical Meeting Report (IOCCP Reports, 9), Paris, France, 16–17 June 2008	E ***(electronic copy only)***
217	Changing Times: An International Ocean Biogeochemical Time-Series Workshop (IOCCP Reports, 11), La Jolla, California, USA, 5–7 November 2008	E ***(electronic copy only)***
218	Second Joint GOSUD/SAMOS Workshop, Seattle, Washington, USA, 10–12 June 2008	E ***(electronic copy only)***
219	International Conference on Marine Data management and Information Systems (IMDIS), Athens, Greece, 31 March–2 April 2008	E
220	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	E ***(electronic copy only)***
221	Surface Ocean CO_2 Atlas Project Pacific Regional Workshop, Tsukuba, Japan, 18-20 March, 2009 (IOCCP Report Number 12)	E ***(electronic copy only)***
222	Surface Ocean CO_2 Atlas Project Atlantic and Southern Oceans Regional Meeting, Norwich, UK, 25-26 June, 2009 (IOCCP Report Number 13)	E ***(electronic copy only)***
223	Advisory Workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges, Indian Institute of Technology (IIT), New Delhi, India, 14–17 July 2009	E ***(electronic copy only)***
224	2009 International Nutrients Scale System (INSS) Workshop Report, Paris, France, 10–12 February 2009	E ***(electronic copy only)***
225	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	E/S ***(electronic copy only)***
226	OBIS (Ocean Biogeographic Information System) Strategy and Work plan Meeting, IOC Project Office for IODE, Oostende, Belgium, 18–20 November 2009	E ***(electronic copy only)***
227	ODINAFRICA-IVProject Steering Committee, First Session, Ostend, Belgium, 20–22 January 2010	*In preparation*
228	First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections	E ***(electronic copy only)***
229	First IODE Workshop on Quality Control of Chemical Oceanographic Data Collections, IOC Project Office for IODE, Oostende, Belgium, 8-11 February 2010 (IOCCP Report Number 18)	E ***(electronic copy only)***
230	SCOR/IODE/MBLWHOI Library Workshop on Data Publication, Paris, France, 2 April 2010	E ***(electronic copy only)***
231	First ODINAFRICA Coastal and Marine Atlases Planning Meeting, Ostend, Belgium, 12–14 October 2009	E ***(electronic copy only)***
232	Eleventh International Workshop on Wave Hindcasting and Forcasting and Second Coastal Hazard Symposium, Halifax, Canada, 18–23 October 2009	E ***(electronic copy only***
233	2010 Meeting of the Joint IODE-JCOMM Steering Group on the Global Temperature-Salinity Profile Programme Ostend, Belgium, 5–7 May 2010	E ***(electronic copy only***
234	Southern and Indian Surface Ocean CO_2 Atlas (SOCAT) Workshop, CSIRO Marine Laboratories, Hobart, Tasmania 16-18 June 2010	E ***(electronic copy only)***
235	The Caribbean Marine Atlas (CMA) Review and Planning Workshop and Saint Lucia National Coastal Atlas Stakeholder Event, Bay Gardens Inn, Rodney Bay, Saint Lucia, 2–6 August 2010	E ***(electronic copy only)***
236	First Session of the IODE Steering Group for the IODE OceanDataPortal (SG-ODP-I), 20–22 September 2010, Ostend, Belgium	E ***(electronic copy only)***

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