6th IBI-ROOS meeting

Iberia Biscay Ireland Regional Operational Oceanographic System 2006–2010

24th-26th February 2009

Météo-France–Toulouse (France)
IBI-ROOS meeting

24th-26th February 2009
Météo-France–Toulouse (France)

The 6th IBI-Roos meeting was hosted by Météo-France in Toulouse (France). 28 persons attended the meeting from the 5 countries involved in IBI-ROOS (see list in annex2). The meeting started at 14h00 on the 24th and finished on the 26th at 12h30. Joel Hoffman welcomed the participants and provided the logistical information for the two days meeting.

Pierre Daniel from Météo-France presented drift prediction activities performed by Meteo-France with Mothy. This activity is part of the national responsibilities in the framework of the French Polmar instruction, and contributes at international level to MPERSS. Since 1994, this service is 24/7/365 operational, both in oil spill and search and rescue activities, for which fast time response is really critical. During the Prestige event, it has been demonstrated that the use of ocean circulation model product could improve drift forecast. It was also pointed out that the impact was better when circulation was dominated by large scale circulation and that in eddy dominated areas, better result were achieved after downscaling from regional to coastal/high resolution models, with tides and refined atmospheric conditions... Such service is interested in accessing to as much as possible ocean circulation products available in the area but there is a need to improve standards in data distribution of ocean model products.
1 General Overview of IBI-ROOS activities for 2008

1.1 News from the MOU

S. Pouliquen reported on the coordination of the IBI-ROOS. 15 institutes have signed the MoU, 5 are considering it. 5 institutes have been identified as potentially interested last year but no contact has succeeded since then. We are very pleased to welcome Manuela Juliano from the University of the Azores and Kathryn Keeble from CEFAS who attended the meeting for the first time. We also welcomed the signature of the MoU by Puertos Del Estado during the meeting.

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1. Centro de Supercomputación de Galicia, Spain
2. Consejo Superior de Investigaciones Científicas (CSIC), Spain
3. Agencia Estatal de Meteorología, Spain
4. University of Cantabria, Spain
5. University of Vigo, Spain

1.2 News from the IBI WWW site

Then S. Pouliquen presented the new design of the IBI web site elaborated in collaboration with Météo-France. It should open before summer.

- The data centre and observing system inventories have been put on the IBI web and will be updated on an early basis at the annual meetings.
- The map of the present observing system has been inserted. It would be good to generate another map showing the 2 year plan for the IBI observing system.
- It was agreed that each partner would provide a summary of its operational oceanography activities in the IBI area for the WWW that shall be a gateway.
to their institutional sites (see Euro-Argo as an example of what could be done: http://w3z.ifremer.fr/euro_argo/about_euro_argo/partners)

• The meeting talks will be put in pdf format on the WWW unless the speaker denies.

1.3 Ongoing projects and calls in relation with IBI

S. Pouliquen presented the status of the EU projects in which the IBI partners are involved:

• Euro-Argo: the purpose is to consolidate the European contribution to Argo and help new countries to join Argo. All IBI countries are represented. It started January 1st for 30 months.

• ECOOP: attempts to organize coastal operational oceanography in Europe. This 3 year project (Feb 2007-Jan 2010) may provide useful prototypes of tools to build on (data management, downscaling, instrumentation).

• EasyCo: aims at building a Polycentric Infrastructure for Operational Ocean Modeling in the whole Atlantic Space joining capacities from all the 5 countries. It aims at forecasting hydrodynamics and biogeochemistry at the regional scale using grid sizes of a few km. It's a 3 year project (Feb 2009-Jan 2011) and the kickoff followed the IBI meeting.

• Asimuth: submitted in December 2008, this proposal wants to build a Gmes downstream service on HAB in the IBI area.

• MyOcean: aims at providing an operational core service in Europe providing observation and forecast products for the global ocean and regional seas. IBI is one of these regions and the IBI community is well involved in the development of the services. It's a 3 year project with a kick-off on the 1st April 2009 in Toulouse. The group suggested proposing Y.-H. De Roeck and G. Nolan as representatives of IBI-ROOS in the core user advisory group. S Pouliquen sent this proposal to K. Nittis the WP18 leader in charge of this activity.

Then it was mentioned that a call on in-situ observing systems could be open next autumn under FP7-I3 (Infrastructure): funds could be raised at least for coordination activities and some developments. EMSA organizes a workshop on the beginning of March, but it seems that the agency prefers to assemble national contributions rather than to collaborate with groups like IBI. A solution to act anyway as a group, is to work together to make a common proposal: that's the purpose of the Oil Spill working group that was formed on Thursday. BASIN is a North-American scientific initiative to study the impact of climate change over the North Atlantic basin. Links have been drawn with some European teams. Moreover, next Environment call for FP7 in 2010 might have a special line for enhancing this joint effort. A common response over the IBI region would be welcome.

1.4 IBI steering committee

Last year, it was decided to form a steering team whose mandate is specified in the terms of reference on the IBI-WWW site. It is composed of the following members and meets at the annual EuroGOOS meeting to assess progress of the working group between two annual meetings.

• France: Sylvie Pouliquen / Jérome Chanut (who replaced Dominique Obaton)
• Spain: Alicia Lavín / Marta de Alfonso
• Ireland: Glenn Nolan / Marcel Curé
• Portugal: José Onofre
• U.K.: Rosa Barciela.
It was agreed that this group has been less efficient than expected and that not much steering and communication was achieved in the past year. The steering team should try to improve in 2009. As communication is really critical in this period were of lot of activities are progressing in parallel, it was suggested to better use the IBI WWW site; the news mechanism will thus be available on the new WWW site. It was also suggested to set up a periodic newsletter that would advertise new activities (new observing system deployed or upgraded, new version of a model running, new service set up), on projects progress, on opportunities of joint actions or projects,… Sylvie Pouliquen volunteered to assemble this newsletter: material has to come from the members and they have to be proactive in providing inputs… There was an agreement that it was worth trying.

It was reminded that it would be useful to have a one-two pages summary of the working group activities to be annexed to this report before mid-march. Action WG leaders.
2 Data exchange working group

2.1 Action status

At last IBI-ROOS annual meeting the following actions were decided. Since then, some have been completed, some just started, really started and one delayed:

1. A data management mailing list to be created: since February 29th:
   ibi-roos-datamgt@ifremer.fr
2. Each institute to look at the user manual to check the format. This quality control could suggest improvements.
3. DEA to be checked by members, Annex A and B to be updated by members who are willing to sign by end of April 2008; inputs from Ifremer, MeteoGalicia and Hydrografico Instituto only. Azti, SHOM, IMI working on it
4. Each observation provider to update the Data Centre Inventory with the FTP site for Puertos and Coriolis to integrate the agreed data into the IBI portal;
5. P Gorringe/Eurogoos to provide the list of FTP sites he is already collecting within the finishing Seprise project so that the transition is done efficiently.
6. Puertos and Coriolis to work on setting up the IBI Portals;
7. Product catalogue to be initiated by Ifremer and filled in by IBI Partners. Thomas Loubrieu to set up the catalogue and ensure that members fill in the product sheet.

In fact action 2 was addressed differently. EUROGOOS DataMEQ working group, in which IBI-ROOS has representatives, has worked on recommendations in term of data format, data organization at European level and wrote a recommendation document which was endorsed at last Eurogoos annual meeting. Therefore, the issue of the format was no more an issue and the OceanSITES V1.1 Netcdf format was chosen as the distribution format by the IBI-ROOS portals.

2.2 Progress on IBI Data Exchange Agreement

S. Pouliquen presented the rationale of the Data Exchange Agreement that was agreed last year:

- to secure data flow between us: this is particularly important when we speak of providing boundary conditions between institutes or building data portals integrating data from the IBI-partners. The proposal is that people who sign this agreement commit to provide the data/Product they described, according to a protocol and that they can’t stop data provision without noticing in advance.
- to protect data/product providers from re-use of one partner data for another purpose than the one agreed.

Each institute who is willing to share data, either observations or model outputs, should fill in the annex A and B of the DEA, in order to make available a clear list of what is freely available to the IBI members.

Presently the following institutes have filled in the annexes and are under process to get the DEA signed:

- Ifremer:
  ⇒ Observations (Coriolis, Marel, Recopesca)
  ⇒ Model : Previmer forecasts
- MeteoGalicia /Intecmar:
  ⇒ Observations: 71 Meteo stations + 3 oceanographic moorings
  ⇒ Model: WRF, WW3, SWAN, MOHID models
• IH:
  ⇒ Observations: 2 Monican moorings, 5 Tide gauges and 3 Wave buoys
  ⇒ WW3 and Swan models
• Puertos Del Estado:
  ⇒ Observations: 8 Metocean moorings, 7 coastal mooring, 30 tide gauges
  ⇒ Models: ESEOO forecasts
• AZTI:
  ⇒ Observations: 6 Metocean moorings, 2 deep-sea buoys
Other institutes have started the process.
It is an important element to secure observation data flow to the IBI portal as well as for downscaling applications.

2.3 Toward an IBI-ROOS portal

Both Ifremer and Puertos Del Estado have been working on integrating more data in the IBI portal. For details, see the "Data Management working group" report in annex 3.

Sylvie Pouliquen proposed an architecture for the IBI FTP site designed to serve both the operational users that get the newest data periodically (the LATEST directory: one file per platform per day) and the other users who want to access the global dataset (the MONTHLY directory), or data per platform (the MONTHLY directory is organized per type of platforms: drifters, moorings, profilers-gliders, vessels, rivers) or for a period (MONTHLY/Platform directories provide one file per month and per specific platform). This architecture was accepted by the IBI partners.

Marta de Alfonso presented the work she did to integrate fixed point stations in Puertos Del Estado IBI database. They were then transmitted to Coriolis to be put on the FTP site. Presently, she has setup the data recovery for Spanish stations (PdE, IEO, MeteoGalicia-Intecmar) and Irish ones. The following institutes have been contacted but data flow is not established yet: Basque Government/AZTI, UKMetooffice, POL, HI, Météo-France and SHOM.

Marta de Alfonso will circulate the DATA Center inventory and it was reminded that the data that are mentioned in this inventory should be made available to the IBI community through the IBI portal at least after DEA has been settled.

Thomas Loubrieu then presented a proposal to set up an IBI product catalogue and discovery tool derived from the tools developed for Mersea and ECOOP. A first version of the IBI catalogue has been derived from the ECOOP and is available at http://www.ifremer.fr/cocoon2/camiif/catalog/IBI-ROOS/catalog-partner.html. For each product, it provides its description: standard parameter naming, time and space coverage, update frequency, links to the documentation and to the delivery services at the producer (or at the IBI portal when settled). To describe or update a product description, a web form has been set up at http://www.ifremer.fr/camiif-forms/IBI-ROOS/. For those willing to set up a THREDDS Data Server (used for OPeNDAP data access for gridded datasets) a tutorial for configuring the server is available in a document taken out of the ECOOP project at ftp://ftp.ifremer.fr/ifremer/sismer/ecoop/TDS. It was agreed that institutes should fill in the catalogue with the products they wish to advertise at IBI-ROOS level (hence a larger catalogue will be produced than the one under DEAs). Since this catalogue is ISO compliant (ISO 19115 now and 19139 soon), the interoperability with other catalogues that follow this norm is made possible.
For 2009, it would be good if more research vessels could transmit data when they cruise or transit over the IBI area. French experience has proven that interesting data could be gathered on these ideally equipped platforms supported by skilled technicians (T and S profiles, SSS,...). Data are transmitted daily by email to Coriolis. Coriolis is willing to offer similar processing facilities to the IBI members to help starting the process.

Finally Sylvie Pouliquen mentioned that we have to work on integrating data for reanalysis purposes over the past 20 years. This work has to be carried out in collaboration with SeaDatAnet project and the WGOOFE-ICES working group (contact YH De Roeck, P Gorringe, R Barciella). We need to identify the key parameters and a strategy to set up this dataset.

2.4 Summary of 2009 Actions on Data Exchange activities

1. DEA to be filled in (Annexes A and B) by members who are willing to sign;
2. Each observation provider to update the Data Centre Inventory with the FTP site for PdE and Coriolis to integrate the agreed data into the IBI portal;
3. PdE and Coriolis to continue the work on setting up the IBI Portals;
4. Product catalogue to be filled in by IBI members;
5. IBI Members to study possibilities of acquiring data from their research vessels;
6. Identify the key parameters and a strategy to set up a dataset for reanalysis purposes.
3 Observing System working group  
Chairpersons are Alicia Lavín and Jacques Legrand.

3.1 Update of the existing and funded observing system for IBI-ROOS

Alicia Lavín presented the upgrades in the observing system performed in 2009 (for details see the updated observing system inventory). She also mentioned the damages that occurred during the January 2009 storm were extreme waves were measured (maximum wave height about 25m at IEO Santander site). The interaction, on January 24, was a good example of the IBIROOS Observing and Modelling Community answer to a punctual demand of information because a strong storm develops in the Western Galicia and Bay of Biscay. The Operational Oceanography System gave a strong contribution to the forecast as a tool to follow the event, prevent and study the unusual case. Finally she presented the summary map that Glenn Nolan assembled showing the existing observing system.

Jacques Legrand presented, as an example, the status of the French network:
- sea level with RT time transmission being added to existing tide gauges (an on-going effort),
- the wave boys operated by Cetmef, Recopesca on fishing vessels (15 boats equipped in IBI area) and the 2 year plan: equip 40 new boat every year (24 in IBI area),
- the estuary station Molit to be equipped with ADCP,
- the deployment of 4 coastal profilers,
- the equipment of one ferry line,
- the experimentation of glider lines.

It was agreed that each institute should provide their 2 year plan to Alicia and Jacques and relevant information to Glenn to assemble a map of the planned observing system.
3.2 **In-Situ network evaluation for coastal monitoring of the bay of Biscay**

Nadia Ayoub presented the thesis work performed by M Le Henaff with P.De Mey at LEGOS/POC. This work proposes a method to evaluate a network of remote or in situ observations, the so-called Representer Matrix Spectrum (RMSpectrum) method (Le Hénaff et al., 2009). The criterion of evaluation is based on the ability of a network to detect the error subspace of a circulation model. In practice, an ensemble of simulations is generated by perturbing a given set of parameters or boundary conditions for the model. A metrics is then computed from the ensemble indicating the number of degrees of freedom of the model error subspace observable by the network as well as their associated spatial structures (‘modes’). The method has been illustrated in the Bay of Biscay for the evaluation of a glider section, using the SYMPHONIE OGCM; in this example, the ensemble is generated by perturbing the wind forcing fields. For further information on the RMSpectrum method and on the SEQUOIA assimilation library, please contact P. De Mey (demey-redir@neyak.org).


3.3 **EMECO project**

EMECO initiative was adopted as a NOOS project in 2008 and there has been interest from BOOS and IBI-ROOS. One of its purposes is to improve the evidence base for environmental assessments by making The best use of data derived from traditional and novel monitoring programmes. A pilot scheme is underway that focuses on eutrophication although in the longer term will shift towards meeting the needs of the Marine Strategy Framework Directive. Presently, it is funded by the British government. The ocean color satellite data from Ifremer is used together with in-situ data (SmartBuoys, FerryBox and research vessels, CPR). data or more: www.emecogroup.org.

As similar activities are planned within the EasyCo project but based on model outputs, it was suggested to collaborate though this project. As CEFAS is partner in the two projects the link will be ensured …

3.4 **Feedback from 3rd MarinERA workshop**

Within the framework of MarinERA, a workshop was organized on infrastructure that aimed to gather key European experts in coastal operational oceanography. The purpose was:

- to identify the relevant commonalities and needs between existing geographical and topical networks and initiatives,
- to highlight the main gaps and weaknesses at the Regional and European levels in coordination actions on networking, data open access and joint development activities,
- to share a long term vision for coastal observatory networks in Europe,
- to implement new European integrating initiatives in a short term perspective.

It was agreed that the EuroGOOS ROOSes were the appropriate level to bring the inputs to progress towards the definition of a pan-European monitoring network for the next 10 years. There was a general agreement on scientific questions to address. The MSFD and the WFD are important guidelines that should help to convince stakeholders of the importance of
coastal monitoring systems. We have now to identify the gaps (geographical, technological, methods). There is a possibility for an FP7-I3 call in autumn that would allow:

- Networking activities: Common strategy aspects, strengthening regional aspects, links with marine ERAnet, operational aspects in technology and maintenance, modeling and data aspects, training, public outreach and education.
- Trans-national access activities: database services freely available, access to services and data for non European countries, capacity building on monitoring systems.
- Joint research activities for high technology sensors: coastal mobile or fixed platforms (glider pools, vessel of opportunity network, …), modeling for network deployments and benchmarking.

3.5 Designing the future IBI-ROOS Observing system

In order to be able to participate to this I3 call but also to have a common strategy to develop the observing system for IBI-ROOS we need to define such a roadmap.

We agreed to work according to the following action list

- Define drivers that lead to the necessity of establishing coastal observatories (European directives MSFD and WFD, climate change assessment, …). 
- Describe the benefits of establishing a European Network of Coastal Observatories.
- Provide an overview of the existing and already funded network and collate the different key technologies developed at the observatories, and those instrumental technologies of common use.
- Agree on key parameters to be observed and available in timely manner.
- Agree on the main observing systems to be developed at the IBI level in partnership within the partners.
- Prioritise the research areas for each driver, according to the existing demand (society, research programmes, policies, directives, etc.)
- Prioritise the technologies to be developed in each research area and each coastal observatory, according to the state of the art of knowledge and the target products, avoiding duplicates and working towards cost-effective developments.
- Create a network of laboratories, sharing technologies, data, training actions, etc., and all those aspects considered relevant towards their sustainability.

During the discussion we agreed that the IBI observing system should observe:

- SSH, temperature and salinity profile,
- Turbidity , Chlorophyll and Oxygen nutrients,
- Sea State/ Winds /Air temp, Humidity, Atmospheric pressure, Solar Radiation,
- Currents and sea level.

These parameters should be observed both with satellite and in-situ platforms, to be used directly or assimilated in models. It was also highlighted the need for consistent reference data (bathymetry, rivers climatology, seabed roughness,…)

A starting point for the designing of the IBI network can be the following list of priorities that was discussed:

- Sustain Argo in the deep ocean.
- Set up new data collection from merchant vessels and ferry-box lines.
- Better use of research vessels in the area.
- Extends acquisition of environmental parameters from fishermen vessels (Recopesca).
- Improve river runoff access.
- Multi-parameters mooring sites: both in ocean and river mouth.
Easy deployable instruments to sample specific areas, phenomena and seasonal processes, such as:
- Coastal profilers
- Gliders
- Drifters
- Fix station measurements (real time tide gauges, HF radars...)
- High resolution satellite products (Altimetry, SST, Ocean Color, blended winds)

The following drafting team volunteered to write this roadmap before summer 2009: Jacques Legrand, Enrique Alvarez, Jose Onofre, Alicia Lavin, Julien Mader, Glenn Nolan, Kathryn Keeble, Ramiro Nevez.

3.6 **Summary of the actions for 2009**

- Each institute to update the existing platform inventory (end March 2009);
- Each institute to provide their 2 year plan for setting up new observing system (mid April 2009)
- Drafting team to issue a first version of the roadmap before summer 2009
4 Model Downscaling

4.1 From Easy to Easyco

The Easyco project is a continuation of the Easy project that was presented in previous meetings. It aims at downscaling from Mercator to coastal for user application (Oil spill drift, alga risk, estuary). It will provide forecast (Wind, surface waves (WW3 + SWAM), ocean current) and tools to users as well as web interfaces. The domain has been extended to the whole Atlantic (including France, UK, and Ireland) and also include biochemistry/Aquaculture/fisheries. The target users are local end users with not only hydro-dynamic but also primary productions products.

4.2 RAIA project

The oceanic observatory of the Iberian shelf (RAIA) is an Interreg IV-A project between Galicia and North of Portugal. RAIA is a three year project (2009-2011) with a budget of 3,6 M€ and it involves 13 partners, being the Conselleria de Medio Ambiente (MeteoGalicia) the Lead Partner.

The main objectives are,

- To improve the oceanic observation at the Western Iberian Peninsula in terms of meteorological, oceanographical and water quality data. To that end, 5 new buoys will be located at the near-coast (see figure below). We expect new technological developments as one of the buoys will be built specifically to measure wind power at sea at different heights.
- To improve operational forecasting models; hydrodynamic and biogeochemical.
- To build up a new operational server www.observatoriaia.org where all the information for the Western Iberian Peninsula (real time data from buoys and rivers outflows, forecasting models, etc) will be served to the community via OpenDAP and WMS services.
- To prepare specific tools to end-users; harbors (Viana do Castelo, Leixoes, Vigo), renewable energies, fishermen, tourism, etc

Approximate location for the new mooring network (red flags) to be installed with RAIA project. Green flags correspond the present day network.
4.3 ECOOP

5 IBI partners belong to ECOOP project regarding the regional integrated FC system IBIROOS: MERCATOR & PdE, IMI, PREVIMER & IST. During 2008, upgrades from V0 to V1 system versions have been carried out such as new physical parameterizations (bulk formulae, more runoffs, best Open boundary data) and best time and space resolutions. IBIROOS downscaling scheme and data exchanges between IBI systems and from systems to the central portal EuroMISS have been also improved:

- Regional IBI MERCATOR (PSY2V3) system provides open boundary data and initial conditions to each IBI coastal one (IMI-NE-Atlantic, IST-MOHID and PREVIMER-MANGA) with the possibility to use the dedicated IBI MERCATOR OpenDAP instead of FTP.
- Each partner developed its own OpenDAP
- Each partner provide XML file (file of meta data) to EuroMISS in order to make easier system outputs availability

Now, the 6-month TOP experiment has started (from Feb the 1st to July 31st): IBIROOS outputs are available through EuroMISS and the DQV tool (Dynamic Quick View) allows to display in real time the different output variables of each IBI system. A simple validation web page (in ECOOP website: www.ecoop.eu) exists so that all SST systems are compared to satellite SST.

During 2009 (the last year of ECOOP) the development of IBIROOS V2 version will go on.

4.4 Progress made in 2008 and feedback from ECOOP

Most of the actions have been achieved or are well on track.

- Continuation of ongoing developments at national level (see model working group report)
- Creation of an interactive atlas of modelled areas at IBI web page (Intecmar): first KML file has been drafted but remains incomplete because not all the groups provided inputs to Pedro.
- Implementation of OpenDAP for model data exchange in the framework of ECOOP (EUROMISS) and IBI-ROOS (future IBI WMS): Mercator, Previmer, IMI, IST connected.
- Start operationally the ensemble storm surge forecasting (ENSURF) at ECOOP for the IBI area: first promising results were presented by Enrique. Any team that is not yet taking part to this tool might contact PdE: other modelled surge could be included, as long as the appropriate format is used. The Bayesian optimisation that is then computed can encompass a larger set of forecast.
- Development of ECOOP V1 (improving existing applications), with the TOP demonstration phase to be set up by the end of 2008, and preparation of V2 based on existing work of NEMO 1/36. See ECOOP summary above as well as the model working group report.

4.5 Summary of the actions for 2009

In 2009, the critical issue will be to keep consistency and complementarities between the developments carried out in parallel within the various EU and Interreg projects. Communication will be crucial.

- Continuation of ongoing developments at national level.
- Start of several very important projects and maintain consistency and complementarities in the developments:
  - EasyCO
  - Raia
- MyOcean
- Lorea
- Arcopol

- Finishing and publishing of an interactive atlas of modeled areas at IBI web page (Intecmar).
- Fill IBI Catalog with description of model products (all).
- Improvement of OpenDAP implementation for model data exchange in the framework of IBI-ROOS (future IBI WMS).
- Maintain operationally the ensemble storm surge forecasting (ENSURF) at ECOOP for the IBI area, including BMA and extend it to Mercator and Previmer models. After the end of ECOOP, Météo-France and Meteogalicia should consider on how to sustain this service.
5 HAB Detection
The group is chaired by P. Gentien and B. Reguera. The HAB group involves Ireland, France, Spain and UK. Marc Sourisseau presented the HAB activity. The work presented last year continued and encouraging comparison with in-situ campaigns in Galicia, Arcachon, Vilaine Bay and South Ireland have been obtained. Related articles have been published or submitted. The group will organize workshops this year.

The work will be continued under the EasyCo Interreg project and also the Azimuth EU proposal if accepted.

Marcel Curé presented the Azimuth EU proposal that aims at developing with SMEs a GMES downstream service for HAB detection, forecast and alert to shellfish farmers in Spain, France, Portugal, Ireland and UK. It is lead by DOMMS (Daithi O’Murchu Marine Research Station), an Irish SME.

Rosa Barciela presented a project funded by the UK Environment Agency Algae08. It’s a pre-operational system using satellite (Ocean Color + SST) and model (physic and ecosystem) information for harmful bloom warning service along south UK beaches. The data are analysed by EA and traffic-light maps are issued. In addition, they would like to develop early warning to fish farming based on OC satellite data. In-situ data from CEFAS train the fuzzy logic system for detecting HAB possible areas: on benchmarking sites, there is a 85% success for detecting Karenia: this algae has a signature on satellite images.
6 Toward Oil spill common activity
Two weeks before the IBI meeting, an oil spill happened during the refuelling at sea of a Russian aircraft carrier. The coast guards were warned by EMSA, who detected the oil spill from SAR images (CleanSeaNet service). The coast guards used commercial software to forecast the drift, based on wind information only. The resolution of the IMR model wasn't high enough to improve the forecast. IMI thanked the IBI partners who provided them with their model outputs (waves and currents).

This recent event comforted the IBI partners that it was important to first assess what was available within the IBI area and identify the gaps that needed to be addressed.

The following points were agreed:

- Enforce the IBI RESOURCE DATABASE – contacts, data products and their description.
- Integrate outputs from projects – EasyCo, Arcopol, Lorea, Clara, ECOOP, Galicia-Drifter into IBI portal:
  - Best practice
  - Responders database
  - Models
  - Validation techniques: drifters, HF radars
- Identify gaps in our knowledge:
  - High resolution wind products
  - Oil drifting processes: wind shear, stokes drift or surface currents?
  - Mesoscale eddy positioning
  - Local fresh water sources
- IBI best practice database, including details on how to better use model products – e.g., as how deep is the surface layer?

P Daniel agreed to coordinate the assessment work and will present it at next IBI meeting in 2010.
The following working group was formed to work on this issue: P Daniel, Julien Madere, Pedro Montero, Ramiro Neves, Marcel Curé, Yann-Hervé De Roeck, Jose Onofre.
7 River Discharge
Chaired by Glenn Nolan and Yann-Hervé De Roeck.

Julien Mader presented the inventory made within the ECOOP project for the IBI area. Julien will send the file to the IBI members. Each country is reminded to check the file and to provide the missing information. We agreed that we want to share the river outflow at the river mouths (this means that these data accessed through the IBI portal should be processed based on the knowledge of each local partner); indeed, our community is interested in the data at the mouth of a river and not in the individual rivers flows that feed this river upstream. It will be the duty of each local partner to integrate the different upstream flows to provide the relevant information at the mouth.

The French institute in charge of Flooding monitoring and forecast (SHAPPI), located in Toulouse, attended the discussion on river outflows. They agreed to work with Ifremer to provide access to the French river outflows. Ireland has the policy to provide free access to the Irish river data. Vicente Perez mentioned that river data collection will be done within the RAIA project and that these data will be made available to the IBI portal. It was agreed that the other countries/institutes will work toward this objective for any river of interest for operational activities in the IBI area.

Ifremer presented a pragmatic and statistical work on correlation between rivers that allow to derive river outflows from neighbouring river equipped with real-time measurements. This is a way to cope with missing real time measurements. Another more sophisticated but more precise way consists in implementing watershed models. This can be achieved with better confidence by agreements with partners interested in terrestrial hydrology like Shapi in France. Such initiatives are welcome in other IBI countries.

For nutrients, the lack of real time and forecast data is even more obvious. Any initiative improving the cross-correlation with estimated flows based on historical data is welcome. Multi-parameter buoys located at river mouths could improve this knowledge. This has to be taken into account in the definition of a coastal observation network, if a proposal is drawn under the I3 call.

7.1 Summary of the actions for 2009

- Update the river inventory provided by AZTI
- Ifremer and Ireland to provide access to their river data on the IBI portal
- Request has to be made for a free distribution by the partners in their respective country;
- Require from water agencies RT data, flow and temperature;
- Require from water agencies more nutrient sensors, and also in QRT;
8 Link with Ospar and ICES

Yann-Hervé De Roeck pointed out that the Marine Strategy Framework Directive that was signed in June 2008 will rely on regional conventions such as OSPAR for the IBI area: hence a tight collaboration with NOOS is expected. He introduced the next Quality Status report that is due in 2010 that relies on ecosystem components:

- Traffic-light assessment on expert knowledge with confidential rate;
- Identification of main pressures (fisheries, pollution, habitats destruction);
- The main interaction with OO seems to be the assessment of climate change.

There in an eutrophication working group in Ospar dealing presently with trans-boundary issues: this topic covers mainly a North-Sea issue, since IBI is not yet concerned with this kind of source to sink problems.

However, the IBI community should pay attention to the products that are developed over the North Sea area, and be ready to answer questioning about the regional impact of climate change (through data and synoptic interpolation via models).

Yann-Hervé then reported on the ICES-WGOOFE activity (ICES Working Group of Operational Oceanographic Products for Fisheries) that first met last November in Hamburg. R Barciela, E Dombrowsky, P Gorringe and YH De Roeack attended. This group highlighted that a large amount of freely available operational oceanographic data exist but are under utilised by ICES research scientists… The group will set up a portal dedicated on products at www.wgoofe.org. We agreed that the IBI catalogue could be used to feed this portal.
9 Wrap session Workplan/actions for 2009

The action plan for 2009 has been discussed during each WG sessions and should serve as the 2009 plan on which each group will report next year.

Portugal offered to host next meeting in Lisbon and the Instituto Hidrographico.

The meeting was closed around 12:30 after thanking the local organizer Joel Hoffmann and Météo-France for the support during the meeting and the invitation to the nice diner organized on the previous day.
Annex 1 Agenda

Welcome from local host and logistic information.
Presentation of operational oceanography activities at Météo-France in the IBI area: oil spill drift prediction with Mothy: P Daniel

General Issues
- Report from the chairs on IBI-ROOS activities (MoU, WWW, Involvement in EU projects)
- Feedback on MyOcean

Data exchange working group Chair Sylvie Pouliquen & Marta Alfonso
- Progress on Lagrangian and underway data exchange within IBI-ROOS: Sylvie
- Progress on fixed station data exchange within IBI-ROOS: Marta
- Update of data center Inventory
- Toward IBI-ROOS portal (T Loubrieu)
  - IBI-ROOS catalogue, IBI-ROOS Opendap servers for model products
  - Progress on IBI-ROOS In-situ access
- Discussion on future Plan on Data Exchange

Observing System working group Chair Alicia Lavin /Jacques Legrand / Glenn Nolan
- Update of the existing and funded observing system for IBI-ROOS (Alicia Lavin) and 2 year plan (J Legrand)
- In situ network evaluation for coastal monitoring in the bay of Biscay (M Le Hénaff /N Ayoub)
- Presentation of EMECO project and discuss possible collaboration (Kathryn Keeble/CEFAS)
- Define the future IBI-ROOS Observing system and the priorities
  - Feedback from 3rd Marinera infrastructure workshop (J Legrand)
  - First thoughts on the IBI area for discussion (Sylvie Pouliquen)

Model Downscaling Chair Enrique Alvarez / Jerome Chanut
- Presentation of Easyco project (Ramiro Neves)
- Presentation of RAIA project (Vicente Perez)
- Progress made in 2008 (Jerome Chanut) with contribution from S Cailleau on the IBI contribution to ECOOP
- Define plans for 2009 (Enrique Alvarez or Jerome Chanut)

Progress on HAB Detection Patrick Gentien /Beatriz Riguera
- Progress made in 2008 (M Sourisseau)
- Presentation of Asimuth project (Marcel Curé)

New Downstream Activities
- Oil spill (M Curé / J Madère to prepare) Why / What / How?
- Progress on River Discharge chair G Nolan/M Curé

Link with Ospar Yann-Hervé

Wrap session Workplan/actions for 2009
## Annex 2 Attendees

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<td>CURE Marcel</td>
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<td>FERNANDES Carlos</td>
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<td>NEVES Ramiro</td>
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<td>JULIANO Manuela</td>
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<td>MADER Julien</td>
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<td>ARANDA Jose Antonio</td>
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<tr>
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Annex 3- Working groups Reports

IBI-ROOS Data Management working group

Members: Sylvie Pouliquen/Ifremer, Marta De Alfonso/Puertos Del Alfonso, Elena Elena Tel Perez /IEO, Glenn Nolan/ IMI, Carlos Santos Fernandes/ Instituto Hidrografico
No UK representative has been identified yet.

1. Action Status

At last IBI-ROOS annual meeting the following actions were decided. Since then some have been completed, some just started, really started and one delayed:

8. A data management mailing list to be created: since February 28th
   ibi-roos-datamgt@ifremer.fr
9. Each institute to look at the user manual to check the format, QC in case there is suggestion for improvement.
10. DEA to be checked by members, Annex A and B to be updated by members who are willing to sign by end of April 2008; inputs from Ifremer, MeteoGalicia and Hydrografico Instituto only. Azti, SHOM, IMI working on it
11. Each observation provider to update the Data Centre Inventory with the FTP site for Puertos and Coriolis to integrate the agreed data into the IBI portal;
12. PGorringle/Eurogoos will also provide the list of FTP sites he is already collecting within Seprise so that the transition is done efficiently.
13. Puertos and Coriolis to work on setting up the IBI Portals;
14. Product catalogue to be initiated by Ifremer and filled in by IBI Partners. Thomas Loubrieu to set up the catalogue and that members to fill in the product sheet

In fact action 2 was addressed differently. EUROGOOS DataMEQ working group, in which IBI-ROOS has representatives, have worked on recommendations in term of data format, data organization at European level and wrote a recommendation document that was endorsed at last Eurogoos annual meeting. Then the issue of the format was no more an issue and the OceanSITES V1.1 Netcdf format was chosen as the distribution format by the IBI-ROOS portals. Based on this, Coriolis team worked on the architecture of the FTP server and the proposed organization will be presented at the IBI meeting.
IBI-ROOS in-situ data portal progress, Puertos del Estado - February 2009

Last year, during 2008 IBI-ROOS meeting in Dublin, we stated a plan to set up the in-situ data portal. The plan was established based on the following principles:

- Data producers must clarify which fixed stations will provide real time data to IBI community and they will permit access to the data.
- Puertos del Estado will collect real time data from the data producers.
- Data will be integrated into the IBI in-situ data base at Puertos del Estado.
- At National level, Spanish data (if desired) will be first distributed through Puertos del Estado to the GTS, Coriolis and SEPRISE and through the IBI portal when it is set up.
- In the framework of MyOcean, and with the project resources, Puertos del Estado will set up the portal with a specific machine dedicated to it. The portal will have some key characteristics to be robust: mirror disks, massive storage, backup, OPeNDAP server...

Waiting for MyOcean resources, the status about fixed stations is the following:

Spain:
- **Puertos del Estado**: stations are completely integrated in the IBI data base and data is distributed to the GTS, Coriolis and SEPRISE.
- **IEO**: Santander-AGL buoy is completely integrated in the IBI data base and data is distributed to the GTS, Coriolis and SEPRISE. Real time data from this buoy is integrated in PdE web page.
- **MeteoGalicia/INTECMAR**: stations are integrated in the IBI data base and we are waiting for the WMO codes to distribute the data. Real time data from these stations are integrated in PdE web page.
- **Basque Government/AZTI**: Puertos del Estado has not access to the data. Data producers have showed intentions to provide it.

Ireland:
- **IMI**: Puertos del Estado has access to the data and we are collecting it in real time. Data is integrated into the IBI data base.

United Kingdom:
- **UK MetOffice**: Puertos del Estado has access to the data and is collecting data in real time. We have to progress in the decoding process to integrate it.

Portugal:
- **HI**: Puertos del Estado has not access to the data. Data producer has showed intentions to provide it.

France:
- **MeteoFrance**: In contact with them to have data access.

We are in contact also with POL (UK) and SHOM (France) to obtain non sea level data.
About tide gauges, Puertos del Estado is collecting real time data in the framework of ECOOP project. We have completely integrated some stations from Ireland and UK and we have yet access to some stations from France and Portugal.
IBI-ROOS in-situ data portal progress, Coriolis - February 2009

As for fixed stations, it was decided last year, during 2008 IBI-ROOS meeting in Dublin, to plan data exchange activities based on the following principles:

- Data producers must clarify which institutes will provide real time lagragian and underway data to IBI community.
- Coriolis will collect real time data from the data producers.
- Data will be integrated into the IBI in-situ data base at Coriolis and Temperature and Salinity data will be qualified according to QC procedure described in Coriolis user manual.
- A first version of the IBI Portal will be set up as an ftp site protected with a password.
- In the framework of MyOcean, and with the project resources, Coriolis, together with Puertos del Estado will upgrade the portal. The portal will have some key characteristics to be robust: mirror disks, massive storage, backup, OPeNDAP server...

In the data inventory that has been performed, very few additional lagragian and underway data streams have been identified by the IBI-ROOS members; it is a bit surprising as it gave the impression that except fixed stations and Argo no data are acquired by the members… This probably needs to be revisited!

In 2008 Coriolis has continued to integrate the data provided by the members and to update the Seprise portal available at Coriolis. This is the V0 of the IBI Portal.

In 2008 Coriolis team have been working at EuroGOOS DataMEQ, ECOOP and MyOcean level in order to design and architecture that will be interoperable with MyOcean and the other EuroGOOS ROOSes and be able to be extended to fulfil additional IBI-ROOS requirements.

- Data format recommendations have been endorsed by Eurogoos and will be the baseline for MyOcean In-Situ Tac.
- Tools have been developed within ECOOP to integrate in-situ data distribution in a European scheme together with satellite and model products and improve data model to be able to distribute them using OGC standards (WMS, WFS,WCS).

Based on these tools, a product catalogue has been initiated for IBI-ROOS and it's up to the members to populate it (see presentation at the meeting).

Coriolis has worked at the French level to integrate in the IBI Portal the in-situ data collected by Previmer (Recopesca, Marel, Pagode planned in 2009). It has started discussion with Previmer partners to have the authorization to provide the data they provide to Previmer to the IBI community.

Proposal for 2009
Coriolis would like to foster the Data acquisition from research vessels (TSG, XBT, CTD) by offering to process the data that the institutes are willing to send on a daily basis by email to the Coriolis center. This process is presently operational from Ifremer, IPEV and SHOM vessels, and from the VOS network coordinated by IRD. It has also succeeded on long test periods from Cornide de Saavedra in Spain.

Coriolis would also like to work with IBI members on integrating ferrybox data. Similar activities will be undertaken by Niva at European level within MyOcean.
Coriolis propose processing facilities for Recopesca if some countries would like to start to deploy such instruments. In the continuation of similar activities in the Mediterranean Sea, Coriolis is willing to integrate glider data if some are deployed in the area and access given to IBI…
Report on IBIROOS Working Group on Observing Systems

The IBIROOS Observing System is composed by a Networks of long term (permanent), continuous, automatic instruments for synoptic in situ observations and QC measurements in the area Iberia-Biscay-Ireland designed to have a compressive vision of the area and feed the IBI-ROOS data exchange system.

The main objectives of the Observing System is to have a permanent knowledge of what exists, optimise the coverage in the area and identify and fill possible gaps, harmonise technologies, equipments and operational procedures and reduce expenses sharing operation costs among partners.

In order to get the proposed objectives some actions has been proposed:

- Establish a detailed list of installations in each category and maintain a regular update of changes.
  
  This list should show:
  - ID, equipment description, measurement characteristics, transmission, data management (details of link to IBI data exchange system,), contact.
  - Update yearly
  - Start with EDIOS data base and send update regularly

The Initial list that was included in the Action Plan was composed by the following systems:

- Shore stations
- Buoys:
  - Shallow
  - Deep
- Repetitive hydrographic sections
- Ferry lines
- Argo floats (?)
- HF RADAR stations

Together a complementary list has been established as follows:

- Pagode profilers
- Gliders
- Ship of opportunity
- Other ?

After the first period of strong improves of the Observing Systems, 2008 has been mainly as a consolidation and coordination year and some very interesting proposals for the future has been presented mainly in France, Portugal and Spain.

As first step for IBIROOS data portal, the main coordination in the Observing System has been established in ‘fixed’ stations. Puertos del Estado has integrated buoys information from IEO (Santander-AGL buoy) and INTECMAR/MeteoGalicia (Arousa and Vigo buoys) in the PdE Portal deep water and coastal buoys net.

Portugal has new operational systems transmitting of coastal buoys (Leixoes, Sines and Faro) and Viana do Castelo (RAIA Project) and Nazaré (MONICAN project) coming next September. Also Off-shore Nazaré buoy will be working in April. HF Radar will also be working tentatively in June.
Instituto Hidrografico Tide Gauges are operating on real time in Viana do Castelo, Leixoes, Nazaré, Peniche and Sesimbra.

Euskalmet buoy moorings are operating in real time and data will be integrated in the IBIROOS system in the future. Moreover, two HF radar (5 Mhz) antennas were installed in 2008 in the Basque Country coast. In 2009, effort will be put on validating existing data and on making possible the installation of a third antenna in South West of France (INTERREG project LOREA).

New developments for the Observing System has been presented mainly from a project RAIA (Portugal/Galicia). A set of moorings (Ons, Miño and Oia) has been designed to both sides of the Spain/Portuguese border and will be develop the following years. All the groups of Operational Oceanography are integrated. Also some HF radars will be deployed in Finisterre and Silleiro in collaboration Puertos del Estado and Xunta de Galicia and in the Ría de Vigo from the University of Vigo.

An ambitious two year plan has been presented by France.

Glider developments and use was presented by Ireland and some improve in their observing system and modelling.
IBI-ROOS Modelling Working group
IBIROOS MODELING GROUP
ACTIVITY REPORT 2008

Authors:

AZTI: Julián Mader
ENSURF JOINT INNIITIATIVE: Begoña Pérez Gómez
IEO: Manuel Ruiz Villarreal
INTECMAR: Pedro Montero
MARINE INSTITUTE: Marcel Cure
MERCATOR: Jérôme Chanut
METEOGALICIA: Carlos Balseiro
MET OFFICE: Rosa Barciela
PUERTOS DEL ESTADO: Marcos García Sotillo
PREVIMER: Yann-Herve De Roeck
SHOM: Fabrice Ardhuin

Compiled by:

Enrique Álvarez Fanjul and Jérôme Chanut

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3. COMPILATION OF EXPECTED ACTIVITIES FOR 2009
1.1 ENSURF JOINT INITIATIVE

A. Review of objectives.

The objective of this ECOOP initiative is to improve the quality, reliability and accessibility of storm surge forecasting at the European level by means of super ensemble forecasting. This would be achieved, as it is stated in the Implementation Plan, by:

1. Creating ENSURF (multi-model Ensemble Surge Forecast system), as a relocatable tool.
2. Assessing ENSURF errors by comparing model output with tide gauge observations and analyzing sources of uncertainty (higher resolution, meteorological effects, etc).
3. Developing advanced visualization and analysis tools.
4. Presenting ENSURF as a joint European service via the ECOOP mechanism for information distribution (link with EUROMISS).

B. Status of the work.

There has been significant advance in the implementation of ENSURF, making use of Matroos visualization tool (developed by Deltares). The system has been divided in two regions, due to the different status of model output exchange: ENSURF-NOOS, implemented at Deltares, and ENSURF-IBIROOS (including western Mediterranean), implemented at Puertos del Estado. Both systems will be in operation for the TOP period and include the Bayesian Model Average (BMA) technique for statistical forecast at the harbours with tide gauge observations. Due to the lack of enough operational forecasts in the Mediterranean it was not possible to include the MOON region.

B.1 Matroos Tool (Multifunctional Access Tool for Operational Ocean Data Services).

Matroos is a web-based, open source code developed at Rijswaterstat-Deltares for making operational forecasts easily accessible. It was in use at Deltares at the beginning of the task, for model output exchange between NOOS partners. Its basic functionalities are: visualization of current water level forecasts (fields and time series), tide gauge observations and BMA forecasts, and possibility of comparison by means of statistical routines. The data are exchanged by means of ftp boxes and data stored in a sql data base (Figure 1).

B.2 Bayesian Model Average Technique.

The BMA provides a weighted average of multiple competing model forecasts, based on their performance during a recent training period. By this technique a probabilistic forecast, i.e., a probability distribution instead of a simple deterministic value is obtained. The idea is to generate an overall forecast PDF by making a weighted average of the forecast PDF’s from the individual models; the mean of the overall forecast PDF is generally better and provides a confidence interval, which is very useful for practical applications.
B.3 ENSURF-IBIROOS: (http://www.tinyurl.com/ensurfIBI)

For the IBIROOS area, eight sources of sea level forecasts have been identified and are contributing to ENSURF-IBIROOS since beginning of 2007 (table 1). The domains of the different applications are shown in Figure 3 and correspond to barotropic 2D and baroclinic 3D models. All of them are integrated in the Matroos implemented at Puertos del Estado and running operationally.

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Figure 2: left: tide gauge stations selected for common output that provide real time data to ENSURF-IBIROOS. Right: Table 1: sources of sea level forecast for this area

B.3.1 Real time sea level data.

For the use of BMA we need access to last weeks of data from tide gauges at the harbours. Within the task a pre-selection of stations was made and distributed between partners to provide model outputs at common places, taking into account the availability of data. At the same time, for tide computation at these selected places, one to two years of data were also requested. The institutions/organizations that have contributed with
B.3.2 Bias and tide correction.

As can be seen in table 1, one of the main difficulties for model data comparison is that some provide just surge component, some total sea level and only one provide both. On the other hand, models work with a mean sea level which is a spatial average of the model domain, while mean sea level at the tide gauge stations is a temporal mean at a specific point. So bias are present both between model outputs and between these and the observations (figure 4), except in the only case that makes use of a kind of assimilation of recent sea level data (Nivmar source). Finally tides are computed in a different way in models and from tide gauge data (for extraction of surge component).

In order to solve this, we recomputed with the same technique (Foreman harmonic analysis) the tide from models output that provide only total sea level (at each grid point) and the tide from observations. Finally, we adjusted the forecasts bias to sea level data observed during the two months previous to TOP period. This is not critical when applying the BMA as this technique already adjusts the bias before providing the new improved forecast, but we made the adjustment anyway.
Figure 4: example of bias between model and observations for one of the sources. The bias remains when comparing the surge component, after tide extraction with the Foreman harmonic analysis. The reason is that Foreman mean sea level from the model output is the same than the mean sea level for the total sea level output but for a different period (one year of data) than the actual observations.

The computation of tide from the output of the baroclinic models, that normally just provide the total sea level, was useful to detect sometimes errors in the way the tide was introduced in the model. Figure 5 shows the amplitude of the main harmonic constituents M2 and S2 for the domain of ESEOAT, after harmonic analysis of one year of model output.

Figure 5: amplitude of M2 (left) and S2 (right) for the ESEOAT baroclinic model domain, after tide computation with Foreman harmonic analysis (1 year of model output)

B.3.3. Results and examples of Matroos capabilities in ENSURF-IBIROOS.

We present examples of the kind of information that can be accessed via Matroos tool and are now available not only in ENSURF-IBIROOS but also in ENSURF-NOOS (in order to avoid duplication we present just the first as it is the most novel and recent work of the task). The tool allows by means of selectable menus to choose which models or data observations, as well as for which period, we want to display (Figure 6). The BMA is computed when more than two sources are available at a particular tide gauge station, and it appears in Matroos menus as an additional source (as well as the 90% confidence interval). The parameters available are waterlevel (total), waterlevel surge and astronomical tide. Apart from this, maps with field information from the models can also be requested for any period since the beginning of ENSURF operation (Figure 7).
Another interesting possibility of Matroos is the computation of basic statistics about the performance of the different forecasts (Figure 8). Although a detailed analysis of the results and the performance of the BMA in IBIROOS remains to be done, it is already evident that BMA forecast reduces the RMSE of the better forecast, as can be seen in Figures 8 and 9, for the case of Barcelona.
Figure 8: example of statistic data that can be obtained through Matroos tool, for Barcelona tide gauge. The forecast provided by the BMA is named as source bma_Med1_fc, while bma_Med1_05 and bma_Med1_95 represent the 90% confidence intervals.

![Figure 8](image)

Figure 9: example of surge forecasts for Barcelona, including the 4 sources available and the BMA (blue). It can be seen that the latter is the one that better agrees with observations (green).

![Figure 9](image)

**C. FUTURE WORK**

Before the end of the project and during the last year, the work will concentrate on the validation and error assessment and link with EUROMISS. Deltares will work on the improvement of the BMA technique (possibility of selection of different training periods), while MeteoGalicia and MeteoFrance will force their ocean models with their meteorological ensembles and will compare the results at Gijon station.
1.2. IBI MODEL DESCRIPTION GRAPHICAL TOOL

- **2008 activities**

During the 2008 IBI-ROOS meeting, INTECMAR was asked to build a KML file with the domains of the models that run in IBI area. The aim of this task was to obtain a map of IBI-ROOS models to upload to IBI-ROOS web page.

In order to achieve this goal, an ASCII file with a brief description of the IBI models was requested to IBI model groups.

Nowadays, the kml file was sent to IBI mail list with the contribution of the most of the groups and it is ready to upload to the new webpage.

- **2009 Plans**

In the near future, we expect to complete the kml file with the rest of the model groups, review the tags and improve the display of the kml.

To achieve that goal, we will require:

- More modeling partners contributions
- To upload the kml to IBI-Roos web page and show it in Google Maps viewer.
- To review the tags, specially operational and non-operational model tag.
2 IBI-MODELING GROUP PARTNER ACTIVITIES AND PLANS

2.1 AZTI

- New modeling Research activities

The activities are developed at three scales:

- Regional - Bay of Biscay: 6.6km – 32 sigma levels ROMS
- Subregional - Basque coastline: 2.2km – 32 sigma levels ROMS
- Local models: <2 km ROMS, TRIMODENA

These models are pre-operational in AZTI and planned to be transferred to Euskalmet in 2009.

- New operational models or improvements in existing ones

Development on local models in Bilbao and Pasajes harbours, based on high resolution bathymetry.

- Validation activities

The validation tasks for hydrodynamic models at regional and subregional scale were focused on surface behaviour with comparison studies of the temperature tracer with observation SST data (from remote sensing and buoys).
- in the column on the slope with temperature and salinity profiles from CTs buoys strings

At local scale, the validation was based on current comparison with ADCP data.

- Downstream applications

The down stream activities were based on oil spill dispersion and water quality assessment at local scale.

- 2009 plans

The validation activities will be followed with current profiles comparison on slope (ADCP 150 KHz on offshore buoys) and with HF radars data. Downstream activities will be developed in the frame of the INTERREG project LOREA.
2.2. IEO

During 2008, Instituto Español de Oceanografía (IEO) have continued with forecasts of shelf and slope circulation in N and NW Iberia. The model aims at providing information for final users as well as insight on circulation for ecosystem studies in support to the intense IEO research in the area in the fields of ecosystem functioning, fisheries assessment, HAB, and pollution monitoring.

The model began its pre-operational phase in April 2007, when it started to be executed daily. The model allows us to get a picture of variability of shelf and slope circulation during 2008. We are able to characterize river plumes, the slope poleward current in autumn-winter and the spatial variability of upwelling circulation both on a seasonal and on an event scale.

The model has been contrasted to measurements from the IEO Coastal Observing System, CTD casts, currentmeters, and TSG around N and NW Iberia. Comparison to operational altimetry products rendered the conclusion that for coastal regional models, the use of the emerging coastal altimetry products will be recommended.
2.3. MARINE INSTITUTE

- New Model Research Activities

Biogeochemical models

The Marine Institute has been testing 2 models: Fasham (NPZD plus surface oxygen flux) and NEMURO (3 nutrients, diatoms and flagellates plus a high level ‘predator’). These are included with the ROMS release and one or both will be adapted to work in the NE Atlantic as part of the forecast. The results of the Marine Institute’s models will be compared with those of other IBI partners in IFREMER and IST as well as satellite derived chlorophyll fields.

![Dissolved Oxygen Concentration at the Sea Bed from Fasham Code](image)

*Dissolved oxygen concentration at the sea bed from Fasham code – part of a multi-annual hindcast run*

Shellfish growth models

As part of the Interreg project EASYCO (3 year project commenced Jan. 2009), the Marine Institute will be producing an off-line shellfish carrying capacity module which is able to work with the operational forecasts from other IBI partners in INTECMAR, IST and IFREMER. To date the Institute has been testing the MUSMOD code developed by Carter Newell of the Great Eastern Mussel Company. This application was developed for a Galway Bay site.

Oil spill modelling

A recent oil spill (Feb. 2009) in the Celtic Sea exposed a weakness in the Irish operational modelling capability to forecast oil slick movement. This precipitated a rapid development of a Lagrangian 3D model based on our ROMS NE Atlantic application. The predictions made were useful to the Irish Coastguard in their tracking operations for this spill.
The Lagrangian model will be improved with the assistance of IST under the newly started Interreg project ARCOPOL (other IBI members in this project are INTECMAR, Meteo Galicia).

- **Improvements in Existing Operational Models**

**New supercomputer**
In August 2008, the Marine Institute commissioned a new HP High Performance Computer at its headquarters in Galway. This machine has 560 cores and its purpose is to run climate models and the operational oceanographic, wave and weather models. The Marine Institute ocean models are now run every week day for a 2.5 day forecast. This will be extended to include the week ends as resources and automation allow.

**New storm surge model outputs**
The Marine Institute has taken part in an activity on storm surge modelling in ECOOP, and in conjunction with the activity leaders Puertos del Estado and other IBI partners - The Met Office, IFREMER. This system based on Bayesian modelling techniques is called ENSURF. It is hoped that the storm surge predictions will continue operationally after the end of ECOOP as an IBIROOS activity.

- **Validation Activities**

A new validation web page has been created on the marine Institute web site at [http://www.marine.ie/home/services/operational/oceanography/ModelValidation.htm](http://www.marine.ie/home/services/operational/oceanography/ModelValidation.htm)
This allows the model output to be compared to ARGO floats in the model domain on a week by week basis, SST derived from microwave satellite sensor, two databuoy outputs of temperature. Irish tide gauges. A variety of statistics can be displayed to check against model output.
ARGO floats coincident with the Marine Institute NE Atlantic domain during one week. Profiles can be shown for each float.

Tide gauge validations for Irish Gauges showing harmonic constituents and time series comparisons
2.4. MERCATOR

A large part of our modelling activities for the past year has dealt with the continuous improvement of the NEMO code. Most of our efforts have still been concentrated on adding the missing physics in NEMO, in particular to make it suitable for coastal applications. In order to do this, we took advantage of the comparison between NEMO and well validated coastal ocean models over a subset of the domain in the bay of Biscaye (Reffray et al., 2008). This allowed us to identify possible weaknesses and validate the numerical changes we made. The overall conclusion of this work was very promising, clearly revealing NEMO’s skill in a coastal environment.

The remaining part of our work has essentially focused on the computational issues arising when moving to the high resolution version of the Mercator IBI model (1/36°).

- **Regional models developments:**

  - **Upgrade of the NEMO code for coastal applications:**
    Initially designed for large-scale, climate oriented, ocean modelling, NEMO has pursued its transition to fill the gap between state of the art coastal ocean models. Last year upgrades performed in Mercator are summarized below:
    
    => Higher-order advection schemes for both tracers and momentum have been added (Quickest, PPM). These are more suited to the sharp fronts that often arise in coastal regions when moving to high resolution.
    
    => The vertical mixing scheme (a 1.5 TKE closure) has been completely revised (energy conservation is now ensured which increases the model stability. Surface and bottom conditions in the prognostic turbulent eddy kinetic energy equation have been clarified: this greatly improves near surface velocity shear and tidal elevations.
    
    => Non-linear free surface option has been optimized and made compatible with partial bottom cells. This option is indeed important when running the model with tides since the sea level can become large compared to the local depth. It also greatly increases the amplitude of compounds tides, generated through non-linear terms in dynamical equations.
    
    => Update of time splitting scheme. The new version is based on the generalized forward-backward scheme of Shchepetkin and McWilliams (2005) as implemented in ROMS (UCLA version). Tracers conservation, a critical issue with previous implementation, in particular where tidal range is large, is now ensured. In addition, moving to this two time-level scheme allows greater barotropic time steps, thus almost dividing the computational cost of the barotropic routine by a factor 2.

  - **Moving to high resolution:**
    During the last meeting, a preliminary attempt to increase the model horizontal resolution from 1/12° to 1/36° was briefly presented. Since then, a 2 years hindcast over years 2003-2004 has been successfully performed with most of the code upgrades listed above. This still represents a computational challenge given that running this model on ECMWF computers requires roughly half the CPU time needed for the global 1/12° global prototype. As can been seen in the different SST snapshots shown in figure 2, moving to 2 km resolution can still have a dramatic impact on the eddy variability and also allows part of sub-mesoscale processes to be resolved.

- **Model validation:**

  - **Tide-only experiments:**
    Many sensitivity tests in pseudo-barotropic mode (homogeneous conditions, no atmospheric forcing) have been performed (impact of open boundary forcing, bottom friction, tide potential, horizontal resolution,…). Model results have been compared to barotropic models dedicated to tidal processes (FES2004-Lyard et al. 2006, TPXO - Egbert and Erofeeva 2002) and to in situ
observations. These appear, at least in terms of surface elevation, satisfactory, errors being
typical of what can be found in other assimilation free tidal models over this area (Fanjul et al.

- **Year 2003-2004 hindcast:**
Of particular interest in the model validation was the impact of tides on the mixing of tracers
and mean flow properties. Systematic comparison to available observations (satellite SST, tide
gauges, Puertos del Estado current-meters and buoys, Marine Institute buoys, Argo floats) over
the time period has been performed. As expected, adding explicit tidal waves greatly improves
the model results in shallow areas such as in the North/Irish Seas. This is illustrated in Figure 1
which shows a comparison between the SST issued from satellite data and from the 1/12° model
simulations with or without tides (the following discussion also applies to the 1/36° results). In
summer, as the mixing driven by the wind and atmospheric fluxes weakens, tidal fronts clearly
show up in the English Channel, the Irish Sea and south of the Shetland. This process is
particularly well reproduced in the model, though these fronts are not as sharp as in
observations. The statistical results summarized in Figure 1d clearly demonstrates the positive
impact, at least during the summer period, of explicitly adding the tidal forcing in the model
simulations.

![Figure 1](image)

*Figure 1: a) July 2004 MODIS SST. b) Corresponding modelled SST without explicit tidal forcing. c) Same as b)
but with explicit tidal forcing. d) Model monthly statistics over the North Sea region relative to satellite derived
SST. Red arrows indicate the positions of tidal fronts. Continuous lines correspond to the 1/12° simulation with
tidal forcing while dashed lines to the standard simulation without tidal forcing.*
• Plans for 2009

• Set-up MyOcean IBI V1 system: progressively moves the system in pre-operational mode and transfer code on Puertos del Estado computing facilities. IBI-regional model will be nested into Mercator 1/12° North Atlantic model. Since, as a start, no data assimilation will be implemented, a periodic restart procedure such as in the ESEOO system (Sotillo et al., 2008) will be used.
• Standardize model validation using IBI-ROOS data portal.
• Implement new diagnostics issued from Lagrangian computations.
• Start to implement multivariate data assimilation in the system.

![Figure 2: a) Snapshot of Sea Surface Temperature in the 1/36° IBI Mercator model. b&c): Snapshots of sea surface temperature in the Mediterranean sea (April 2003) as simulated by the 1/12° model (b) and the 1/36° model (c). Note the intense meandering of the Algerian current in the 1/36° solution.](image)
2.5. METEOGALICIA

- 2008 Activities

Meteogalicia has centred its efforts in the improvements of the local models inside the operational forecasting system running nowadays.

In order to do that the improvement and development of the atmospheric models is also needed.

Implementation of the Local Meteorological Models

During last year, WRF model are operational at MeteoGalicia, not only for the weather forecasters, also to force hydrodynamic and wave models in the Rias. For this purpose a high resolution WRF model (1.3 km resolution) will be execute near the coast nested to operational solution for whole Galicia Region at 4 km resolution

The new operational scheme will implement a finer resolution than current models, covering Southwestern Europe at 36 km of resolution, Iberian Peninsula at 12 km, and Galicia at 4 km, as it can be seen in the next figure

Figure 1: New grids configuration with WRF model at MeteoGalicia
A comprehensive validation will be done, running different cases forcing with high resolution meteorological model and old atmospheric configuration.

**Other Improvements**

In order to improve temperature and salinity results, we are focusing our efforts in trying to forecast river flows, due to the utmost importance of the rivers on the behaviour of the Ria.

We are starting to use, SWAT model, in order to make this kind of forecasts.

![Figure 5: SWAT forecast of Eume river flow](image)

General behaviour of flow forecast is agreed with real observations. All important Galician rivers are starting to be modelled and then these results will be used in MOHID model forecast.

- **Validation activities**

High resolution model results are being validated against new near-coast network. This network will permit us to make a full verification of high resolution models inside the Ria.
**2009 Plans**

Tasks for the next months will include:

- Use of new high resolution winds (1 km resolution near the coast) in order to reproduce better the different coastal oceanographic features. Also, studying the influence of high resolution forcing instead of a lower resolution.
- Use of new data network available for coastal models to go on validating them and give results with best accuracy.
- Use river forecast to improve local results.
- Publish meteo and ocean results in a OpenDap Server to share meteorological and ocean data.
2.6. MET OFFICE

- **2008 Activities**

- Open Ocean Modelling - Forecasting Ocean Assimilation Model (FOAM)- NEMO

  Progress this year:
  - Operational FOAM-UM models transitioned to FOAM-NEMO at 1/4° global, 1/12° regional configurations (North Atlantic, Indian Ocean and Mediterranean Sea).
  - Model features are:
    a. 50 vertical levels
    b. Data assimilation: ice, SSH, satellite & profile T and S
    c. Analyses and 5 day forecasts of
      i. Currents at depths from the surface to the ocean bottom
      ii. Temperature and salinity through the water column
      iii. Mixed layer depth
      iv. Sea-ice concentration and thickness
    d. Driven by NWP surface forcing
    e. Standard outputs produced 12 hourly
    f. Hindcast capability
    g. Hadley Centre (HadOCC) Carbon Ocean Cycle model coupled on line.
  - Future work in 2009:
    a. UK-FR collaboration on advanced data assimilation methods: NEMOVAR.
    b. OSSEs for design, support and assessment of global observing systems (GODAE)
    c. Transition biological data assimilation scheme (Hemmings, Barciela, Bell, JMS, 2008) implemented in FOAM-UM to ORCA025-HadOCC coupled system

- Products derived from satellite data: OSTIA

  OSTIA is a 1/20° global operational SST and sea-ice analysis. The system was implemented operationally in 2006. It is based upon FOAM data analysis scheme and is persistence based without an underlying ocean model. It uses in situ, microwave and infrared SST data and a bias correction scheme to address biases in satellite data. The UK Met Office NWP models now using the SST analysis from OSTIA as well as ECMWF.

- Products derived from satellite data: OSTIA

  - Products derived from satellite data: OSTIA

  - Products derived from satellite data: OSTIA

- Products derived from satellite data: OSTIA

  - Products derived from satellite data: OSTIA

- Products derived from satellite data: OSTIA

  - Products derived from satellite data: OSTIA
- Modelling Tidal Seas - Shelf Seas Models (POLCOMS)

The POLCOMS system is a state-of-the-art model developed with Proudman Oceanographic Laboratory. It is driven by the Met Office Numerical Weather Prediction surface fluxes, has tidal forcing based on 15 harmonic constituents and takes FOAM boundary conditions to allow propagation of mesoscale features into POLCOMS regional domain.

Main progress this year has focused on the transition of the POLCOMS system to NEMO-Shelf, which is planned for the end of 2009.

Suite of nested POLCOMS models. The top left figure shows the Atlantic Margin Model (AMM) domain at 12 km resolution. The top right figure shows the Medium Resolution Coastal Shelf (MRCS) at 6Km resolution. The bottom left figure shows the Irish Sea model at a resolution of 1.8 Km.

- Shelf seas biogeochemical modelling (POLCOMS-ERSEM)

The coupled POLCOMS-ERSEM system has the following characteristics:
- On-line coupling to a simple sediment model.
- Running operationally with 5-day forecast.
- Extensive validation (T, S, SPM) against in situ data sets (PML, CEFAS SmartBuoy, FerryBox,) and satellite products.
- Visibility diagnostics added to operational products being validated against satellite data.
The system is currently being trialled as a nuisance bloom forecasting system for the UK Environment Agency, called the AlgaRisk Forecasting system, in partnership also with PML.

As part of the ECOOP project, the POLCOMS-ERSEM system delivers daily fields to the EuroDESS and EuroMISS web portals:

- EuroDESS Environmental Status Support to North Sea Fisheries Assessment (figure 2)
- EuroDESS Ecosystem Health in the North Sea (figure 3), which is available at [http://lovejoy.nerc-essc.ac.uk:8080/eCWMS_Ecoop_Ecosystem/godiva2.html?menu=ecoop](http://lovejoy.nerc-essc.ac.uk:8080/eCWMS_Ecoop_Ecosystem/godiva2.html?menu=ecoop).

![Environmental Status Support to North Sea Fisheries Assessment web portal.](image)
2.7. PUERTOS DEL ESTADO

- 2008 Activities

The ESEOO Ocean Forecast System provides since 2006 daily predictions of a range of oceanographic 3-D variables (currents, temperature and salinity, among others) for the Iberian Peninsula coastal areas and its surrounding Atlantic and Mediterranean waters, as well as around the Canary Islands. Two of the three ESEOO regional components (ESEOAT & ESEOCAN) are included within the IBI Area.

In year 2008, PdE has performed different activities mainly aimed to upgrade the Forecast System and to enhance its validation. Among other improvements, it is worth to mention that the ESEOO system is now ready to use as ocean forcing data (both initial and boundary conditions) the new FOAM forecasts (provided by the UK-MetOffice from his new 1/12° Atlantic Basin Application, which is based on NEMO model).

Along this year, a new on-line validation system has been developed to validate, qualify and continuously monitor the quality of the products and services delivered by the ESEOO system. This new procedures, developed within the framework of the ECOOP Project, allow us to routinely produce a daily cal/val report after each forecast cycle. This quality evaluation is carried out by means of comparisons with any observing data available at the moment. By now, only in-situ observations from the PdE buoy networks are used. However, the system is ready to easily include any data from any other operational network. The new cal/val system is also able to generate cal/val outputs using remote sensed data (by now, this validations with satellite data, has been only performed off-line). This cal/val system has also arise as a useful tool to provide feedbacks about the adequacy of any change in the system (i.e. changes in forcing input data, model set-up, physical parameterizations, resolution, bathymetry, ...) helping to evaluate any potential upgrade of the ESEOO Forecast System.

Example of comparison between modelled and observed surface currents (dir & speed). ESEOAT forecasts (red line) and observations (black line) at PdE Silleiro Buoy.
PdE is performing, within the framework of the Spanish Project MOMAC, a comprehensive validation of the ESEOCAN component in the Macaronesian area. Besides cal/val activities, in this Project is planed to prepare a 1-yr hindcast exercise that allow us to evaluate the adequacy of ESEOCAN outputs to be used as forcing of physico-chemical models in the Macaronesian area.

\[ \text{ESEOAT predictions for 2 different events (outputs at 24-h, 48-h and 72-h forecast horizons are shown): Panels a) to c): Predictions from the forecast run started at 20081128, whereas panels (d) to (f) illustrate outputs from the ESEOAT run started at 20081212.} \]
PdE is also partner of the EU InterReg EASYCO Project. This project will help us to increase dissemination of the ESEOO operational forecasts, reaching a wider and larger user-community. At the same time this Project will allow us to perform scientific comparisons between different model systems currently available in the IBI area. We expect to have valuable feedbacks from these works, and to use them in order to improve the ESEOO Ocean Forecast System performance.

- **2009 Activities**

The 2009 Puertos del Estado activity will be focused in the development of activities in the framework of the projects MyOcean, ECOOP and EasyCO.
2.8. PREVIMER

• 2008 Activities

The operational model of the Bay of Biscay has been reshaped to encompass the English Channel and the South North Sea (up to 52°45’N). A better representation of the fluxes between the Bay of Biscay and Channel is expected.

Characteristics of this MANGA model:
- MARS3D,
- Resolution: 4km horizontally, 30 levels,
- Forcing: 72 rivers, meteorological conditions from Arpège (Météo-France).

The ability of the model to reproduce the temperature and salinity field over the shelf has been assessed. Comparisons between simulations of the years 1999-2004 and a comprehensive data set of both in situ and satellite measurements has been done and the main results can be summarized as follows:
- despite some misfits, the climatology of the hydrology and its seasonal variability are correctly simulated. The biases and root mean square errors remain very weak at all depths when validating salinity (<0.1 psu and <0.6 psu respectively);
- the predicted temperature shows a global overestimation of temperature (bias of around 0.8°C) and the maximum errors are located near the thermocline (RMSE of 1°C at 20-40m);
- statistics computed over the period 1999-2004 highlight different hydrological processes. The model is shown to properly reproduce the annual dynamics of sea surface temperature, as well as the dynamics of large river plumes observed by high frequency time series from coastal salinity gauges. The misfits highlighted by these various comparisons between model and observations are attributed to heat fluxes and mixing parameterisation.

PREVIMER biological modelling over the Bay of Biscay has also improved in 2008, by providing new online indices, as for instance the percentage of phytoplanktonic nitrogen issued from Loire River (a useful estimation for policy making).
An index of growth and toxicity potential of the harmful algae *Pseudo Nitzschia* is also displayed, which had succeeded a first qualitative validation on historical monitoring data.

- **2009 Plans**
  
  - Parametrizations:
    - Heat fluxes. From Luyten and Mulder (1992) to Large and Yeager (2004) and Fairall et al. (2003);
    - Turbulence. From Gaspart et al (1990) to the Generic length scale turbulence closure model (Umlauf and Burchard, 2003);
  
  - Numerics:
    - Generalized sigma coordinate system;
    - Better numerical dispersion (better propagation of physical wave on a wider part of the spectrum);
    - Improvement of the standard ADI scheme on the second order error;
  
  - Forcing:
    - Open boundary conditions provided by Mercator;
  
  - Assimilation:
    - One year hindcast with SST assimilation.
  
  - Biology:
    - expansion of the biological modelling over the MANGA area;
- 6 local models, with finer nested grids (coupled with actual model);
- better assessment of stoichiometric ratios of nutrients.

All these improvements will benefit to partners over the IBI area, by inter-comparison, benchmarking and nesting, through the participation to the ECOOP, LOREA and EASYCO projects.
2.9. SHOM

- **2008 Activities**
  
  - Use of new dissipation parameterization based on the swell analysis by Collard et al. (JGR in revision) and Ardhuin et al. (GRL, in press), and steepness-related whitecapping (Ardhuin et al., JPO in revision)
  
  - Calibrated against 2007 buoy & altimeter data
  
  - Now routinely validated as part of the JCOMM verification exercise (monthly reports on JCOMM page, e.g. http://preview.tinyurl.com/7bz6j)

- **2009 Plans**
  
  - Work on coupling with a 3D primitive equation model (first done with MARS3D in partnership with Ifremer)
  
  - Verification of surface current effects on ocean waves: tidal currents expected to be included in Previmer in June 2009, global currents after verification ...

*map of RMS difference (cm) for Hs between a 2007 hindcast with currents (Mercator PSY3V1) and without*
3. **COMPILATION OF EXPECTED ACTIVITIES FOR 2009**

- Continuation of ongoing developments at national level
- Start of several very important projects:
  - EasyCO
  - Raia
  - MyOcean
  - Lorea
  - Arcopol
- Finishing and publishing of an interactive atlas of modeled areas at IBI web page (Intecmar)
- Fill IBI Catalog with description of model products
- Improvement of OpenDAP implementation for model data exchange in the frame of IBI-ROOS (future IBI WMS).
- Maintain operationally the ensemble storm surge forecasting (ENSURF) at ECOOP for the IBI area, including BMA