Spatial Data Infrastructure for Marine Environment - Ifremer initiatives in France and in Europe

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INSPIRE Conference 2012 - Istanbul June 26th 2012
Ifremer was created in 1984, from the merger of ISTPM (Scientific and Technical Institute for Sea Fisheries) created in 1918, and CNEXO (National Centre for the Exploitation of the Oceans), created in 1967.

- The origin of this merger: to have only one public institute in the field of marine sciences.

- Ifremer is a public institute of industrial and commercial nature (EPIC)

- Ifremer is placed under the joint supervision of three Ministries: Higher Education and Research; Ecology, Energy, Sustainable Development and the Sea; Food, Agriculture and Fisheries.

- Ifremer’s locations
Ifremer's missions are to conduct and promote basic and applied research, make expert assessment reports and take action for technological and industrial development intended to:

- Identify, evaluate and enhance marine resources and enable their sustainable exploitation
- Improve methods of monitoring, forecasting trends, protecting and enhancing marine and coastal environments
- Encourage the economic development of maritime activities
French marine spatial data infrastructure

Ifremer – Observing the ocean

- 7 research vessels (107m to 24m length) + coastal boats
- 2 submarines (up to 6000m depth), 1 AUV
- coastal networks operated for 35 years
- automatized observatories: floats, buoys, sea floor
- networks of ships of opportunity
- connected to networks (GTS, Argos, Inmarsat, Internet, …)
Ifremer - Main fields of observations

- Physical/Chemical oceanography
- Geophysics, Geology
- Deep sea biology and ecology
- Coastal environment
- Fishery monitoring
- Coriolis
  Physical/Chemical oceanography
  Sea cruises
  Observation systems (Argo, DBCP, VOS)
  - Water column characteristics: temperature, salinity, currents, carbon, chlorophylls, ...

  [http://www.coriolis.eu.org](http://www.coriolis.eu.org)

- Cersat
  Marine Satellite data
  - Wind, Ocean colour, Ice...
  Multi missions, multi orbits

  [http://cersat.ifremer.fr](http://cersat.ifremer.fr)

- Marine Geosciences database
  Geology and geophysics
  - Bathymetry, gravimetry, magnetism, acoustic, seismic, ...

  [http://www.ifremer.fr/sismer](http://www.ifremer.fr/sismer)
Ifremer - Complementary data management systems

- **Quadrigé²**
  Coastal environment and aquaculture
  coastal networks, plankton, contaminants,...
  [http://envlit.ifremer.fr](http://envlit.ifremer.fr)

- **Harmonie** [http://sih.ifremer.fr/](http://sih.ifremer.fr/)
  fishery monitoring
  sea cruises, observations & surveys
  environmental & economical data

- **Biocean**
  Deep sea environment
  sea cruises & submersible dives
  [www.ifremer.fr/biocean](http://www.ifremer.fr/biocean)
French marine spatial data infrastructure:

- Collect, archive and distribute reference maps and other marine data sets
- Gather and make available vector and raster spatial data produced by Ifremer and its partners
- Web GIS proving discovery, viewing and download online services
- Designed according to the European INSPIRE directive for interoperability and according to the OGC and ISO TC 211 standards
**Sextant - What kind of spatial data are involved in INSPIRE?**

- **Environment**
  - Water quality (coastal networks)
  - Marine habitats

- **Aquaculture**

- **Halieutics**
  - Fishing activities
  - Resources
  - Economical aspects

- **Geoscience**
  - Bathymetry
  - DTM
  - Sedimentology
  - Acoustical imagery (Sonar)
  - Ocean physics
  - Hydrodynamics (Temperature, salinity, currents)

- **Historics data**
  - Historic photos, etc.
Different kind of data can be integrated:
- Vector (Shapefile, Oracle Spatial)
- Images (Scan, Orthophotos...)
- Grid data
- DTM, Lidar
- Models and digital analyses (hydrodynamics...)
- Climatology (in situ, satellitales)
Sextant - Functionalities

**Discovery Services**

*The metadata catalog*

**View Services**

*The Geoviewer*

**Download Services**

*The Basket*
To promote the share and distribution

We have to normalize:

- Data description (ISO 19115)
- XML encoding (ISO 19139)
- Access to catalogues (CSW)

Geonetwork Software

At the moment:

- 3000 metadata on-line
- 5000 geographic information available
You can choose many different criteria to search a metadata

- **Where**: to search a metadata according to its geospatial information
- **What**: to search a metadata according to its content
- **Who**: to search a metadata according to its producer
- **When**: to search a metadata according to its date
The Web GIS interface allows end-users to create maps including several layers from internal and external sources.

- The portal access to local or remote OGC services: Displaying data by WMS.

The Geoviewer allows end-users:

- To consult and explore data:
  - Navigation, zoom tools
  - Query layer
  - Export map in pdf

- To manage layer display:
  - Layer order
  - Transparency
  - Symbology (grid data)
Choose your extraction parameters

- Formats
  - Vector (Shapefile, MapInfo, MIF/MID, GML/KML)
  - Raster (Ecw, GeoTiff, Jpeg)
- Coordinate system (WGS84, Lambert, NTF, ETRS89...)
- Extraction extent

Read and agree to respect the data’s constraints

Reception of an email indicating that your extraction zip is ready to be downloaded

- Accessible via HTTP protocol
- Accessible via FTP protocol
Sextant - Interoperability and Inspire

- **Metadata normalized**
  - ISO 19115 and ISO 19139 standards compliant
  - OGC standard - Catalogue Services Web (CSW 2.0.2)
    - [http://www.ifremer.fr/geonetwork/srv/fr/csw](http://www.ifremer.fr/geonetwork/srv/fr/csw)
  - Inspire directive

- **Viewing data**
  - OGC standard - Web Map Service (WMS)
    - [http://www.ifremer.fr/services/wms1](http://www.ifremer.fr/services/wms1)
  - Sensor Web Enablement (SWE)

- **Data extraction**
  - OGC standard - Web Feature Service (WFS)
    - [http://www.ifremer.fr/services/wfs1](http://www.ifremer.fr/services/wfs1)
  - OGC standard - Web Coverage Service (WCS)
    - [http://www.ifremer.fr/services/wcs1](http://www.ifremer.fr/services/wcs1)
Sextant offers Web Services (WMS, WCS) for:
- Oceanographic model output
- Meteorological model output
- Digital Elevation model
- ...

Some particularities:
- 4D: Latitude, Longitude, Elevation, Time
- Binary files: NetCDF, Opendap protocol
French marine spatial data infrastructure

Sextant - Thredds / ncWMS: Selection of depth

Depth levels available on the data
Sextant - Thredds / ncWMS: Selection of time

time available on the data
Sextant - Thredds / ncWMS : Time series
SeaDataNet has set up and operates a pan-European infrastructure for managing marine and ocean data by connecting National Oceanographic Data Centres (NODCs) and oceanographic data focal points from 35 countries bordering European seas.
SeaDataNet principles

- SeaDataNet is based on a semi-distributed system that incorporates and enhances the existing NODC network.

- Major technical development activity enables the data centres to interact as a virtual data centre, able to deliver integrated data, meta-data and products of controlled quality through a unique portal.

- SeaDataNet data types focus on water column parameters:
  - Physical
  - Chemical
  - Bio-chemical
Main accomplishments

- Development of common standards:
  - Vocabularies, Transport formats
- European catalogues with standardised XML ISO descriptions
- One unique portal to access all data: virtual data centre
- Set of tools to be implemented in each data centre
  - **MIKADO**: generator of XML descriptions of SeaDataNet catalogues
  - **NEMO**: reformatting software to SeaDataNet formats
  - **Download Manager**: downloading software
  - **ODV**: Ocean data view adapted to SeaDataNet needs
  - **DIVA**: for product generation adapted to SeaDataNet needs
SeaDataNet portal: http://www.seadatanet.org

- with harmonised services, products and tools
At the European level: a continuum of projects

Distributed infrastructure for marine observation

(observation is often the result of research projects)

- **EuroFleets**: Harmonization of European Research Fleet
- **EuroArgo**: European Contribution to the Argo programme
- **EuroSites**: Deep Sea Observatories, Contribution to OceanSites
- **EMSO**: Sea floor observatories
- **Jerico**: Coastal observatories

- **SeaDataNet**: Marine Data Management and Data Access
- **Geo-Seas**: Marine geophysical and geological Data
- **EuroBis**: Bio-geography

- **MyOcean (GMES)** - Marine Core Services, operational oceanography, hydrodynamic models: hindcast, nowcast, forecast
- **EMODNET (DG-Mer)**: Integrated access to products
Any questions?

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