Management of events, samples, videos and data generated by deep-sea submersibles

Catherine Borremans
Ifremer – SISMER
Centre Bretagne - ZI de la Pointe du Diable - CS 10070 - 29280 Plouzané, France

IMDIS 2013 - International Conference on Marine Data and Information Systems
Lucca (Italia), September 23-25, 2013
Outline Presentation

- The Submersibles
- Submersible Data & Users
- Submersible data management-Biocean
- Evolutions & New data flow
- Onboard software
- Back on land
- Focus on submersible videos
- International context
The Submersibles

Manned/Unmanned, Propelled/Towed/Autonomous vehicles
Submersible data

**In situ/Raw data**
- Positioning
- Micro bathymetry
- Seismic reflection
- ADCP
- CTD
- Images (video and stills)
- Measurements
- Observations
- Bio/Geo/Hydrological samples

**Post-processing data**
- Images and related observations
- Bio/Geo/Hydrological sample analyses
Submersible users

- Biologists/Ecologists
- Geologists
from Ifremer and from the international scientific community
Submersible data management

Biocean

The data management system for deep-sea benthic ecological data from:

- Benthic sedimentary ecosystems
- Hot-vent ecosystems
- Cold-seep ecosystems
- Deep coral reef ecosystems
- Canyons
Biocean

Different data types mainly collected by research submersibles and multiple gear:

- Samples (biology, water, sediment) and analyses: specimens identification and definition of their living conditions
- Measurements (physics, chemistry)
- Images (stills)
**REAL-TIME**

- **CASINO** Acquisition of surface operations
  - Cruise Log
  - Dive Log

- **ADELIE** Acquisition of submarine operations
  - Cruise Log
  - Dive Log

**POST-PROCESSING**

- **Echange Terre / Mer** Data import/export
- **BIOCLEAN** Taxonomic Nomenclature Management
- **DONENV** Environmental Data Capture

**Back on Land**

- GESCOL Collection Management

Internet Access to data
http://www.ifremer.fr/iis/bioclean
http://www.iobis.org
Evolutions

- New equipment and technologies: a huge increase in data volume (e.g.: video)
- Newcomers: geologists
- Obsolete information technologies: new functionalities needed

➔ Bioccean system to be renewed
A « new » data flow

<table>
<thead>
<tr>
<th>REAL-TIME</th>
<th>POST-PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>On board ships</td>
<td>Back on Land</td>
</tr>
<tr>
<td><strong>CASINO</strong> Acquisition of surface operations</td>
<td><strong>BGMB</strong> Geology</td>
</tr>
<tr>
<td><strong>ADELIE</strong> Acquisition of submarine operations</td>
<td><strong>QUADRIGE</strong> Biology</td>
</tr>
<tr>
<td><strong>ALAMER</strong> Metadata &amp; Data post-processing for cruises, dives and moorings</td>
<td><strong>SISMER</strong> Cruises</td>
</tr>
</tbody>
</table>

Reference lists
Onboard software: Alamer

Objectives

• Record and Report events (= operations) e.g.: moorings, cores, observations…
• Track samples from cruises, dives and moorings operated by biologists or geologists
Onboard software: Alamer

Functionalities

- Import reference data
- Import « real-time » surface and submarine georeferenced operations
- Formatting
- Description of results, samples, measures, stills
- Safeguarding
- Export
Onboard software: Alamer

Technologies

- MySQL database
- Java+Eclipse RCP
- « Stand alone » application + « Web Services » layer
- Multiplatform
- Multilingual

→ To be used onboard both French and Foreign vessels
A « new » data flow

REAL-TIME | POST-PROCESSING
--- | ---
**On board ships**
CASINO  
Acquisition of surface operations

ALAMER  
Metadata & Data post-processing for cruises, dives and moorings

ADELIE  
Acquisition of submarine operations

**Back on Land**
BGMB  
Geology

QUADRIGE  
Biology

SISMER  
Cruises

Reference lists
Back on land: dedicated databases

RAW DATA
- direct from sensors and cameras
- Positioning
- Micro Bathymetry
- Seismic Reflection
- ADCP
- CTD
- Images (Video and Stills)

ALAMER
- Cruise, Dives, Moorings, Operations
- Bio/Geo/Hydro Samples
- Measures
- Stills

SISMER
- CRUISES
- GEOPHYSICS
- PHYSICS-CHEMISTRY
- VIDEO

QUADRIGE
- BIOLOGY

BGMB
- GEOLOGY
Back on land: dedicated databases

SISMER

National data banking activity covering the fields of marine physics, chemical, underway geophysics, video and general information on French oceanographic cruises and data sets.
Back on land: dedicated databases

QUADRIGE

Initially the operational information system for French coastal monitoring, to store and give access to raw biological and ecological data. It is expanding to other subjects and is becoming a more general biodiversity information system.
Back on land: dedicated databases

BGMB

The Marine Geological Database of Brest contains geological data related to samples and measures taken by the departments of Ifremer:

• observation and sampling stations: position, type of observation and sampling (submersible, drilling, dredging)
• descriptions of samples
Back on land: dedicated databases

RAW DATA
- direct from sensors and cameras
  - Positioning
  - Micro Bathymetry
  - Seismic Reflection
  - ADCP
  - CTD
  - Images (Video and Stills)

ALAMER
- Cruise, Dives, Moorings, Operations
- Bio/Geo/Hydro Samples
- Measures
- Stills

SISMER
- CRUISES
- GEOPHYSICS
- PHYSICS-CHEMISTRY
- VIDEO

QUADRIGE
- BIOLOGY

BGMB
- GEOLOGY
Focus on video data management

Data bank
SISMER

Context
Special data: volumes, formats, diffusion,…

Objective
To provide georeferenced video online:
search tool → selection of video files extracts →
download
Focus on video data management

Technical needs

Management of both:

- a raw video file format for perennial high quality safeguarding (numerous)
- a compressed video file format version for web diffusion (to be defined)

Scientific oriented video indexing:

- metadata (cruise, location, time,...)
- inside events: observed taxa, geological features, anthropogenic impacts,...
Focus on video data management

Project for the long term

To provide video related products and tools:

- automatic object detection (complex issue due to the submarine environment characteristics)
- picture enhancement (blur, light,…)
- video based automatic mosaïc generation
International context

... or INTEROPERABILITY aspects

SeaDataNet and OBIS: use of common standards for oceanographic, environmental and taxonomic data + data connection

Eurofleets: towards a common metadata acquisition and transmission software – EARS

ODIP: input to development and implementation of standards on a global scale
Conclusion - perspectives

Past & Present

<table>
<thead>
<tr>
<th>REAL-TIME</th>
<th>POST-PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>On board ships</td>
<td>Back on Land</td>
</tr>
<tr>
<td><strong>CASINO</strong> Acquisition of surface operations</td>
<td><strong>GESCOL</strong> Collection Management</td>
</tr>
<tr>
<td><strong>ADELIE</strong> Acquisition of submarine operations</td>
<td><strong>BIOCLASS</strong> Taxonomic Nomenclature Management</td>
</tr>
</tbody>
</table>

Internet Access to data
http://www.ifremer.fr/s/biocf
http://www.ioebe.org
Conclusion - perspectives

Present & Future

**REAL-TIME**

- **CASINO**  Acquisition of surface operations

<table>
<thead>
<tr>
<th>On board ships</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADELIE</strong>  Acquisition of submarine operations</td>
</tr>
</tbody>
</table>

**RAW DATA**

direct from sensors and cameras

- Positioning
- Micro Bathymetry
- Seismic Reflection
- ADCP
- CTD
- Images (Video and Stills)

**POST-PROCESSING**

- **ALAMER**  Metadata & Data post-processing for cruises, dives and moorings

**Back on Land**

- **BGMB**  Geology
- **QUADRIGE**  Biology
- **SISMER**  Cruises

Reference lists
Acknowledgements

Loïc Petit de la Villeon (IDM-SISMER)
Gilbert Maudire (IDM)
Olivier Soubigou (NSE-ILE)
Marie-Paule Corre (NSE-ILE)
Jean-Marc Sinquin (NSE-ILE)
The « biologist » team (EEP-LEP)
The « geologist » team (GM-LGM)
...

Remarks and suggestions are welcomed!

Thank you for your attention

Contacts
alamer@ifremer.fr
sismer@ifremer.fr