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**IODE data flow
(National Oceanographic Programmes (NOPs) and Cruise Summary
Reports (CSRs))**

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Background

In the late 1960s IODE started the system of the National Oceanographic Programmes (NOPs) and Cruise Summary Reports (CSRs, formerly ROSCOPs) as a way to share information on planned research cruises as well as to report on the results of research cruises. For many years the NOP information was managed by the IODE Secretariat. However, at IODE-XV (1995) an offer was made by the University of Delaware to take on this task as part of OCEANIC (www.cms.udel.edu). The IODE Committee accepted this kind offer and Oceanic managed the service for well over ten years. At IODE-XVI, IODE decided to cease the mailing of paper copies of NOPs by the Secretariat, requested NODCs to mail NOPs directly to OCEANIC, and recommended that NOP information be made available on-line through OCEANIC. OCEANIC has continued this function, but has found it increasingly difficult to fund this activity in recent years.

The ROSCOP (Report of Observations/ Samples Collected by Oceanographic Programmes) was conceived by IOC/IODE in the late 1960s in order to provide a low level inventory for tracking oceanographic data collected on Research Vessels. The ROSCOP form was extensively revised in 1990, and was re-named the Cruise Summary Report (CSR). Most marine disciplines are represented in the CSR, including physical, chemical, and biological oceanography, marine geology and geophysics, fisheries, marine contaminants, and marine meteorology. Traditionally, it is the Chief Scientist's obligation to submit a CSR to his/her National Oceanographic Data Centre (NODC) within two to three weeks after the cruise. In the early years, these were periodically transmitted to the World Data Centres for Oceanography and to ICES.

In the late 1980s ICES led the effort to digitise the ROSCOP/CSR information and pioneered the development of a database for this information, and, in collaboration with IOC/IODE, developed and maintained a PC-based CSR entry tool and search facility. The emphasis for this was on ICES member countries, but extended to other countries who wished to submit their information. The CSR activity gained new momentum in Europe during the EU-funded EURONODIM/Sea-Search projects under the lead of BSH/DOD, Germany. The combined ICES and Sea-Search/SeaDataNet CSR database now comprises details of over 35000 oceanographic research cruises primarily from Europe and North America, but also including some other regions (e.g. Japan, Australia), some information extending back over the last 40 years, and with some as far as to 1873. Every fortnight, CSRs of BSH/DOD and ICES are synchronised. BSH/DOD has developed and now operates an on-line system for SeaDataNet partners entering and updating Cruise Summary Reports 'CSROnline' directly by Chief Scientists, and also for handling CSRs, delivered by NODCs in an agreed XML format. In addition, BSH/DOD offers searching of the CSR database via the 'CSR Retrieval' facility.

Both the CSR entry and the CSR retrieval facilities are hosted at a dedicated server at BSH/DOD, but can be accessed via the Sea-Search portal (www.sea-search.net).

International Research Vessel Programme Database for POGO and CoML

Over the last few years there has been a renewed interest in an operational and well maintained database and web-site for research vessels of length > 60 metres, certified for open ocean research. Most recently the Partnership for Observation of the Global Oceans (POGO) members have recognized the need to improve on information sharing on pre-planned, planned, current and past cruises and related databases to enhance awareness of opportunities, to improve cost-effectiveness of cruises and to improve data mining.

Subsequently, having reviewed the OCEANIC activity, POGO issued a call for tender to establish an international research vessel programme database for open ocean research vessels. This comprises approximately 300 research vessels, operated by about 50 institutes worldwide. Most of these institutes are represented in POGO and/or the International Research Ship Operators' Meeting (ISOM). The basic aim of POGO is to have an instrument supporting more efficient use of the research vessels, mutual tuning of planned cruises, pooling and combining resources.

Many potential benefits of such an international cruise database were identified:

- Helps scientists from different countries coordinate future funded research through information about research vessels of opportunity
- Aids in retrospective ability to find data in regions of interest
- Makes it possible for projects to conduct joint work and to fill empty berths
- Creates capacity-building and training opportunities
- Would aid in tracking and distributing data
- Would provide information to evaluate the benefit of observations from ships as part of GOOS
- Would make it possible for scientists and operational users from other projects to get instruments deployed and/or samples taken in hard-to-reach areas of the ocean (e.g. drifters, profiling floats, moored buoy servicing)
- Would allow cost sharing among institutions, projects, and nations
- Would make possible intercomparisons, intercalibrations, validation among different data types (eg. CTD vs. Argo, in situ vs. remote sensing)

Such a facility would also be particularly useful to the Census of Marine Life (CoML), as an information tool for gaining access to data-collection platforms as well as to data already collected in the past.

A proposal submitted, and subsequently revised, by the EU SeaDataNet project consortium was selected by POGO to develop and operate of a dedicated web-site for an International Research Cruise Database. This was endorsed by a number of organisations and programmes, notably the CoML.

SeaDataNet consortium

SeaDataNet is a five year EU-funded project, which began in April 2006 and is coordinated by IFREMER. It is building on the progress made by the EU-funded EURONODIM and Sea-Search projects (focus mainly on metadata), the MEDAR/MEDATLAS projects (focus on data) and the long-term infrastructure provided by major oceanographic data centres and marine research organisations in Europe. Partners in SeaDataNet are NODCs from 35 countries that are part of major marine and oceanographic institutes, well experienced and engaged in many national and international data management projects and programmes, and also active in international organizations, such as IOC/IODE and ICES. Thus the activities are undertaken in an international context and are striving for adoption and, where necessary, development of global standards.

Within SeaDataNet entry services for the CSR database are being further upgraded by BSH/DOD as part of the move towards Web Services, so that a full automatic exchange from national systems, is foreseen in due time. This will provide further support for the direct online entry system that a number of countries prefer instead of implementing their own national system. The central operator BSH/DOD remains necessary for overall quality checking, monitoring of performance, throughput and support. Also the retrieval services by BSH/DOD are migrating towards Web Services, which will enable building of alternative user interfaces on top of the CSR database by national and international organisations.

Additionally within the SeaDataNet community, a standardised set of controlled vocabularies (or reference libraries) are being built: for example, parameters (including general discipline), Sea Areas (IHB), organisation contact information (including scientists), projects, countries (ISO3166), etc. that will contribute to streamlining services and relations in and between metadatabases. With relevance to research vessels and cruises, SeaDataNet is looking into common vocabularies for:

- Platform names, to be managed by ICES (as Web Service) by evaluating and harmonizing the existing ship names list of ICES, in collaboration with the US NODC, and the platform names of JCOMMOPS, which include drifting buoys, floats and fixed moorings as well as ships, and setting up a consistent management schema.
- Directory of Marine Organisations, containing full addresses and profile descriptions of organisations that are in any way involved in marine and oceanographic research, and data acquisition and management. This has already been set-up for Europe and is operated by MARIS, Netherlands, as the EDMO database at the Sea-Search portal (www.sea-search.net). It is maintained by NODCs using an online Content Management System. As part of SeaDataNet it is being upgraded to a Web Service which will enable automatic use of the database by other systems. Furthermore all SeaDataNet metadatabases will make relational use of EDMO for organisations and retrieving their full addresses.
- Research Vessel Directory, containing characteristics, owners and operators' information for all European marine and oceanographic research vessels, developed and operated by EurOcean. A first release of the European RV Directory will be launched soon and it will feature an option for owners and operators to submit new vessel information or updates for existing vessels by online forms, which will be processed by EurOcean in the database. The content format is in conformance to the OCEANIC. As part of SeaDataNet activities appropriate links/relations to the platform names vocabularies, the CSR database and the EDMO database are being developed.

The Pan-European SeaDataNet infrastructure is based upon national ocean data management infrastructures, operated by major research institutes and governmental organisations as integrated parts of their primary activities. The SeaDataNet funds are used for concerted development activities, improving communication and defining/agreeing mutual standards, which are adopted and implemented in the institutional and national systems. This implies that the sustainability of the infrastructure is secured beyond the lifetime of the SeaDataNet project, because it is embedded in existing and on-going activities and budgets.

Development of the international research cruise web-site

A dedicated International Research Cruise web-site is under development that will give access to the following interrelated information modules, specifically for open ocean Research Vessels:

- Research Vessel Cruise Programme database, containing planned cruises per research vessel and owner / operator
- Research Vessel Directory database, containing characteristics of each research vessel, owner / operator contact details and, if available, a link to the ship's web page

- Cruise Summary Report (CSR) database, containing details of completed cruises and providing a first level inventory of oceanographic measurements made and samples taken.

Each of these three database applications will feature a mechanism and application for adding new entries and updating existing entries and for searching and retrieving information.

The CSR database, the EDMO database and the Research Vessel Directory, including their management and maintenance, have been set-up in the first instance for Europe, but are being extended by BSH/DOD, MARIS and EurOcean respectively towards global coverage and adapted to support also the specific requirements of POGO and the CoML in addition to the SeaDataNet requirements.

The Research Vessel Cruise Programme database requires some new development, because it is not included in SeaDataNet. The other two databases will build on the existing CSR and Research Vessel Directories described above, which will be further developed during SeaDataNet. Use can be made of the same database structures and ongoing developments, but for the entry, maintenance and search applications it will be organised so that the POGO content can be managed and presented as a stand-alone collection, both in content coverage as in “look and feel”. This requires extra software developments. Furthermore there will be a global focus, which will require extra effort beyond SeaDataNet in organising and operating the initial entries and regular maintenance of each of the three POGO databases.

The SeaDataNet partners will be primarily responsible for the technical operation and maintenance of the POGO website and databases. The provision of new information (i.e. content) and updates of that information will be a task of the POGO and ISOM contacts themselves, using the available mechanisms provided. In this process the SeaDataNet partners will monitor and regularly report to POGO on the updating, provide support to users and encourage regular maintenance, but will rely largely on POGO and ISOM to remind their members of the need and benefits of regular updating of the system.

The website and databases for POGO and CoML will be developed and operated by a subgroup of the SeaDataNet consortium, i.e. a partnership of BSH/DOD, MARIS, EurOcean and BODC. MARIS, Technical Coordinator for SeaDataNet, will act as the contact point and coordinator, and is also involved in the web-site set-up, tuning of the EDMO directory, and the user interface for the Research Vessel Cruise Programme database. BODC leads the Research Vessel Cruise Programme database.

The approach as described will deliver to the requirements of POGO and CoML, whilst building on already developed systems. This means that POGO and CoML can take advantage of these without funding their development and be integrated with a standards based approach.

The two phase work plan is as follows:

Phase 1: December 2006 – March 2007:

- The International Research Cruise web-site will be developed.
- In the Research Vessels Database software provision will be made by EurOcean to enter, maintain and identify/select the open ocean Research Vessels and include common vocabularies.
- EurOcean will load the open ocean Research Vessel directory with the characteristics from Oceanic for the ca. 300 vessels of length >60 m.
- Arrangements will be made and instructions provided for POGO and ISOM for maintenance of their Vessel Specifications in the Research Vessel Directory.

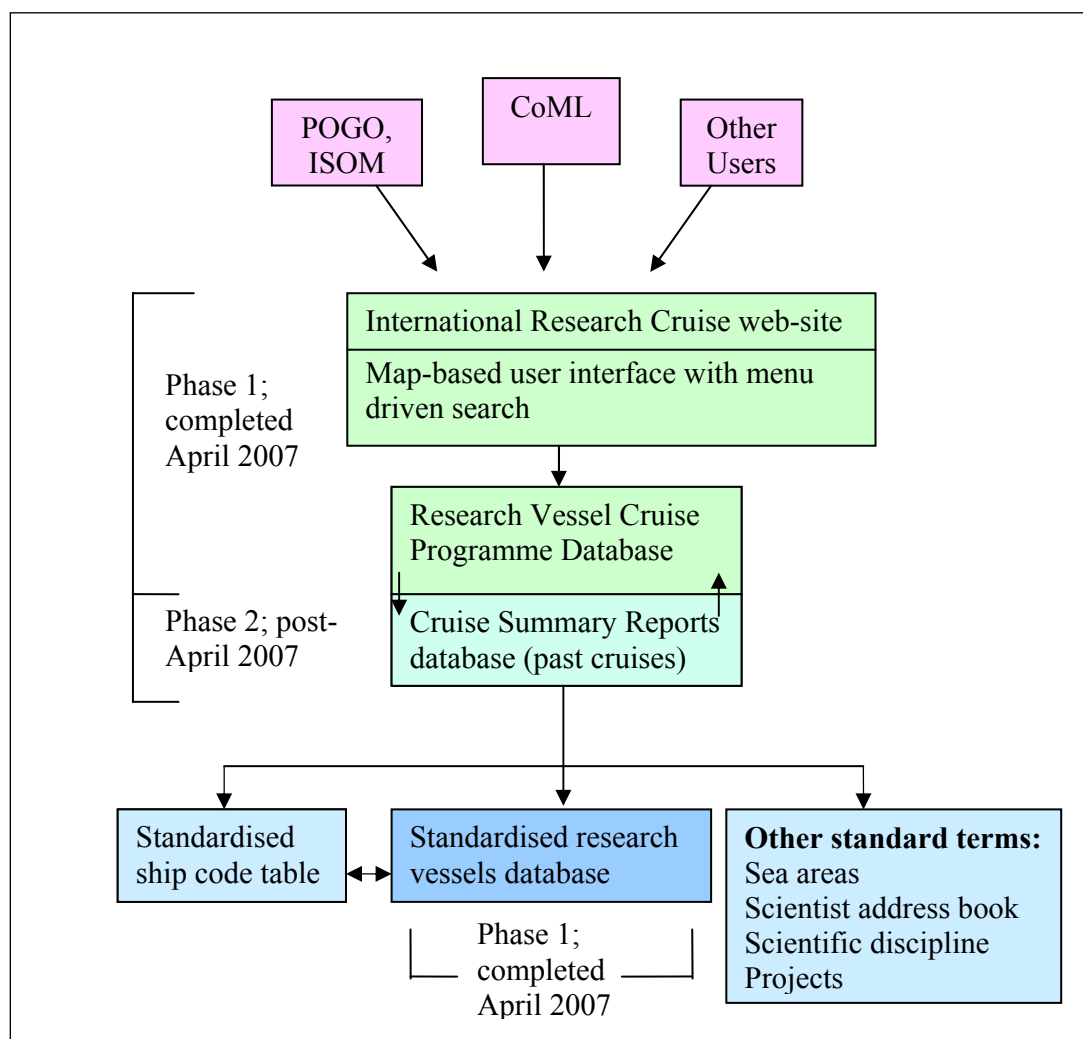
- An alternative User Interface will be developed for the Research Vessel Directory within a POGO “look and feel”.
- Design of the Research Vessel Cruise Programme input format in collaboration with POGO and ISOM.
- POGO and ISOM members will be requested by BODC to provide their 2007 Cruise Programmes using the agreed input format (initially Excel spreadsheet/ASCII csv file, possibly moving to XML).
- The International Research Vessel Cruise Programme database will be extended and adapted by BODC.
- The initial 2007 Cruise Programme information will be validated and loaded to the International Research Vessel Cruise Programme database.
- A new User Interface will be developed by MARIS for the International Research Vessel Cruise Programme database and activated at the web-site. Development of the user interface, including map-based searching, will provide:
 - Selection by Sea Area, date range, project, discipline, berths available, Chief Scientist
 - Rubber-banding to select area from map
 - On searching a list of cruises will be returned, with links to further detailed information (including web-links to external web-pages where available) and their Marsden Square locations shown on a map
 - An export option to csv files and map file (picture)
- Arrangements will be made and instructions provided for POGO and ISOM for maintenance and update of their entries in the International Research Vessel Cruise Programme database
- BSH/DOD will analyse the software provisions to be made for the CSR database, entry and retrieval, to enter, to maintain and to identify/select the open ocean Research Vessels and their CSRs.
- Note: in this phase local copies will be held of the vocabularies, relations between databases will not yet be fully supported and maintenance will follow existing mechanisms (Research Vessel directory => online form with processing by EurOcean; Research Vessel Cruise Programme database => Excel spreadsheets/ASCII csv file with processing by BODC).

Phase 2: April 2007 – April 2009:

- The International Research Cruise web-site will be further developed and updated as new information is provided.
- The CSR database will be made available for on-line entry to POGO organisations and further developed to include POGO input to the CSR database. Software provisions will be made by BSH/DOD to identify/select the open ocean Research Vessels and to include common vocabularies.
- An alternative User Interface will be developed for the CSR database in a POGO “look and feel”.
- For the Research Vessel Directory an online Content Management System will be included, enabling each operator to maintain its vessel characteristics themselves online with quality control of information by EurOcean.
- Also for the Research Vessel Cruise Programme database an online Content Management System will be included, enabling each operator to maintain its planned cruises themselves online with quality control of input by BODC. Delivery of annual programme updates can still be done in bulk using the agreed Excel spreadsheet/ASCII csv file.

- Relations between databases will be fully implemented and supported, so that a user can move seamlessly from the Research Vessel database to the Cruise Planning database to completed cruises (i.e. Cruise Summary Report database).
- These full links between databases and with vocabularies will be developed using Web Services.
- Maintenance will follow new mechanisms (Research Vessel directory => online CMS with QC by EurOcean; Research Vessel Cruise Programme database => annual Excel spreadsheets/ASCII csv (or XML) files with processing and QC by BODC plus online CMS for intermediate updates; CSR => online CMS with QC by BSH/DOD).

The web-site and database user interfaces will be fit and tested for use by common and popular web browsers (i.e. IE6, IE7, Mozilla Firefox, and Netscape 7) on Windows and Linux platforms.



Schematic overview of International Research Cruise Database and Web-site

Benefits to IODE

IODE has long maintained an active interest in cruise programme information. From an IODE perspective, this cruise programme information is the first step in a data tracking system; this is followed up by the Cruise Summary Report (CSR) documenting the data that have been collected, detailed cruise reports and the data themselves. The POGO-CoML initiative has revitalised the cruise programme part of this activity for large ocean-going research vessels (>60m), and once the system is in place IODE can extend and build upon this to include all research vessels – and build a dedicated IODE/global portal if required. Although the work for POGO and the CoML is carried out under the banner of the SeaDataNet consortium, IODE is a partner within the SeaDataNet project, as is ICES, and many of the SeaDataNet partners are NODCs within the IODE framework, and thus are contributing to IODE through this activity. They also ensure sustainability of the databases and systems in the future. One further benefit is the development of a standardised set of controlled vocabularies which is being undertaken by SeaDataNet in collaboration with the IODE Steering Group on MarineXML.

Action requested from the IODE Committee

The IODE Committee is invited to propose action regarding the global extension, and once the system with its integrated web services is in place, IODE can extend and build upon this to include all research vessels - and build a dedicated IODE/global portal if required.

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