The future of the 21st century ocean

Marine Sciences & European Research Infrastructures

International Symposium
28 June - 1 July 2011
Le Quartz, Brest, FRANCE

www.europolemer.eu/en/infrastructures

EUROPOLE MER

224031

Content

Program overview

Day1 Tuesday 28 June	Day 2 Wednesday 29 June	Day 3 Thursday 30 June	Day 4 Friday 1 July
9:00 – 11:30 **Session 1**: Opening Session 11:30 – 13:00 **Session 2**: What are the added values of the integrated research infrastructures in marine sciences?	8:30 – 12:30 **Session 5**: Feedbacks from existing large integrated infrastructures	9:00 – 13:15 **Session 7**: Integrated infrastructures: European strategy for governance and funding	In-house workshops (not public) 8:15-12:30 **EMSAC** 8:30-13:00 **EuroArgo** 9:00-13:00 **Jerico-Fonce** 9:30-13:00 **EMBRC** TBC **EMSO**
13:00 – 14:30 **Lunch** Coffee in the poster area	12:30 – 14:00 **Lunch** Coffee in the poster area	13:15: **End of Symposium** Workshops manage lunch independently.	13:00 **End of specific workshops** Workshops manage lunch independently.
14:30 – 15:30 **Session 2** (ctd) 15:30 – 19:00 **Session 3**: Feedbacks from existing large integrated infrastructures	14:00 – 19:05 **Session 6**: Integrated infrastructures and users	**Specific workshops in parallel** Public workshops (public): 14:15-18:00 **JERICO** 14:30-17:30 **EuroArgo** 15:00-17:00 **Euromarine** In-house workshops (not public) 13:15-17:30 **EMSAC** 14:00-18:00 **SIOS** 14:00-18:00 **EMBRC** 14:30-18:30 **Eurofleets2** 14:00-18:30 **EMSO**	**The following meals are included in the Symposium registration:** - Lunch on Tuesday - Cocktail on Tuesday evening - Lunch on Wednesday - Symposium diner on Wednesday : **please bring the access voucher, which is in your name tag. See access map on the back of the voucher (5 minutes walk from the Symposium venue).** Luggage storage available at Le Quartz venue on Thursday and Friday.
19:00 – 21:00 **Session 4: Posters and cocktail**	20:00 **Symposium diner at the Château de Brest**		**SYMPOSIUM** **WORKSHOPS**

Welcome

Brest, June, 28th

Dear Participants,

Research Infrastructures (RI) of pan-European interest that correspond to the long term needs of the European research communities in marine sciences are listed by the European Commission in the ESFRI Roadmap or within the Integrated Infrastructure Initiative (I3) of the European Framework Programmes.

These RIs are major contributors to the European Research Area, in which national research agencies are involved for the current and upcoming decades, and are a future key component of the GMES (Global Monitoring for Environment and Security) and of the GEOSS (Global Earth Observation System of Systems).

Considering this framework, the general aims of this symposium are:
(1) to identify the major challenges for marine sciences of this century, and
(2) to favour dialog between contributors/managers of the RIs and their users, including scientists, industry and stakeholders.

Europole Mer, a cluster of excellence gathering 15 marine institutes and universities of Western Britanny, welcomes you to Brest and to this Symposium!

Paul Tréguer
President of Europole Mer

Sponsor

Europole Mer http://www.europolemer.eu
Europole Mer is a consortium of research and higher education organisations in West Brittany focusing on marine science and technology that supports research projects around 5 topics, whilst fostering interactions and collaborations between the Europole Mer members (below).
contact@europolemer.eu

Organising team

Organising / scientific committee

EUROPOLE MER	Paul Tréguer, Séverine Thomas, Nadine Réniers
EURO-ARGO	Pierre-Yves Le Traon, Emina Mamaca
EMSO	Jean-François Rolin
EMBRC	Anne-Emmanuelle Kervella, Bernard Kloareg
JERICO	Patrick Farcy
ESONET	Ingrid Puillat

Advisory Committee

EUROMARINE	Mike Thorndyke
EMSO	Paolo Favalli
Région Bretagne	Jean-Yves Le Drian
AWI	Ulrich Bathmann
IMR Bergen	Tore Nepstadt
CSIC	Carlos Duarte

Detailed program

DAY 1: Tuesday 28 June 2011

8:30-9:00 **Welcome**

Session 1: Opening session. Chair: Paul Tréguer (Europôle Mer)

9:00	Hervé Péro	European Commission, DG RTD *Topic : Research infrastructures*
9:20	Gesine Meisssner	European Parliament *Topic : Integrated Maritime Policy as a concept for a sustainable approach to oceans and seas*
9:40	Jean-Yves Le Drian	Président of Region Bretagne *Topic : Committee of the Regions (CoR) of the European Union*
10:00	Rudy Herman	EWI *Topic : Joint Programming Initiative "Healthy and Productive Seas and Oceans"*
10:20 – 10:50		**Coffee break**
10:50	Adi Kellerman	International Council for the Exploration of the Seas *Topic : The Marine and Maritime Science and Technology Forum – a consultancy body to the European Commission*
11:10	Ronan Stephan	DGRI, French Ministry of Research and Higher Education *Topic : French policy with respect to marine infrastructures*

Session 2: What are the added values of the integrated research infrastructures in marine sciences? Chair: Uli Bathmann (AWI)

11:30	Chris Barnes	University of Victoria *Topic : Cabled ocean observatories: Challenges, benefits and opportunities, viewed from NEPTUNE Canada*
12:00	Chet Koblinsky	NOAA *Topic : The value of a Global Integrated Ocean Observing System for Climate to the US National Oceanic and Atmospheric Administration*
12:30	Masao Fukasawa	JAMSTEC *Topic : Marine observing system in JAMSTEC*
13:00-14:30		**Lunch**
14:30	Mike Thorndyke	University of Gothenburg *Topic: 150 years of marine infrastructures, networks and resource centres: from time series to genomes and back*
15:00	Iain Shepherd	European Commission - DG MARE, Maritime Policy in the Atlantic, Arctic, outermost regions *Topic : Marine knowledge for smart and sustainable growth*

DAY 1: Tuesday 28 June 2011 (ctd)

Session 3: Feedbacks from existing large integrated infrastructures. Chair: Tore Nepstad (IMR Bergen)

15:30	Eeva Ikonen	European Commission *Topic: ESFRI program*
16:00	Olaf Banki	Lifewatch *Topic: LifeWatch infrastructure for 'marine' biodiversity and ecosystems*
16:30-17:00		**Coffee break**
17:00	Pierre-Yves Le Traon	Ifremer *Topic: Euro-Argo : a new European Research Infrastructure for climate change research and operational oceanography*
17:30	Paolo Favali	Istituto Nazionale di Geofisica e Vulcanologia *Topic: EMSO_European Multidisciplinary Seafloor Observatory*
18:00	Jacques Binot	Ifremer *Topic: EUROFLEETS European project: first results and perspectives*
18:30	Per W. Nieuwejaar & Uwe Nixdorf	IMR Bergen & AWI *Topic: European Research Vessels Fleets*

Session 4: Poster session. Chair: Patrick Farcy (Jerico)

19:00-21:00 Cocktail & Posters

DAY 2: Wednesday 29 June 2011

Session 5: Feedbacks from existing integrated large integrated infrastructures. Chair: Pierre-Yves Le Traon (EuroArgo)

8:30	Pierre Bahurel	Mercator Ocean *Topic: MyOcean, a European service organisation for ocean monitoring and forecasting*
9:00	Zdenka Willis	NOAA *Topic: US Integrated Ocean Observing System (IOOS): Delivering the Benefits*
9:30	Roger Proctor	University of Tasmania *Topic: The Australian Integrated Marine Observing Systems*
10:00	Martin Visbeck	IFM-Geomar *Topic: Scientific challenges in ocean circulation and climate dynamics: Observing changes along the Deep Western Boundary Current*
10:30-11:00		**Coffee break**

DAY 2: Wednesday 29 June 2011 (ctd)

11:00	Gilbert Maudire	Ifremer *Topic: SeaDataNet : Pan-European infrastructure for marine and ocean data management*
11:30	Laurent Mortier	IPSL *Topic: GROOM : Gliders for Research, Ocean Observation and Management*
12:00	Roberto Di Lauro	Stazione Zoologica "Anton Dohrn" in Naples *Topic: EMBRC ant its European and Worldwide connections.*
12:30-14:00		**Lunch**

Session 6: Integrated infrastructures and users: what are the major scientific challenges of the 21st ocean? How do large integrated infrastructures meet these challenges (science, industry)? Chair: Jean-François ROLIN (ESONET)

14:00	Kostas Nittis	Marine Board – ESF *Topic: Navigating the Future: linking research challenges and infrastructure needs*
14:25	Michael Rohn	GMES Bureau/DG ENTR *Topic : European Earth Observation Programme (GMES)*
14:50	Maurice Heral & Jean-François Masset	ANR / Ifremer *Topic: The Eranet scheme : from Marinera and Marifish to Seas-ERA, their contribution to common programmes and infrastructures*
15:15	Juergen Mienert	University of Tromsö *Topic: Scientific Challenges in Arctic Marine Geosciences*
15:40	C. Mével, A. Kopf and R. Gatliff	AWI & IPGP *Topic: Towards a distributed infrastructure for research drilling in Europe*
16:05	Henry Ruhl	NOC *Topic: The EMSO scientific perspective*
16:30-17:00		**Coffee break**
17:00	Bernard Kloareg	CNRS & UMPC *Topic: EMBRC and the transfer of marine genomics knowledge to a wider user community*
17:25	Hervé Claustre	CNRS *Topic: The EuroArgo scientific perspective*
17:50	Dominique Durand	NIVA *Topic: Paving the future of European coastal observing systems: the Jerico scientific perspective*
18:15	Truls Johanessen	University of University of Bergen (GFI and BCCR) and UNI-Bjerknes *Topic: The marine component of the Integrated Carbon Observing Systems (ICOS)*
18:40	Herman Scholten	Deltares *Topic: Networking of testing and simulation infrastructures, the Hydralab example*
20:00-		**Symposium diner at the Chateau de Brest** (bring voucher located in your name tag)

DAY 3: Thursday 30 June 2011

Session 7: Integrated Infrastructures: European strategy for governance and funding. Chair: Anne-Emmanuelle Kervella (SBR)

9:00	Waddah SAAB	European Commission, DG RTD *Topic: Towards sustained EU marine research and observation infrastructures*
9:30	Annika THIES	European Commission, DG RTD, RI Unit *Topic: A legal tool for setting up European Research Infrastructures - ERIC.*
10:00	Agnès ROBIN	European Commission, DG RTD, RI Unit *Topic: Synergies FP7- Structural funds for Research Infrastructures*
10:30	Damien PERISSE	Representative of Conference of Peripheral Maritime Regions of Europe (CRPM) *Topic : The role of the Regions in financing infrastructures for marine research*
11:00-11:30		**Coffee break**
11:30	Round Table	Chaired by Paul Tréguer and Pierre-Yves Le Traon, with the participation of Ulrich Bathmann (AWI), Damien Périssé (CRPM), Rudy Herman (EWI), Nadia Pinardi (INGV) (represented by PM Marie Poulain), Maurice Héral (Ifremer/ANR), Joaquin Tintore (SOCIB and IMEDEA), Susana Gota-Goldmann (DGRI), Waddah Saab (EC). *Topic: exchanges of experiences between EMSO, EuroArgo and EMBRC, role of the regional and national fundings in the Integrated Infrastructures, interaction with governance and impact on scientific orientations.*
13:00	Organising Committee	General conclusions of the Symposium

End of plenary sessions on DAY 3 at 13:15

DAY 3: Thursday 30 June 2011 (afternoon)

Specific workshops in parallel (free access, please contact workshop organisers to register attendance)

Public workshops

14:15-18:00	**JERICO**	: New observing systems for VOS: from RECOPESCA to CANOE
14:30-17:30	**EuroArgo**	: Scientific presentations on EuroArgo
15:00-17:00	**Euromarine**	: Round Table on marine biological data integration

In-house workshops

14:30-18:30	**Eurofleets2**	: preparation meeting for new program Eurofleets2
13:15-17:30	**EMSAC**	: General Assembly
14:00-18:00	**SIOS**	: Svalbard Integrated Arctic Earth Observing System
14:00-18:00	**EMBRC**	
14:00-18:30	**EMSO**	

DAY 4: Friday 1 July 2011

Specific workshops in parallel (ctd): no public workshop on Day 4

8:30-13:00	**EuroArgo**	: Partners meeting
8:15-12:30	**EMSAC**	: General Assembly
9:00-13:00	**Jerico-Fonce**	
9:30-13:00	**EMBRC**	
TBC	**EMSO**	

End of Symposium on DAY 4 at 15:00

Specific workshops

Euro-Argo - European component of a worldwide in situ global ocean observing system, based on autonomous profiling floats (public)

Thursday 30th June afternoon and Friday 1st July morning. **Room 4**
Contact : Pierre-Yves Le Traon : Pierre.Yves.Le.Traon@ifremer.fr

The first session (Thursday afternoon) will discuss recent scientific works on Argo in Europe through a series of invited presentations. The second session (Friday morning) will be limited to Euro-Argo partners. The meeting will review the status of Euro-Argo ERIC organization and application and will discuss the 2011-2013 workplan for Euro-Argo.

Euro-Argo Workshop, June 30 afternoon 14h30-17h30 (public)

Euro-Argo scientific meeting will follow the Brest general symposium:

K. Von Schuckmann et al: global ocean climate variations from Argo data
B. Klein: combining Argo data with moored instruments to study water mass variability of Labrador Sea Water.
V. Thierry: Main outcomes of the international Argo Oxygen workshop (May 2011)

Coffee Break: 15h45-16h

H. Claustre: Argo and biogeochemical observations
P.M. Poulain et al: Defining an Argo sampling strategy in the Med and Black seas
G. Larnicol: Synergy between EuroArgo data and altimetry data

Discussion

Euro-Argo ERIC Partners Meeting, July 1st morning 8h30 – 13h00 (not public)

EMSO European Multidisciplinary Observation

Thursday 30th June afternoon and Friday 1st July morning. **Room 9**
Contact: Jean-François Rolin: Jean.Francois.Rolin@ifremer.fr

The EMSO-Preparatory Phase project addresses European-scale network of subsea observatories and platforms with the basic scientific objective of long-term monitoring, mainly in real-time, of environmental processes related to the interaction between the geosphere, biosphere, and hydrosphere, including natural hazards. It will be a geographically distributed infrastructure composed of several deep-seaf observatories, which will be deployed on specific sites around European waters, reaching from the Arctic to the Black Sea passing through the Mediterranean Sea, thus forming a widely distributed pan-European infrastructure. It has made consistent progress towards the definition of an appropriate legal structure and organisational model. Moreover, following the successful completion of ESONET-NoE (the FP6-funded project strictly linked to EMSO) and the activation of national funding programmes, the scientific community is rapidly getting involved in the implementation phase of several EMSO sites. The workshop will provide a important opportunity for discussion with the representatives of the funding agencies.

EuroMarine Round Table on data integration in marine science (public)

Round table, Thursday 30th June afternoon 15h00 – 17h00 (public); **Room Meridienne (plenary session room)**
Contact: Stéphane Pesant: spesant@marum.de

The public and ESFRI 2011 Symposium participants are invited to attend the round table discussions on Thursday the 30th of June afternoon, and to participate in the following question period.

EuroMarine is a European Coordinated Action to achieve further integration among research institutions that were involved in FP6 marine Networks of Excellence (Marine Genomics Europe, EUR-OCEANS and MarBEF), notably across molecular, organism and ecological approaches in marine science. EuroMarine will publish a vision paper on the integration of marine biological data in Europe. The objectives of the vision paper are to:

1. Describe the landscape of marine biological data in Europe, identifying the various communities, initiatives and types of information in need of integration.
2. Propose methods to improve integration of marine biological data in Europe and internationally.
3. Propose mechanisms leading to institutional commitments towards the implementation and funding of the proposed integration methods.

The round table will bring together a group of 15 experts on marine data integration in Europe. ***The round table will address the three objectives of the vision paper, with a special focus on integrating the various instruments put forward by the European Commission, notably by the DG Information Society and Media, DG Maritime Affairs and Fisheries, DG Research and Innovation, and the ESFRI roadmap.***

Group of experts

1. Jean-François MASSET, Ifremer
2. Gilbert MAUDIRE, Ifremer
3. Ariel TROISI, International Oceanographic Data and Information Exchange
4. Michael DIEPENBROEK, Universität Bremen
5. Neil HOLDSWORTH, International Council for the Exploration of the Sea
6. Rolf APWEILER, European Bioinformatics Institute
7. Roberto DI LAURO, Stazione Zoologica Anton Dohrn
8. **TBD (Observatories) EMSO, JERICO**
9. Ward APPLETANS, Vlaams Instituut voor de Zee
10. Renzo KOTTMANN, Max-Planck-Institut für marine Mikrobiologie
11. Jeroen RAES, Vlaams Instituut voor Biotechnologie
12. **TBD (Operational oceanography) MyOCEAN, GMES**
13. Stéphane PESANT, Universität Bremen
14. Francisco HERNANDEZ, Vlaams Instituut voor de Zee
15. Frank Oliver GLÖCKNER, Max-Planck-Institut für marine Mikrobiologie

Jerico - New observing systems for VOS: from RECOPESCA to CANOE (public)

Thursday 30th June afternoon. **Room 3**
Contact: Patrick Farcy: Patrick.Farcy@ifremer.fr

Since many years Voluntary Opportunity Ships as shipping or ferry boats are used to acquire physical data of the surface of the ocean. In order to use other kinds of VOS, we are producing new generation of sensors as RECOPESCA for fishing boats and CANOE for sailing boats. This workshop will present this new generation of sensors and the future opportunities.

Jerico workshop, Thursday 30th afternoon 14h15 – 18h00 (public)

JERICO WP10 - Task 10.4

New observing systems for Ships of Opportunity

14h15 to 18h00

Chairman: **Laurent Delaunay** (Ifremer)

14.15 Introduction by **Fabienne Gaillard** and **Patrick Farcy**

14.30 ***The future in the ferrybox system and operations***
Pascal Morin, CNRS: a new system in the Channel and Bisquay
Dominique Durand, NIVA: ferryboxes in the north of Europe

15.10 ***The Australian activities***:
Roger Proctor, IMOS: IMOS "SOOP program"

15.30 **The open sea initiative for salinity**
Gilles Reverdin: The SSS infrastructure on cargo ships

15.50 ***The fishing boats systems***:
Patrice Woerther & **Emilie Leblond**: RECOPESCA probe and operation
Michela Martinelli, CNR: The Italian Fishery Observing System: a tool for collecting fishery and oceanographic data in the Adriatic Sea

16.30 ***The sailing boats systems***:
Martin Kramp, Sailing One & **Fabienne Gaillard**:
The "Oceano-scientific" equipment
JC Le Bleis, NKE & **Fabienne Gaillard**: Projet CANOE
Olivier Menage et **Thomas Gorgues**: projet VAIMOS

17.30 **Round table and conclusion: Gilles Reverdin**

Jerico – Fonce workshop, Friday 1st July 9h00 – 13h00 (not public).

EMBRC: European Marine Biological Resource Centre

Thursday 30th June afternoon and Friday 1st July morning. **Room 1**
Contact: Anne-Emmanuelle Kervella: akervella@sb-roscoff.fr

Unlocking the secrets of marine organisms.
The distributed pan-European Research Infrastructure (RI) EMBRC provides access to model marine organisms and related genomic resources, for both research and training. The main coastal marine laboratories will be embedded within this RI to provide access to model marine organisms and their ecosystems together with modern technology and 'omic' platforms. The RI entered into its preparatory phase in February 2011.

This workshop is only open to EMBRC members.

EMSAC: European Marine Science Applications Consortium: mid-project General Assembly.

Thursday 30th June afternoon, 13h15 – 17h30 and Friday 1st July morning 8h15 – 12h30. **Room Petite gallerie**
Contact: Philippe Monbet: philippe.monbet@pole-mer-bretagne.com

Water resource management is becoming an urgent challenge, for Europe and the world, as populations grow and requirements increase. Degradation of our coastal and estuarine waters is of particular concern to policy makers at regional, national, EU and international levels, and increasingly so to the public at large. The EMSAC project addresses this challenge by ensuring that Europe's knowledge on water resource is effectively directed towards building the mix of solutions required. This includes topics like water quality, prevention of coastal risks and living resource management. EMSAC helps to achieve this by working collaboratively with clusters of expertise in different regions of Europe, involving research institutions, businesses and public authorities. This workshop will host the third General Assembly of EMSAC focused on defining the Joint Action Plan between partners.

This workshop is open to EMSAC GA members.

Eurofleets2 - preparation meeting for new program Eurofleets2

Preparation meeting, Thursday 30th of June, 14h30 – 18h30 (not public). **Room 5**
Contact: Jacques Binot: jacques.binot@ifremer.fr

Supported by the European Commission through the 7th Framework Programme for Research and Development, the EUROFLEETS project addresses the Capacities Programme: "Sustainable development, global change and ecosystems" and regroups 24 organizations from 16 countries (14 EU member states and two associated countries to it). It began in September 2009 for 4 years. As all other I3 projects it includes Trans National Access aspects together with Networking and Joint Research ones.

Two European ship time calls have been successfully launched within EUROFLEETS frame in 2010, and 11 cruises will be funded on basis of their scientific excellence on board European Research Vessels made available by their owners or operators.

To progress on this integrating track a new proposal (EUROFLEETS2) will be submitted in November 2011. A first meeting took place on the 3rd of May with 30 participants of 21 potential partners. Second meeting is planned in Brest on the 30th of June to confirm key European vessels and/or equipment made available, networking new possibilities including polar research or virtual fleets, and innovation potential inputs.

SIOS - Svalbard Integrated Arctic Earth Observing System

Thursday 30th June afternoon, 14h00 – 18h00. **Room 8**
Contact: Nicole Biebow: Nicole.Biebow@awi.de

The international research infrastructure initiative SIOS (www.sios-svalbard.org) aims at building up a comprehensive regional-scale Arctic System observation platform which can provide both Earth System modelers and other communities interested in changes in the Arctic with continuous quality-assessed data ranging from the deep sea to the ionosphere. In October 2010, the 3-year SIOS preparatory phase project was started; this project will establish the formal and financial framework needed for the operation of the future research infrastructure. In parallel, a gap analysis of existing and needed new infrastructure is entering is final phase; the final report of this process will be completed by summer 2011.

At the meeting on 30th June, we will briefly present the SIOS initiative and present the WP9 "International cooperation and Integration". One of the tasks of this WP9 is devoted to identifying possible synergies and mutual benefits between SIOS and other ESFRI or other large scale infrastructure projects active in the Arctic, and to establish close links via coordinated observations, methodologies and standards. These topics will be discussed during the meeting.

Invited talks abstracts list (in alphabetical order):

MyOcean, a European service organisation for ocean monitoring and forecasting
Bahurel Pierre
Mercator Ocean

Lifewatch infrastructures for 'marine' biodiversity and ecosystems
Banki Olaf
Lifewatch

Cabled ocean observatories: challenges, benefits and opportunities, viewed from NEPTUNE Canada
Barnes Christopher[1], Best Mairi, Johnson Fern, Pautet Lucie and Pirenne Benoît
[1]NEPTUNE Canada, University of Victoria, P.O. Box 1700, Victoria, BC, Canada V8W 2Y2
crbarnes@uvic.ca

Advent of the first cabled ocean observatories demonstrates challenges, benefits, opportunities and added values for ocean science and commercial applications. Introducing abundant power and high bandwidth communications into diverse ocean environments allows: discrimination between short and long-term events, interactive experiments, real-time data/imagery, and complex multidisciplinary teams interrogating vast interoperable databases over decades. Cabled observatories will transform ocean sciences, with a progressive wiring of the oceans. They are expandable in footprint, nodes and instruments, promote new scientific questions and discoveries, and spawn new technologies. NEPTUNE Canada (NC) completed installation of the subsea infrastructure and 100 instruments in 2009-10 (with 30 more in 2011-12), establishing the world's first regional cabled observatory, northeast Pacific. Alcatel-Lucent designed, manufactured and installed the 800km backbone cable and five nodes located at the coast, continental slope, abyssal plain, and ocean-spreading ridge (100-2660m). Principal scientific themes are: plate tectonic processes and earthquake-tsunami dynamics; seabed fluid fluxes and gas hydrates; ocean/climate dynamics and biotic effects; deep-sea ecosystem dynamics; engineering/computational research. The Data Management and Archive System (DMAS) controls the network and gives transparent, interoperable data access within Web 2.0 environment. New knowledge, scientific interpretations, and policy applications are addressing: ocean/climate change, ocean acidification, mitigating natural hazards, non-renewable and renewable natural resources. Challenges are considerable: technical innovations/management, increasing users, funding, maximizing educational/outreach activities. Socio-economic benefits are substantial: resource/hazard/environmental management, sovereignty, security, transportation, data services, and public policy. Ocean Networks Canada manages NC and VENUS observatory networks, facilitating commercialization of technologies and data services/products through its Centre of Enterprise and Engagement.

***EUROFLEETS European project*: first results and perspectives**
Binot Jacques[1] and Mazauric Valérie[1]
[1] Ifremer (Institut français de recherche pour l'exploitation de la mer), Issy les Moulineaux, France.
Jacques.Binot@ifremer.fr
Valerie.Mazauric@ifremer.fr

Supported by the European Commission through the 7th Framework Programme for Research and Development, the EUROFLEETS project http://www.eurofleets.eu/np4/home.html addresses the Capacities Programme: "Sustainable development, global change and ecosystems" and regroups 24 organizations from 16 countries (14 EU member states and two associated countries to it). It began in September 2009 for 4 years. Two European ship time calls have been successfully launched within EUROFLEETS frame in 2010, and 11 cruises will be funded, on basis of their scientific excellence, on board European Research Vessels made available by their owners or operators, from 2011 to 2013.

Other forward steps have been achieved in terms of training and formation, inter operability and shared strategic vision. A third ship time call dedicated to Regional research vessels closed early May. To progress further a new proposal (EUROFLEETS2) will be submitted to EC in November 2011, with a widened partnership and some new European key research vessels and/or equipment made accessible.

Networking activities will explore new domains such as polar research or virtual research fleets. Best efforts will be also deployed to better integrate innovation inputs and foster industrial active participation.

At longer term the EUROFLEETS project is promoting the integration within ESFRI roadmap of a coherent group of newbuilt interoperable and innovative Regional research vessels covering main European eco-regions.

The EuroArgo scientific perspective

Claustre Hervé
CNRS

EMBRC and its European and worldwide connections

Di Lauro Roberto
Coordinator EMBRC, Stazione Zoologica Anotn Dohrn, Naples, Italy

The European Marine Biological Resource Center is one of the 13 infrastructure projects on the Biological and Medical Research infrastructures ESFRI road map. The preparation phase was funded for three years and with the kick off meeting held in Naples on February 24 the project has started to develop the preparation of its scientific, legal, financial and governance model. In addition, the EMBRC is participating in a movement that includes all Biological and Medical Research infrastructures in order to stimulate measures aiming at the support of their operational phase. Finally, EMBRC is leading a global movement that should expand its mission and vision world wide with a new initiative called GEMBIOL.

Paving the future of European coastal observing systems: the Jerico scientific perspective

Durand Dominique[1], Morin Pascal, Puillat Ingrid and Farcy Patrick.
[1] Norwegian Institute for Water Research, Gaustadalléen 21, 0349 Oslo, Norway.
dominique.durand@niva.no

The coastal is often characterised by the complexity and high variability of the physical, chemical and biological processes that are taking place. Observing the coastal seas may therefore often be challenging. Environmental status of European Seas and the need of information for decision-taking on remediation measures are nowadays the focus of two European directives (Water Framework Directive and the Marine Strategy Framework Directive). The efficient implementation of these two Directives requires a reliable and harmonised network of observations of standard environmental parameters. Moreover, the increase demand for services based on operational forecasting (through GMES and EuroGOOS) of the sea is putting new requirements on coastal observing systems in terms of operationality, continuity, sampling in time and space and quality control. The newly started Infrastructure project JERICO aims at integrating and harmonising existing operational coastal observatories around Europe, as well as converging on recommendations on a future optimal and realistic network of coastal observations. Such recommendations will be based on a comprehensive analysis of the heterogeneity and gaps from regional to sensor and methodological approach levels. The requirements from users, the agreement on best practices and identified and tested emerging technology will be the basis of the definition of a Jerico label for qualified coastal observatories. A number of existing infrastructures will be made available, through dedicated calls, for international collaborative research. A particular focus is given on the integration of observations and resulting data within existing standards for data management.

EMSO: the European-scale network of fixed seafloor and water-column observatories

Favali Paolo[1], Beranzoli Laura[1], Rolin Jean-Francois, Waldmann Christoph, Gillooly Michael, Danobeitia Juan Jose, Hall Per, Likousis Vasilios, Ruhl Henry A., Mienert Jürgen, Miranda Jorge Miguel Alberto, Çagatay Namik & Greinert Jens
[1] INGV-Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605 - 00143 Roma, Italy
emsopp@ingv.it

EMSO (European Multidisciplinary Seafloor Observatory, http://www.emso-eu.org/), a Research Infrastructure of the ESFRI Roadmap (http://cordis.europa.eu/esfri/roadmap.htm/), is the European-scale network of fixed seafloor and water column observatories constituting a distributed infrastructure for long-term monitoring of environmental processes. EMSO is the Eulerian part of the "European Ocean Observing System", as the Ostend Declaration recognised as a priority

The key approach characterising EMSO is represented by the collection of long-term data series. This allows investigations of the complex interrelations between processes and properties from the top of the ocean to the seabed beneath with the appropriate time scale (from seconds to decades). The interfaces between different realms, geosphere-hydrosphere-atmosphere-biosphere, can be finally explored.

EMSO will reply to the requirement expressed in the frame of GMES (http://www.gmes.info/) and will be essential component of GEOSS (http://www.earthobservations.org/geoss.html/).

The development of EMSO relies upon the synergy between the scientific community and the industry and will offer the chance to improve the European excellence with respect to other countries, mainly Japan, Canada and USA.

EMSO is currently involved in the Preparatory Phase (PP) coordinated by INGV, funded by the European Commission in FP7, and concerns 12 European research institutions representing 12 Countries. EMSO-PP is dealing with the creation of the legal entity in charge of managing the research infrastructure. EMSO-PP is setting the basis to create a European Research Infrastructure Consortium (ERIC) particularly suitable for Research Infrastructures.

Sea-going facilities and their operating systems in JAMSTEC

Fukasawa Masao[1] and Imawaki Shiro
[1]Research Institute for Global Change, Japan Agency for Marine-Earth Science and Technology, 2370061 2-15 Natsu-shima, Yokosuka City, Kanagawa, Japan
fksw@jamstec.go.jp

Japan Agency for Marine-Earth Science and Technology (JAMSTEC) is responsible for maintenance and operation of eight research vessels (RV), one drilling vessel, one submersible, two ROVs, one AUV and one deep towing vehicle. The RVs and the submersible are operated in accordance with cruise plans which are proposed by scientists and selected by three committees consisted of scientists mainly from out of JAMSTEC. The first committee is hosted by University of Tokyo and handles "bottom-up" proposals mainly from the scientists in universities. The second one is by JAMSTEC and reviews(handles) submitted proposals based in terms of official action plans of JAMSTEC. Third one handles proposals for diver use and is hosted also by University of Tokyo. Besides these cruises, JAMSTEC retains its own ship time for governmental project of Dense Ocean floor Network. Of these eight RVs, the biggest RV, *Mirai,* has been engaged in activities of international research frameworks such as WCRP-WOCE, CLIVAR, IGBP- JGOFS and IOCCP/GO-SHIP. At this stage, there is no way for foreign scientists to submit their cruise proposal to the committees above. However, in reality, under collaborative research with Japanese scientists, quite a few foreign scientists have been on boards the RVs and the submersible. Cruise information such as cruise highlights, tracks and hydrographic data are of free access though JAMSTEC data portal site. As for the drilling vessel, *Chikyu*, she is operated under control of IODP in principal independent from the committees mentioned above.

The Eranet scheme : from Marinera and Marifish to Seas-ERA, their contribution to common programmes and infrastructures

Héral Maurice[1], Masset Jean-François
[1] Agence National de la Recherche (ANR), 212 rue de bercy, 75012 Paris, France
Maurice.Heral@ifremer.fr

ERA-Nets projects enable to work on research programs shared by a scientific community, here the marine sciences one, in order to implement some joint activities (common programmes, joint calls), but also to promote a shared vision on cross-cutting stakes like research infrastructures (RI) and capacity building. Thus for example, MARINERA (2006-2009) contributed to the setting-up of European integration projects for distributed RI such as EUROFLEETS (research vessels and underwater vehicles) and JERICO (coastal & shelf seas observatories). MARIFISH also focuses on common research programmes for fisheries.

SEAS-ERA (2010-2014), MARINERA's follow-up, proposes, among other policy-oriented tasks, to continue this action in favour of a shared vision on marine RI, at a moment when a lot of initiatives has become on-going European integrated projects. Not only it is about showing an updated overview of these initiatives, but it is also about highlighting the interactions and the complementarities within each sub-domain (for example, infrastructures for *in-situ* data acquisition and their dual use research/monitoring), the possibilities of common vision and road map for new investments (in

investigating at first the regional scale relevance), the conditions for a long-lasting trans-national access, and the relations with the maritime and industrial sectors for opportunities of mutual use of the respective infrastructures.

Such analyses could be performed with the support of the current European projects and their scientific advisory boards, to lead to a common vision and concrete propositions which could then be implemented, either within the framework of the joint programming "Healthy and Productive Seas and Oceans" currently in preparation, or thanks to the next EC funding cycle 2014-2020.

Joint Programming Initiative "Healthy and Productive Seas and Oceans"

Herman Rudy[1], and Angell-Hansen[2], Kathrine
[1] Department Economy, Science and Innovation, Flanders Authority, Belgium
[2]JPI Oceans Secretariat, Brussezls, Belgium
rudy.herman@ewi.vlaanderen.be ka@forskningsradet.no

The JPI "Healthy and Productive Seas and Oceans" is the high-level strategic mechanism, recently established by Member States dedicated to provide an integrated European approach to investing in cutting-edge and innovative marine and maritime research and technology development. The JPI Oceans is a top driven process aiming long term perspectives, and will be built on the principle of variable geometry. Member States will decide where to participate and which funds to contribute: This may include institutional, project-related or new funds. In cooperation with JPI Oceans, EU instruments will continue to be invaluable pillar for the support of human resources, scientific capacities and research infrastructures. This will also include developing flagship initiatives promoting the cooperation between research, education and industrial sectors. Thereby, the JPI Oceans can make a uniquely European contribution to better understanding, use and protection of our seas and oceans.

The JPI Oceans will mobilise in a coordinated way Europe's resources and capacities in the marine and maritime areas, on the basis of an integrated marine and maritime strategic research and innovation agenda, to fill critical gaps and enable this by providing an integrated knowledge and technology base for our seas and oceans. The JPI Oceans will consolidate and integrate knowledge across all marine/maritime sectors and research in order to help:

- Enable the advent of a knowledge based maritime economy, maximising its value in a sustainable way;
- Ensure Good Environmental Status of the seas and optimise planning of activities in the marine space;
- Optimise the response to climate change and mitigate human impacts on the marine environment

No doubt that Marine Research Infrastructures fulfil an important role in the development of this JPI Oceans.

ESFRI Program

Ikonen Eeva
European Commission / Academy of Finland

Observing ocean –atmosphere carbon fluxes: the marine component of the Integrated Carbon Observing System (ICOS)

Johannessen Truls[1], Watson Andrew, Huertas Emma and Marine ICOS team
[1]Bjerknes Center for Climate Research, Allegaten 55, Bergen 5007, Norway
Truls.Johannessen@gfi.uib.no

The oceans are important sinks for the greenhouse gases produced by human activity – for example, on millennial time scales they will take up most of the carbon dioxide we are releasing to the atmosphere. In response to global climate change, uptake or release of these gases will change with time. It is important therefore to have some way of tracking ocean-atmosphere fluxes, to know how the Earth system as a whole, and the marine part of it in particular, is responding to anthropogenic activities. ICOS is the European component of what will become a global in-situ observational network for the monitoring of fluxes of greenhouse gases (principally carbon dioxide, methane and nitrous oxide) between the atmosphere and both land and ocean. It is one of the projects listed in the roadmap for ESFRI (European Strategic Forum for Research Infrastructures). The marine component of ICOS will be made up of regular surface observations from voluntary observing ships using automated instruments, time series sites at which observations through the water column can be made, and support for global observations of the marine carbon inventory. In recent years projects such as CARBO-OCEAN and CARBOCHANGE, supported by EU FP6 and FP7, have shown that it is possible to define with

good space and time resolution the basin-wide fluxes of CO_2 between atmosphere and ocean in the North Atlantic using an observational network like that envisaged for ICOS. This flux is more variable than previously believed, and undergoes decadal changes of quite large magnitude.

The Marine and Maritime Science and Technology Forum – a consultancy body to the European Commission

Kellermann, Adolf
International Council for the Exploration of the Sea (ICES), H.C. Andersens Boulevard 44-46, DK-1553 Copenhagen, Denmark.
adi.kellermann@ices.dk

Europe is facing a struggle with fragmentation of the marine and maritime research sectors of the European research area. This dilemma has resulted in duplication of existing services and complexity of stakeholder interactions. Reduction of the fragmentation became a priority in the political process of structuring the European Research Area. Several major European marine and maritime research networks and intergovernmental organizations decided to join forces in the MARCOM+ initiative and elaborate on the abilities to advice on emerging policy needs. The overall objective of the project is to propose a new, integrated governance and consultancy model, which will take form of a forum (The European Marine and Maritime Science and Technology Forum). MARCOM+ is testing panels, open fora and electronic, internet-based fora as possible means of future exchange and cooperation between the marine and maritime research communities and other partners (industry, regional authorities, civil society and other stakeholders of the seas), and advice-generating tools. The first, implementation phase will work around topical areas such as sea food, transport, ocean energy etc. The panel on research infrastructure and interdisciplinary dialogue made some recommendations for future priorities and activities. Progress of the project will be reported.

EMBRC and the transfer of marine genomics knowledge to a wider user community

Kloareg Bernard
Station biologique de Roscoff (Centre National de la Recherche Scientifique and Université Pierre et Marie Curie), 29680, Roscoff, France

Cutting-edge genomic approaches are now sufficiently mature to significantly contribute to the knowledge based bio-economy in the marine sector. Applications include improving the efficiency of characterisation and mining of marine diversity for aquaculture, biotechnology products and bio-processes. Marine genomics knowledge also has enormous potential to assist organisations involved in governance and sustainable management of the marine environment and its resources. However, the direct utility of marine genomics in developing commercial advantage and in general problem solving is often not apparent to decision makers in government and industry, because a large amount of valuable marine genomics knowledge is inaccessible to users or exists in non-user-friendly contexts. By providing a variety of enabling technologies and resources in marine genomics the ESFRI research infrastructure known as the "European Marine Biological Resource Center" (EMBRC) is a powerful instrument to accelerate the predicted "blue revolution" in marine bio-industries. This will require, however, a proper exposure of the concepts, data and resources in marine genomics to its potential end-users, including to scientists as well as to government and industry policy makers. We here illustrate the potential of marine genomics in blue agronomy, blue biotechnology and blue chemistry and present the objectives and methodology of "Marine Genomics for Users" (MG4U), a FP7, KBBE-funded Coordination Action which seeks to bridge the gap between marine genomic knowledge and innovation.

The value of a Global Integrated Ocean Observing System for Climate to the US National Oceanic and Atmospheric Administration

Koblinsky Chester J.[1]
[1] NOAA/OAR/Climate Program Office, 1315 East West Highway, Silver Spring, Maryland 20910, USA.
Chester.J.Koblinsky@noaa.gov

Over the past few decades NOAA and numerous international partners have built a global integrated observing system for understanding and monitoring the ocean's role in climate and the impact of climate on the ocean. Some key elements include: the Argo profiling float network, a global surface drifter program, tropical moored buoy arrays, air-sea flux moorings, ship-based hydrographic sections, volunteer ship observations, and satellite-based measurements The information from this system has supported a variety of valuable contributions ranging from ocean process studies to routine global climate prediction. The value of the system will increase as it is used for a broader range of science and

services. New frontiers for this system could include: understanding biogeochemical variability, sustaining marine ecosystems; supporting resilient coastal communities; and providing early warning of abrupt changes. The challenge will be to sustain current capabilities while expanding the architecture to address new requirements and changes in marine technologies and infrastructure.

Committee of the Regions (CoR) of the European Union
Le Drian Jean-Yves
Région Bretagne

Euro-Arg: a new European Research Infrastructure for climate change research and operational oceanography
Le Traon, Pierre-Yves, Mamaca Emina, Pouliquen Sylvie and Euro-Argo partners
Ifremer, Centre de Brest, BP70 29280 Plouzané, France.
pierre.yves.le.traon@ifremer.fr

In early 2012, the Euro-Argo research infrastructure will become a new European legal entity (Euro-Argo ERIC). The objective is to organize a long term European contribution to the international Argo array of profiling floats. Argo is now the most important global in-situ observing system required to observe and understand the role of the ocean on the earth climate. Euro-Argo is also an essential component of the in-situ infrastructure required for the GMES Marine Core Service and its MyOcean project (operational oceanography). Euro-Argo will thus develop European contribution to the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS). We will provide an overview of the development of Euro-Argo over the past years and detail the now agreed Euro-Argo long term organization. We will also illustrate some key achievements on the use of Argo in Europe both for operational oceanography, ocean and climate change research.

SeaDataNet : Pan-European infrastructure for marine and ocean data management
Maudire Gilbert[1], Schaap Dick M.A., Fichaut Michèle and the SeaDataNet consortium.
[1] IFREMER, Brest, France
Gilbert.Maudire@ifremer.fr

SeaDataNet is an Integrated Research Infrastructure Initiative (I3) in European FP6 (2006 – 2011) to set up a data management system adapted both to the very distributed in-situ marine observations and to the users need for an integrated access to data. Its major objectives are to:

- **encourage long-term archiving** at national level to secure ocean data taking into account that all the observations made in the variable oceanic environment can never be remade if they are lost;
- **promote best practices** for data management, taking benefits of the development of international initiatives and standards on data quality insurance, data descriptions (metadata and common vocabulary) and interoperability. Software tools are developed or adapted accordingly to support these practices and the adoption of standards;
- **establish online services** to facilitate data discovery, data requests, data visualisation and data download for users;
- **process data sets of reference** like ocean climatologies at a regional basin scale to provide comprehensive data sets;

Sustainability of the infrastructure is researched by a balance between the activities mostly undertaken at national level by the National Oceanographic Data Centres and the effort done at the Pan-European level by the project. The SeaDataNet consortium brings now together a unique group of 56 partners from major oceanographic institutes of 36 countries bordering Black Sea, Mediterranean Sea, North-East Atlantic, North Sea, Baltic Sea and Artic Sea.

Strong cooperation has been developed with other European marine initiatives both in the fields of research, operational oceanography and scientific support for environmental decision making.

Integrated Maritime Policy as a concept for a sustainable approach to oceans and seas
Meissner Gesine
European Parliament

Towards a distributed infrastructure for research drilling in Europe

Mevel Catherine, Kopf Achim and Gatliff Robert.
[1] Institut de Physique du Globe de Paris, 1 rue Jussieu, 75238 Paris cedex 05, France.
mevel@ipgp.fr

Drilling and sub-seafloor sampling have been identified an emerging component in deep-sea research in Europe. However, despite the success of ECORD (European Consortium for Ocean Research Drilling) within IODP (Integrated Ocean Drilling Program) and its spin-off from the ECORD-Net ERANET project, the DS^{3}F Coordination Action, the ESFRI list is still lacking facilities that favour sampling and instrumentation of the sub seafloor. At present, the EU project DS3F (Deep-sea & Sub-Seafloor Frontier) aims at coordinating all efforts in the deep sea to provide a roadmap for the 8th EU Framework program. Simultaneously, IODP has developed a new Science plan for the next decade of marine research drilling. In there, European technology, namely seafloor drill rigs and other mission-specific components, plays a key role to study questions related to geodynamics, climate change and deep biosphere. As a result, it would be beneficial to establish a "distributed infrastructure for research drilling" that encompasses state-of-the-art developments such as MeBo and BGS Rock drill, giant piston corers, and logging and long-term monitoring technology developed by European researchers and/or companies. This would strengthen Europe's role in IODP and other international efforts, and further the bonds between academia and SMEs in Europe.

Scientific Challenges in Arctic Marine Geosciences

Mienert Juergen
University of Tromsø, Norway

The Arctic has always fascinated mankind as one of the most remote and unexplored places on Earth. Progress in and a huge hub for Arctic marine geoscience in the twentieth century was the concerted action of several countries to carry out the Arctic Coring Expedition with icebreakers Sovetskiy Soyuz (Russia) and Oden (Sweden) and the ice-strengthened Vidar Viking drill vessel. A recovery of ~340 m of sediment cores provided the first groundtruthing of the of a major climate transition from a warm greenhouse climate to a colder icehouse climate approx. 46 million years ago. The finding suggests that the Cenozoic cooling in the Arctic occurred parallel with that in the Antarctic. Ongoing marine technology developments like new boring technologies from ice-strengthened vessels may allow a continuation to study processes in one of the strangest environments on earth, the deep ocean. We are only just beginning to understand the physical and biological processes that take place and the coupling between surface and deep ocean processes while at the same time environmental pressure on the Arctic Ocean is rising. Hydrocarbon exploration frontiers, intensive bioprospecting and deep-sea carbon dioxide sequestration to combat climate change are not only visions but realistic developments on the horizon.

It was not before 2007 when the first time in the history of humankind underwater robotic vehicles reached the seafloor of the Arctic Ocean to explore hydrothermal plumes and life at the most northern extension of the Mid-Atlantic Ridge ranging from 3000 to 5000 m water depths. The Arctic Ocean is the new frontier but it is still hard to get under it and down to its seafloor but this may rapidly change within future decades due to global warming and sea ice melting. It will request new environmental measures to access the natural resources within and beneath the ocean. The Arctic region is believed to contain vast oil and gas reserves and other mineral resources, which are likely to become accessible. Natural systems of the Arctic Ocean seabed show bubbling methane. There is increasing evidence that the ocean has been found to be releasing this powerful greenhouse gas from deep but also shallow regions. The discovery will raise concerns that ocean warming and sea ice melting may allow unlocking billions of tonnes of methane from beneath the ocean. However, nobody knows if the Arctic Ocean methane emissions are recent or indeed long term processes that have nothing to do with global warming.

The challenges that lay ahead of us are related to provide answers to the most eminent questions. Thus, today scientists are increasingly sending specialised laboratories to the deep seafloor in order to continuously observe these remote bio-, hydro- and geospheres that are so important for our life on Earth. A move towards a sustained economic growth in the Arctic requires the expansion, modernisation and integration of marine research. Basic European research and science driven technological development plays a major role in this respect, and continuous improvement of research and infrastructure integration is needed. Sharing of knowledge, pooling of existing research and new technology development are essential for developing, strengthening and implementing Arctic Marine Geoscience research to achieve European excellence in one of the most rapidly changing environments.

GROOM : Gliders for Research, Ocean Observation and Management
Mortier Laurent
IPSL, Paris.

Underwater gliders are intelligent and affordable platforms, useful for long-term, multi parameter marine observations. Because of their remotely controlled navigational capabilities and the high spatial and temporal resolution of their measurements in real-time, gliders have been identified to fill gaps existing in the existing ocean observing systems. Along with there rapidly growing importance in purely science driven applications, the implementation of gliders into the Global Ocean Observing System has been recognized as a key point to improve the observational capabilities of the observing systems.

The objective of the GROOM proposal is the design of a new European research infrastructure to use underwater gliders for the benefit of European citizens, researcher, and industry. GROOM will define the scientific, technological and organizational/legal levels, of a European glider capacity for research and sustained observations of the oceans, in line with the other European and international initiatives for marine in-situ observations. The proposal for this new infrastructure strongly relies on EuroARGO and JERICO infrastructures, which are emerging and also considers the relevant international coordinating bodies such as GOOS. The proposed technological infrastructures will be based on several dedicated 'gliderports' to maintain and operate a European fleet of gliders in coordination with US, Canadian, Australian and other similar infrastructures. This new infrastructure would be beneficial for both academic oceanographic research and operational oceanography systems on which a large number of marine activities and societal applications now rely.

European Research Vessels Fleets
Nieuwejaar, Per Wilhelm[1] and Uwe Nixdorf,
[1]Institute of Marine Research/Research Vessel Department, PO Box 1870 Nordnes, 5817 Bergen, Norway.
uwe.nixdorf@awi.de

The European research fleet operators maintains a large and active network which is built up over the past 10-15 years, and in addition a number of tools and methods have been developed to maximize the utilization of the fleets, share knowledge and experiences, and to identify more cost effective ways of designing, building, operating, maintaining and support the research vessels.

Two research vessel operator groups are currently active, one global and one European, in addition EurOcean maintains databases for European research vessels and equipment. Another example of European cooperation and integration of European research vessel fleets is OFEG, a "barter club" for exchange of ship time on large oceangoing vessels.
The EC-funded project Eurofleets is aimed at improving the development and design of future vessels and instruments in addition to developing new tools and methods for a better utilization of the existing fleets and the ERICON Aurora Borealis project to build and operate a polar scientific drilling vessel is another example of European collaboration to develop the future European research vessel fleet.

The balance between demand and supply for research vessels is in most cases acceptable in terms of quantity. The exception is polar research vessels where the demand is much higher than what is available. In terms of quality and functionality there is also a large gap since many of the existing research vessels are old and relatively poorly equipped compared with what the marine science community is asking for and expecting to have access to.

Navigating the Future: linking research challenges and infrastructure needs
Nittis Kostas[1], McDonough Niall and Carbonnière Aurélien.
Marine Board-ESF
[1]Hellenic Centre for Marine Research, Athens-Sounio Ave., PO Box 712 Anavyssos, Attica, GR-190 13, Greece
knittis@ath.hcmr.gr

The Marine Board is currently in the process of producing its Navigating the Future IV position paper. Due for publication in 2012, the position paper will assess future challenges and opportunities associated with the seas and oceans in a European context, and identify associated research priorities and support mechanisms. Drawing from the NFIV

process, this presentation examines how infrastructure needs can be linked with, and support, identified future research challenges, both in the public and private domains.

The Ostend Declaration, adopted at the EurOCEAN 2010 Belgian EU-Presidency Conference (October 2010, Ostend), highlights the need for a long-term, sustainably funded European Ocean Observing System. A number of marine and relevant environmental research infrastructures are already on the ESFRI opportunity list including EURO-ARGO, EMSO, ICOS, SIOS and LIFEWATCH, while needs extending beyond those accounted for by ESFRI are being examined by the EC Expert Group on Marine Research Infrastructures (MRIs). Furthermore, at European level, several projects and initiatives are already in place which will contribute to a truly integrated EOOS, including EMODNET/Marine Knowledge, SEAS-ERA, JPI Oceans, and a range of EC-funded research infrastructure integrating activities (JERICO, EUROFLEETS, EUROSITES) and data related projects (MyOcean, SEADATANET etc.). We must continue to re-evaluate and update our infrastructure needs as the research and societal challenges we face change. Much progress will also depend on Member State commitment and funding, the adoption of novel management and governance mechanisms and the development of strategic collaborations with industry and regional authorities if the planned MRIs are to be delivered.

The role of the Régions in financing infrastructures for marine research

Perissé Damien
Conference of Peripheral Maritime Regions of Europe (CRPM)

What is the added value of the integrated research infrastructures in marine sciences?

Péro Hervé
European Commission, Directorate-General for Research & Innovation, Head of Unit "Research Infrastructures.
Herve.pero@ec.europa.eu

Research Infrastructures (RI) of pan-European interest are notably those listed in the ESFRI Roadmap or by the European Commission within the Integrated Infrastructure Initiatives. Many of these RIs are of distributed nature, which allows the support to strategic networks covering and linking all scientific fields and providing improved research services. Integrating Activities bring together and integrate, on a European scale, key research infrastructures in a given field, in order to promote their coordinated use and development. They provide researchers with a harmonised and optimised access to the best research facilities, independent of where these are located and by whom they are operated. Through Networking Activities and Joint Research Activities, the EU actions help improve, in quality, quantity and cost-effectiveness, the services provided by the infrastructures. Benefits are wide ranging:

- 90% of the users (researchers) estimate that without the EU action they could not have carried out their transnational project at the required level of excellence; integrated RIs also draw their attention to some aspects that may be tempted to neglect: finances, strategy, IPR, or legal aspects
- Integrating activities enable the development of new advanced technologies (e.g. "next generation" detectors, ultra-fast electronics, etc.) and the associated growth of the European technology market, estimated at about 5B€/year, as well as the creation of a new generation of researchers ready to exploit in the best way the essential tools they need
- They not only help structuring the European Research Area, they also foster European governance and the emergence of unique interlocutors on the international arena (e.g. EURO ARGO)
- Integrated research infrastructures allow exchange and training of staff and development of best practices; they support the concept of "open innovation", which is today particularly important, notably for promoting social and user innovation as well as "citizen science"
- Integrated research infrastructures support the development of common European strategies, to be possibly applied worldwide (e.g. EMSO); success is however conditioned by access to state of the art RIs, open platforms, open access to data and well-developed skills.

The past FP5/6/7 have definitely contributed to federating a system of highly visible inter-governmental RIs. However, Europe continues to face the sub-optimal use of resources, the difficult EU-level decision-making process for the launch of new RIs and the risk of not being able to face evolving and ever greater challenges in the future. The need for further EU support remains, even after 10 years of continuous actions. The activities should be targeted in the next Framework Programme towards increased co-ordination and integration efforts among infrastructure stakeholders and the achievement of sufficient critical mass to foster development of key technologies and innovative approaches, and of a correspondingly competitive industry and sustainable society.

Australian initiatives in marine information infrastructure

Proctor Roger[1]
[1]University of Tasmania, Integrated Marine Observing System, eMarine Information Infrastructure, Hobart, 7001 Tasmania, Australia.
roger.proctor@utas.edu.au

The Australian Integrated Marine Observing System (IMOS, www.imos.org.au) is a research infrastructure project to establish an enduring marine observing system for Australian oceanic waters and shelf seas (in total, 4% of the world's oceans). Science plans have been developed for 6 'nodes' – a Bluewater and Climate node and 5 regional nodes (Western Australia, Southern Australia, Tasmania, New South Wales and Queensland) – with datastreams provided through 11 National Facilities. Marine data and information are the main products and data management is therefore a central element to the project's success. A single integrative framework for data and information management has been developed which allows discovery and access of the data by scientists, managers and the public, based on standards and interoperability. All data is freely available. The eMarine Information Infrastructure Facility of IMOS has control over the delivery of these data, which simplifies the information flow. Recently IMOS has taken on the task of developing its information infrastructure to form the Australian Ocean Data Network (AODN, www.aodn.org.au) which aims to become the 'one-stop-shop' for marine data in Australia. This widens the scope of marine data to be published, increases the number of organisations publishing data, and places additional demands on the IMOS information infrastructure. The development from IMOS to the AODN highlights some of the issues in developing a wide, unconstrained data network.

Synergies FP7- Structural funds for Research Infrastructures

Robin Agnès[1] and Profilis Christos.
[1] European Commission, Directorate-General for Research & Innovation, 1049 Brussels, Belgium.
Christos.PROFILIS@ec.europa.eu

The overall objectives of the FP7 Research Infrastructures (RIs) actions (1.7 B€), are:
• Optimising the use and development of the best RIs existing in Europe,
• Helping development in all fields of science and technology new RIs of pan-European interest,
• Maintaining European RIs at the forefront of the advancement of research, and able to help industry to strengthen its base of knowledge and its technological know how.

The Cohesion Policy 2007-2013 aims at:
• Reducing regional disparities,
• Promoting competitiveness, growth and employment,
• Addressing sustainability issues.
The 2 relevant Structural Funds (SFs) are: ERDF, European Regional Development Fund and ESF, European Social Fund (e.g. for human capital).

Despite the different objectives of the funding programmes, their complementary nature and synergies have been explored and proven, e.g. ELI Extreme Light Infrastructure. For RIs to be implemented by 2012, it is necessary to raise interest of national SFs *Managing Authorities* for these projects and to explore and assess the impact of the planned RI facilities on the economy of the region, in particular in terms of creation and development of innovative businesses (including spin-offs, start-ups, etc). For RIs to be implemented after 2013, it is useful to stimulate the *Managing Authorities* to explore the possibility to include them in the future National or Regional Sectoral Operational Programs.

Useful information:
EC Research & Innovation – Research Infrastructures
http://ec.europa.eu/research/infrastructures/index_en.cfm
Practical Guide to EU funding opportunities for Research and Innovation
http://cordis.europa.eu/eu-funding-guide/home_en.html
Future Cohesion Policy
http://ec.europa.eu/regional_policy/what/future/index_en.cfm

The marine perspective of GMES services
Rohn Michael
European Commission - DG Enterprise and Industry, GMES Bureau - Brey 9/207, Av d'Auderghem 45, 1049 Bruxelles
michael.rohn@ec.europa.eu

A general overview of the GMES programme is given and past, present, and future activities of the GMES bureau are outlined.

In GMES leading edge scientific work meets EU policy development which in this combination leads to a complex but at the same time very exciting programme with tremendous opportunity. Besides a long-term strategy for building a knowledge base for policy makers' extreme events suddenly need quick answers and provide also opportunity for explaining the needs and associated investments of such services to the public. From this perspectives important challenges for the GMES bureau are outlined which are important in order to ensure a transition from past and ongoing research activities to the planned future Public Service at European level.

The EMSO scientific perspective
Ruhl Henry
NOC

Society's need for a network of *in situ* ocean observing systems cross many areas of earth and marine science. Here we review the science themes that benefit from data supplied from ocean observatories. Understanding from existing studies is fragmented to the extent that it lacks the coherent long-term monitoring needed to address questions at the scales essential to understand climate change and improve geo-hazard early warning. Data sets from the deep sea are particularly rare with long-term data available from only a few locations worldwide. These science areas have impacts on societal health and well-being and our awareness of ocean function in a shifting climate.

Substantial efforts are underway to realise a network of open-ocean observatories around European Seas that will operate over multiple decades. Some systems are already collecting high-resolution data from surface, water column, seafloor, and sub-seafloor sensors linked to shore by satellite or cable connection in real or near-real time, along with samples and other data collected in a delayed mode. We expect that such observatories will contribute to answering major ocean science questions including: How can monitoring of factors such as seismic activity, pore fluid chemistry and pressure, and gas-hydrate stability improve seismic, slope failure, and tsunami warning? What aspects of physical oceanography, biogeochemical cycling, and ecosystems will be most sensitive to climatic and anthropogenic change? What are natural versus anthropogenic changes? Most fundamentally, how are marine processes that occur at differing scales related?

The development of ocean observatories provides a substantial opportunity for ocean science to evolve in Europe. Here we also describe some basic attributes of network design. Observatory networks provide the means to coordinate and integrate the collection of standardised data capable of bridging measurement scales across a dispersed area in European Seas adding needed certainty to estimates of future oceanic conditions. Observatory data can be analysed along with other data such as those from satellites, drifting floats, autonomous underwater vehicles, model analysis, and the known distribution and abundances of marine fauna in order to address some of the questions posed above. Standardised methods for information management are also becoming established to ensure better accessibility and traceability of these datasets and ultimately to increase their use for societal benefit.. The connection of ocean observatory effort into larger frameworks including the Global Earth Observation System of Systems (GEOSS) and the Global Monitoring of Environment and Security (GMES) is integral to its success. It is in a greater integrated framework that the full potential of the component systems will be realised.

Towards sustained EU marine research and observation infrastructures
Saab Waddah
European Commission, DG RTD

Networking of testing and simulation infrastructures, the Hydralab example
Scholten Herman
Stichting Deltares

Marine knowledge for smart and sustainable growth
Shepherd Iain
European Commission, DG Mare, Maritime Policy in the Atlantic, Arctic, outermost regions

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French policy with respect to marine infrastructures
Stephan Ronan
French Ministry of Research and Higher Education, DGRI

A legal tool for setting up European Research Infrastructures – ERIC
Thies Annika
European Commission, DG RTD B3, B-1049 Brussels

The legal framework for a European Research Infrastructure Consortium (ERIC) has been designed to facilitate the establishment and operation of research infrastructures of European interest with the involvement of several European countries.

Complementing national and inter-governmental schemes, the ERIC Regulation provides a common legal framework based on Article 187 of the Treaty on the Functioning of the European Union (TFEU).

An ERIC is a legal entity with legal personality and full legal capacity recognised in all EU Member States. Its basic internal structure is very flexible, leaving the members to define in the statutes, case by case, membership rights and obligations, the bodies of the ERIC and their competences. The liability of the ERIC's members will generally be limited to their respective contributions.

An ERIC is recognised by the country hosting its seat as an international body or organisation for the purposes of the directives on value added tax (VAT) and excise duties. It also qualifies as international organisation for the purpose of the directive on public procurement.

An ERIC will therefore, under certain limits and conditions, benefit from exemptions from VAT and excise duties on its purchases in all EU Member States and it may adopt procurement procedures respecting the principles of transparency, non-discrimination and competition but not subject to the directive on public procurement as implemented in national law.

Useful information:
http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric

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150 years of Marine Infrastructures, Networks and Resource Centres: From Time Series to Genomes and back again.
Thorndyke Michael
Royal Swedish Academy of Sciences and Gothenburg University, Sven Loven Centre for Marine Sciences, Sweden.

Since the founding of the first marine station in Ostend by Van Beneden in the late 19th Century, Marine Research Stations and Laboratories have been at the forefront on innovation and development in the marine sciences. Van Beneden's lab was established in collaboration with an Oyster Company and he himself was an Anatomist. Marine stations have served as key infrastructures for programmes in research, training and education, and conservation of marine biological diversity. Their successes are reflected in the diversity and scope of research activities they support – from biomedical research and molecular biology and genomics, to experimental and systems ecology and coastal-offshore circulation. There are six areas of research in which marine stations have made, for more than a century, remarkable contributions: (1) The use of marine organisms as models in developmental biology, molecular biology and genetics, biotechnology, neuroscience and pharmacology; (2) the long history of inventorying and monitoring all types of marine organisms, forming a firm basis on which to build a comprehensive study of biogeographic gradients in biological diversity; (3) the spatial facilities that have been developed to study aspects of biodiversity experimentally, ranging from the molecular level to experiments on natural communities in the marine environment; (4) evaluating fish stocks and assisting in developing strategic policies to strengthen the fishing economy in both developed and developing countries;

(5) being responsible for collecting a remarkable time series of baseline data, both biological and geochemical as well as physical against which human impacts can be assessed and (6) providing the infrastructure both to respond rapidly to unexpected events and to study the biological effects of longer-term environmental change. Now as enter the second decade of the 21st Century with its focus on climate change, renewable energy and sustainable ecosystem services marine stations are again in the vanguard of research, training and education.

Sustained ocean observations in support of ocean circulation and climate dynamics research

Visbeck[1] Martin.
[1] Leibniz-Institut fuer Meereswissenschaften (IFM-GEOMAR), Duesternbrooker Weg 20, D-24105 Kiel, Germany.
mvisbeck@ifm-geomar.de

Sustained ocean observation have allowed to address new and pressing research concerned with changes in the basin scale ocean circulation and its role in regional and global climate dynamics. In 1999 during the first OCEANOBS'99 conference the international largely physical oceanographic community came together and outlined global plans and aspirations to establish sustained ocean observations in support of research and routine ocean applications. The plans called for a range of remote sensing assets in space to document the time evolution of seas surface temperature, surface roughness and wind stress, sea surface height, sea ice cover and ocean colour. To complement the space based observations a range of in-situ networks were proposed. The continuation of high spatial resolution XBT lines, a 5-10 year repeat of a number of trans-basin hydrographic surveys, a coordinated set of open ocean and boundary current moorings (OCEANSITES), a global network of profiling floats (Argo) and a global surface drifter program for SST calibration. All observations were a contribution to the global ocean observing system (GOOS) which provides the ocean observations in support of the mandated global climate observing system (GCOS).

In 2009 a the second OCEANOBS'09 conference (www.oceanobs09.net) the accomplishments of the first decade of sustained ocean observations were discussed and plans and aspirations developed to sustain existing observations, complete the plans from 1999 for the physical observing system and include and grow where feasible the observing systems to include more geochemical variable and aspects of the marine biology and ecosystem. OCEANOBS'09 also identified the need to develop a more generic and inclusive Integrated Framework for Sustained Ocean Observations (IFSOO). A group of experts has developed to key elements of such a framework that will be presented.

Ocean circulation and climate dynamics research benefits from long term observations in key locations to supplement the global data base from the Argo network. In order to document long term changes of the oceans meridional overturning circulation a network of deep western boundary current observations was installed over the last decade. Measurements of the strength of the overflows and throughflows have provided a glimpse at the rich dynamics of ocean currents. Near surface flows in the tropical oceans provide key information to support the forecast of seasonal climate variability. New frontiers are the ocean below 2000m depth, ocean margins and the connection to the coastal zone.

US Integrated Ocean Observing System (IOOS®): Delivering Benefits to Science and Society

Willis Zdenka
US IOOS Program Office, 1000 Wayne Ave, Suite 1225, Silver Spring, MD 20910 – United States
Zdenka.S.Willis@noaa.gov

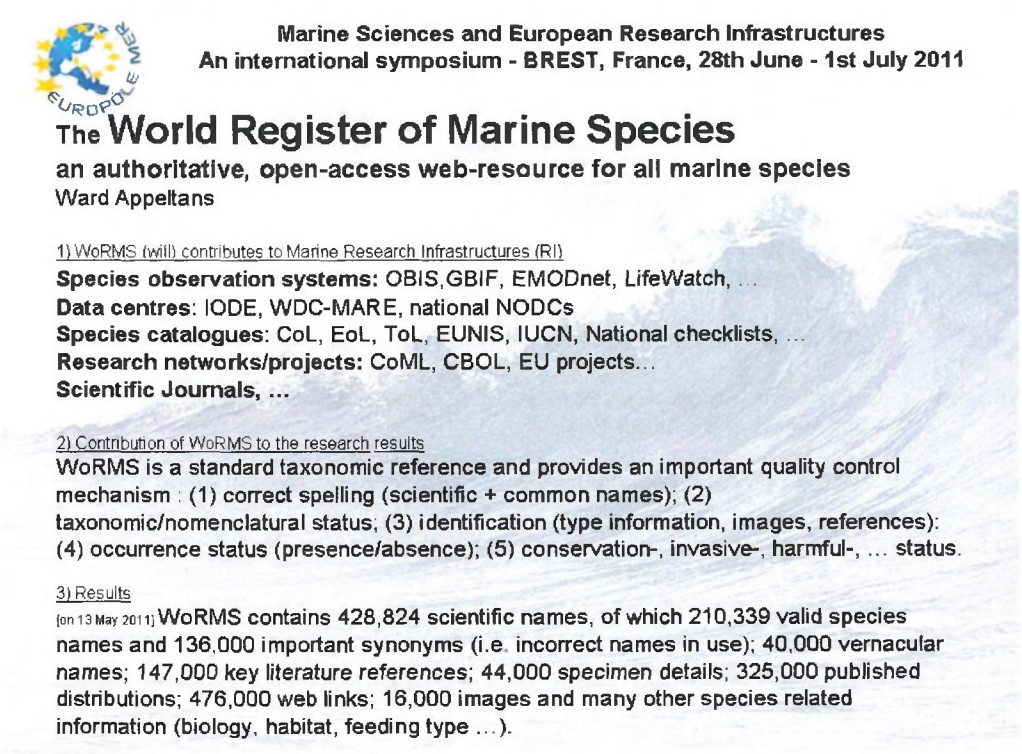
The United States Integrated Ocean Observing System (IOOS®) is a user-driven, coordinated network of people, organizations, and technology that generate and disseminate continuous data about our coastal waters, Great Lakes, and oceans supported by strong research and development activities. IOOS® is our Eyes on our Oceans, Coasts and Great Lakes that enable the United States to track, predict, manage, and adapt to changes in our marine environment and deliver critical information to decision makers to improve safety, enhance our economy and protect our environment. IOOS provides a major shift in the approach to ocean observing by drawing together the vast network of disparate federal and non-federal observing systems to produce a cohesive suite of data, information, and products on a sufficient geographic and temporal scale to support decision-making. Two interdependent components constitute the U.S. IOOS: (1) the global ocean component, and (2) the coastal component. The strength of IOOS is in its partnerships, starting with the federal agencies, the partnerships extend internationally for the global component and to the local level for the coastal component. The coastal component includes the national set of observations for the U.S. Ocean, Coasts and Great Lakes, a network of Regional Associations that are establishing Regional Coastal Ocean Observing Systems (RCOOS) and the Alliance for Coastal Technologies (ACT). The U.S. IOOS is our nation's contribution to the Global Ocean Observing System (GOOS) — the ocean component of the Global Earth Observation System of Systems (GEOSS).

Posters list and abstracts (in alphabetical order)

Posters are listed her by name of presenting author. Co-authors are listed in the abstracts.

APPELTANS Ward	The World Register of Marine Species: an authoritative, open-access web-resource for all marine species.
APPELTANS Ward	Progress towards a European portal on marine species observations.
ARCHAMBEAU Anne-Sophie	The Global Biodiversity Information Facility (GBIF): Free and open access to biodiversity data
BAISNEE Pierre-François	The EUR-OCEANS Consortium and its relevance to European marine infrastructures
BENZIE John	Marine Genomics for Users, a coordination action to promote the knowledge transfer in the marine genomic sector
BOUTTE Christophe	Tara Oceans: A holistic approach to marine biodiversity and ecosystems dynamics
BOUTTE Christophe	BioMarKs: Biodiversity of Marine euKaryotes
BRAULT Patrice	Nke profiling floats update
CANARIO Adelino	The Algarve and the Marine Sciences Centre: A natural infrastructure
CARVALHO Telmo	European marine infrastructures: sharing information for maximising the usage.
CHARRIA Guillaume	French ocean observing system on coastal environment.
COCK Mark	Our shared sea: Mechanisms of ecosystem change in the western Channel
FERRARIS Martina	Pelagia noctiluca temporal evolution and feeding activity in the Western Mediterranean Sea.
GLAVES Helen	Geo-Seas: A pan-European e-infrastructure for the management of marine geological and geophysical data
HAUGAN Peter M	Ocean observatories for understanding and monitoring Arctic change.
HJELM Ulrika	ASSEMBLE: Association of European Marine Biological Laboratories
HOWARTH John	The Irish Sea Observatory
JACOBSEN Anita	Network of leading mesocosm facilities to advance the studies of future aquatic ecosystems from the Arctic to the Mediterranean – MESOAQUA (FP7 - Ga no. 228224)
JACOBSEN Anita	Mesocosm facilities at HCMR, Crete in the eastern Mediterranean.
KOOISTRA Wiebe	The European Marine Biological Resource Centre (EMBRC).
LALLIER François	GDR ECCHIS: The French national network for research on the Biology of Deep-Sea Chemosynthetic Ecosystems
LE RESTE Serge	Bi-directional satellite communications on Argo floats
LECORNU Fabrice	PREVIMER: Coastal Observations & Forecast covering the Bay of Biscay and English Channel
MADDISON Lisa	IMBER, supporting Data Management.

MAMACA Emina	Euro-Argo: A new European Research Infrastructure
MOSTAJIR Behzad	MEDIMEER: LAgrangien Mesocosms Platform (LAMP) and the choice of automated sensors to study the marine plankton food web diversity and functioning under local and global changes. Field tests in the frame of MESOAQUA European project (2009-2012, www.mesoaqua.eu)
PERHIRIN Steven	Development of a quasi-all-optical extension devoted for expandable submarine cabled observatories.
PETERSEN Wilhelm	COSYNA-An Integrated Coastal Observation System for Northern and Arctic Seas
PETERSEN Wilhelm	FerryBox – Nine years of experience of continuous water quality observations along transects in the North Sea
PFEIL Benjamin	Ocean flux and observing systems – the oceanic component of ICOS
QUERON Céline	ShareBiotech: Sharing life science infrastructures and skills to benefit the Atlantic Area biotechnology sector
RUIZ Simón	SOCIB, a new internationally open glider infrastructure in the Balearic Islands.
SCHULZ-STELLENFLETH Johannes	Coastal Observing and Forecasting System for the German Bight. Estimates of Hydrophysical States
SCORY Serge	Synergy between Eurofleets and SeaDataNet: the example of EARS ("Eurofleets Automatic Reporting System") and the "Cruise Summary Report" database.
SMYTH Tim	Marine Infrastructure in the Western English Channel underpinning centennial scale research
THORNDYKE Michael	EuroMarine: Integration of European Marine Research Networks of Excellence
VALERO Myriam	Ecokelp: A multidisciplinary project about ecosystem services and future for kelp forests
VANDEPUTTE Marc	AQUAEXCEL: Aquaculture infrastructures for excellence in European fish research.
WICHOROVSKI Marcin	Integrated Ocean Data and Information Processing System



The World Register of Marine Species: an authoritative, open-access web-resource for all marine species

Appeltans Ward[1], Decock Wim, Vanhoorne Bart, Hernandez Francisco, Bouchet Philippe, Boxshall Geoff, Fauchald Kristian, Gordon Dennis, Hoeksema Bert, Poore Gary, van Soest Rob, Stöhr Sabine, Walter Chad and Costello Mark J.
[1] Flanders Marine Institute (VLIZ), InnovOcean Site, Wandelaarkaai 7, B-8400 Oostende, Belgium
ward.appeltans@vliz.be

The World Register of Marine Species (WoRMS, www.marinespecies.org) is an online database edited by over 200 world-leading taxonomists from 27 countries. In 2007, this database grew out of the European Register of Marine Species (ERMS), and its combination with several other species registers maintained at the Flanders Marine Institute (VLIZ) in the framework of the EU Network of Excellence MarBEF. It now integrates and hosts over 20 global (Cetacea, Porifera, ...), regional (Europe, Antarctica, Canada, ...) and thematic (harmful algae, ...) databases.

WoRMS works with related initiatives to ensure complementarity and makes its content permanently available to readers and to other databases, including the Ocean Biogeographic Information System, the Global Biodiversity Information Facility, Species 2000's Catalogue of Life, and the Encyclopedia of Life. Via our website, web services and full download access, many institutions, national and international data centres and research groups are using WoRMS as their standard taxonomic reference and therefore it provides an important quality control mechanism.

As of 13st May 2011, WoRMS contains 428,824 scientific names, of which 210,339 valid species names and 136,000 important synonyms (*i.e.* incorrect names in use); 40,000 vernacular names; 147,000 key literature references; 44,000 specimen details; 325,000 published distributions; 476,000 web links; 16,000 images and many other species related information (biology, habitat, feeding type ...).

WoRMS is permanently hosted by VLIZ, which has a professional data centre with a strong focus on biological data management. The IPR of WoRMS is governed by the Society for the Management of Electronic Biodiversity Data (SMEBD).

Progress towards a European portal on marine species observations

Appeltans Ward[1], Claus Simon, Vandepitte Leen, Herman Peter, Holdsworth Neil, Maudire Gilbert, Ó Tuama Éamonn, Pesant Stéphane, Schaap Dick, Vanden Berghe Edward, Vladymyrov Vladimir and Francisco Hernandez
[1] Flanders Marine Institute (VLIZ), InnovOcean Site, Wandelaarkaai 7, B-8400 Oostende, Belgium
bio@emodnet.eu

Two years ago, the EU Commission initiated the development of a European Marine Observation and Data Network (EMODnet), which is one of the steps in Europe's integrated maritime policy action plan. The biology part is currently being worked out by a consortium of European government agencies and research institutions and one US partner, and is spearheaded by the Flanders Marine Institute, who is also host of the European Ocean Biogeographic Information System (EurOBIS) and the World Register of Marine Species (WoRMS).

The biology portal (http://bio.emodnet.eu/portal) already contains over 14 million species observations from 281 datasets (from small-scale research projects to long-term monitoring campaigns). According to our inventory, this represents 60% of existing datasets. Not less than 21 thousand species are recorded. According to the European Register of Marine Species (ERMS), this represents 63% of our marine biodiversity. Some groups (e.g. fish, birds ...) and some parts (e.g. English Channel, North Sea...) are better covered than others.

The system is a network of distributed data systems, is OGC-compliant, contains standardized data and integrates data with different levels of accessibility. The portal includes different functionalities, such as an online data catalogue, a data querying service, a taxonomic ontology, a data mapping interface, a data downloading service, a helpdesk and feedback function. Both observation and monitoring data and data products can be integrated, visualized and redistributed through the portal.

This system will also provide essential information on descriptors for Good Environmental Status (GES), currently under development by the EU Marine Strategy Framework Directive.

Marine Sciences and European Research Infrastructures
An international symposium - BREST, France, 28th June - 1st July 2011

The Global Biodiversity Information Facility (GBIF):
free and open access to biodiversity data.

1) Relevant Marine Research Infrastructures (RI)
GBIF has developed an informatics infrastructure to enable discovery and access to biodiversity data.
GBIF supports the formation of a Biodiversity Observation Network under GEO (Group on Earth Observations) to monitor the status and trends of the world's biological resources.

2) Contribution of the RI to the research results
GBIF provides scientific biodiversity data for decision-making, research endeavours and public use.

3) Results
Currently, more than 276 million species-occurrence records are accessible online from over 336 providers.
Using species distribution analyses and ecological niche modelling already helps to demonstrate potential changes in marine biota, based, particularly, on temperature changes. These studies can help inform policy on conservation and fisheries management, e.g., the selection of sites for marine reserves.

The Global Biodiversity Information Facility (GBIF): free and open access to biodiversity data.

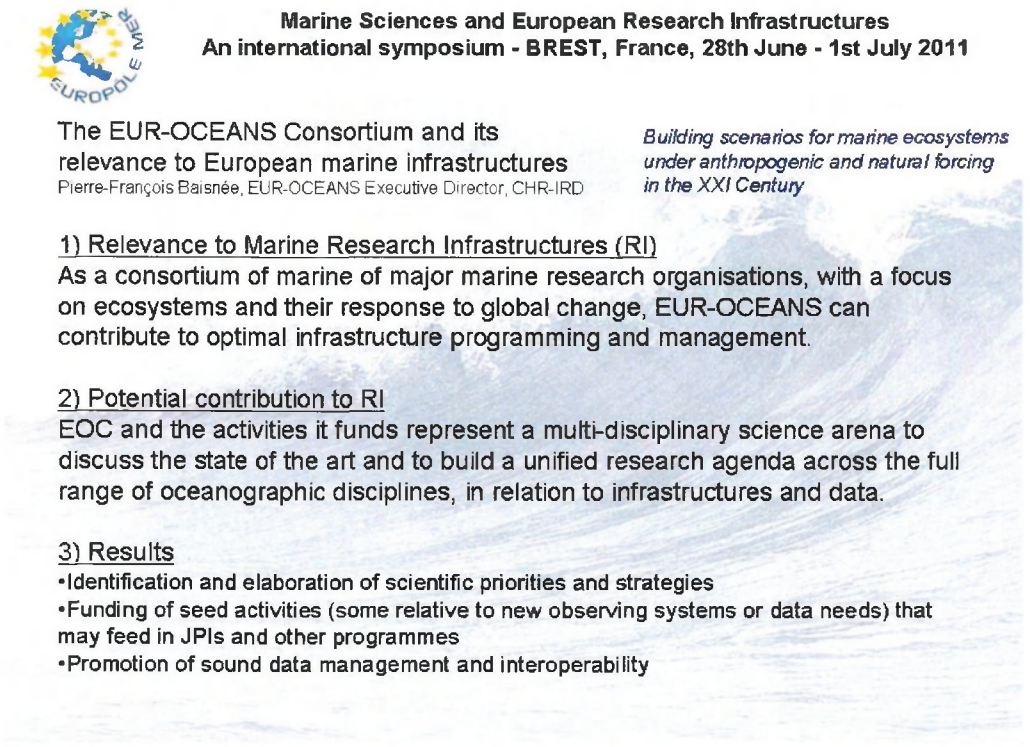
Archambeau Anne-Sophie[1], Chenin Eric, Vignes Lebbe Régine, Akbaraly Michael and Gasc Delphine
[1]GBIF France, MNHN – Géologie, CP 48, 43 rue Buffon 75005 Paris, France.
archambeau@gbif.fr

The Global Biodiversity Information Facility (GBIF, www.gbif.org) is an international organization that is working to make the world's biodiversity data accessible anywhere in the world. Currently, 56 countries and 46 international organizations (including OBIS, SCAR...) share their data and catalyzed agreements on many of the standards and protocols required to make disparate datasets compatible.
Over 265 million of scientific data records from over 12000 datasets from 323 institutions worldwide are now accessible through the GBIF data portal (data.gbif.org). The two types of data currently being shared are:

- Species occurrence records (based on specimens and observations) - information about the occurrence of species at particular times and places.
- Names and classifications of organisms - information on the names (both scientific and common) used for species and on the classification of those organisms into taxonomic hierarchies.

Most of the data shared by the GBIF network can be mapped geospatially, which allows a vast array of analysis. Different web services are also available and can be reused by others applications.
A global biodiversity commons is thus now a reality, allowing access to previously inaccessible records, and analyses which were previously impossible. GBIF also contributes to GEOSS.

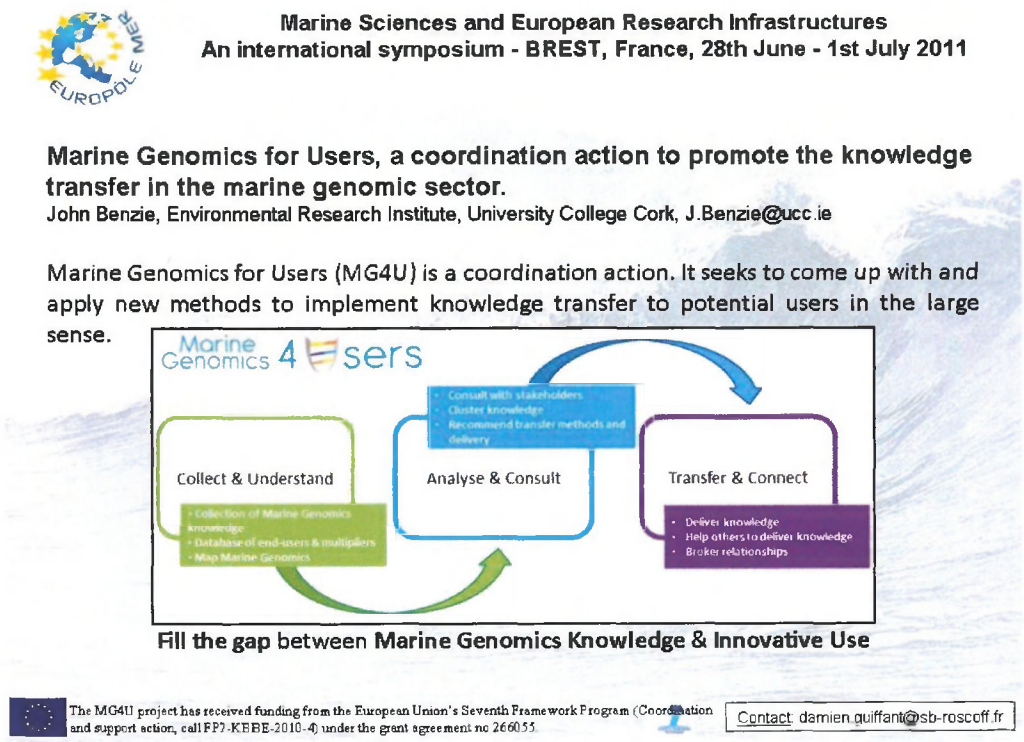
The national GBIF nodes develop tools to enlarge the GBIF activities and help data publishers to connect their data to the GBIF portal. The French node (www.gbif.fr) can be contacted at the following address: gbif@gbif.fr and the following number: +33 (0)1 40 79 80 65.



The EUR-OCEANS Consortium and its relevance to European marine infrastructures

Philippe Cury and Baisnée Pierre-François[1]
[1] EUR-OCEANS Project Office, CRH-IRD, av. J. Monnet, BP 171, 34203 Sète cedex, France
pierre-francois.baisnee@ird.fr

The EUR-OCEANS Consortium (EOC) is a follow-up structure of the former EUR-OCEANS network of excellence (NoE). It gathers 29 research organizations in Europe and beyond. Its focus is on the impact of climate/global change on marine ecosystems and biogeochemical cycles, and the construction of scenarios relevant to the emerging International Platform on Biodiversity and Ecosystem Services (ipBes). The aim of the Consortium is to favour joint initiatives between key Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs) across Europe, to help the community achieve significant progress in marine sciences during the next decades. This is implemented by organising and sponsoring activities which focus on hot topics and can lead to wider European (FP8, JPI…) projects. These activities include Gordon-like conferences, flagship programmes, foresight workshops and public outreach. The EOC can thus contribute to optimal infrastructure programming and management. We will present EOC scientific priorities and highlight some activities under this perspective.



Marine Genomics for Users, a coordination action to promote the knowledge transfer in the marine genomic sector.

Benzie John[1], Guiffant Damien, Murphy David, Obst Matthias, Wesnigk Johanna, Cerda Joan Canario Adelino and Kloareg Bernard.
[1]Environmental Research Institute, University College Cork
J.Benzie@ucc.ie

A number of novel so-called "omics" techniques and derived approaches refer to genomics and metagenomics. To date, the quantity of genomic resources on model marine organisms is becoming highly significant and every year, new applications become available. Applications include improving the efficiency of characterisation and mining of marine diversity for aquaculture, biotechnology products and bio-processes. Marine genomics knowledge also has enormous potential to assist organisations involved in governance and sustainable management of the marine environment and its resources.

This amount of data needs to federate a community of specialist in marine genomics, with the participation of specialists in knowledge management, to promote the field and their potential applications.

To do that, Marine Genomics for Users (MG4U), an FP7 Coordination Action, coordinated by the Station Biologique de Roscoff (CNRS), seeks to come up with and apply efficient methods to implement knowledge transfer to potential users in the large sense. The direct usefulness of marine genomics in terms of the economy and the environment is still often not apparent to political or industrial decision-makers. Moreover, a major part of knowledge in marine genomics is still inaccessible to users, or at least exists in unfriendly-user contexts. The objective of MG4U is to develop a methodology and tools to resolve these difficulties.

Marine Sciences and European Research Infrastructures
An international symposium - BREST, France, 28th June - 1st July 2011

[BioMarKs - Christophe Boutte]

1) Relevant Marine Research Infrastructures (RI)
EMBRC

2) Contribution of the RI to the research results
Sampling facilities: vessels, sampling material, diving
Bioinformatics ressources: calculation and storage

3) Results
Biobank: European biological samples
Imaging and sequencing data
High throughput data analyses process

BioMarKs: Biodiversity of Marine euKaryotes

Boutte Christophe[1], de Vargas Colomban[1] & BioMarKs consortium
[1]Station Biologique de Roscoff, Place Georges Teissier, 29680 Roscoff, France
boutte@sb-roscoff.fr

BioMarKs integrates 8 EU research institutes and 30 EU experts in eukaryotic microbial taxonomy and evolution, marine biology and ecology, genomics and molecular biology, bioinformatics, as well as marine economy and policy, to assess the taxonomic depth, environmental significance, human health and economical implications of the least explored biodiversity compartment in the biosphere: the unicellular eukaryotes or protists. Marine protists are microbial organisms which may build complex (in)organic skeletal structures. They profoundly impact biogeochemical cycles and climate; they have complex genomes with thousands of genes producing molecules which influence marine ecosystem functioning, human health and economy, and which represent outstanding potential for future green energies, pharmaceutics and chemical industries.

BioMarKs will assess protist biodiversity at 3 depths (subsurface, deep-chlorophyll maximum, surface sediment) in 9 EU coastal water sites from Spitzbergen to the Black Sea using massive sequencing. We will use both rDNA and reverse transcribed rRNA general eukaryote and group-specific markers, in order to analyze both diversity and abundance/activity of marine protists at different taxonomic levels. A suite of physical, chemical, and biological metadata from the same samples will allow statistical analyses of the ecological forces shaping marine protist biodiversity.

This general strategy will be used to establish a baseline of protist biodiversity in EU coastal waters, measure biodiversity change in marine protist communities facing ocean acidification, and evaluate the impact of ballast water and pollution on marine protist biodiversity.

The data retrieved in the frames of *BioMarKs* will become the largest world community resource on marine unicellular eukaryotic biodiversity.

Marine Sciences and European Research Infrastructures
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[OCEANS - Christophe Boutte]

1) Relevant Marine Research Infrastructures (RI)
EMBRC

2) Contribution of the RI to the research results
Roscoff Culture collection: reference strains for metagenomics and transcriptomics
Bioinformatics ressources: calculation and storage

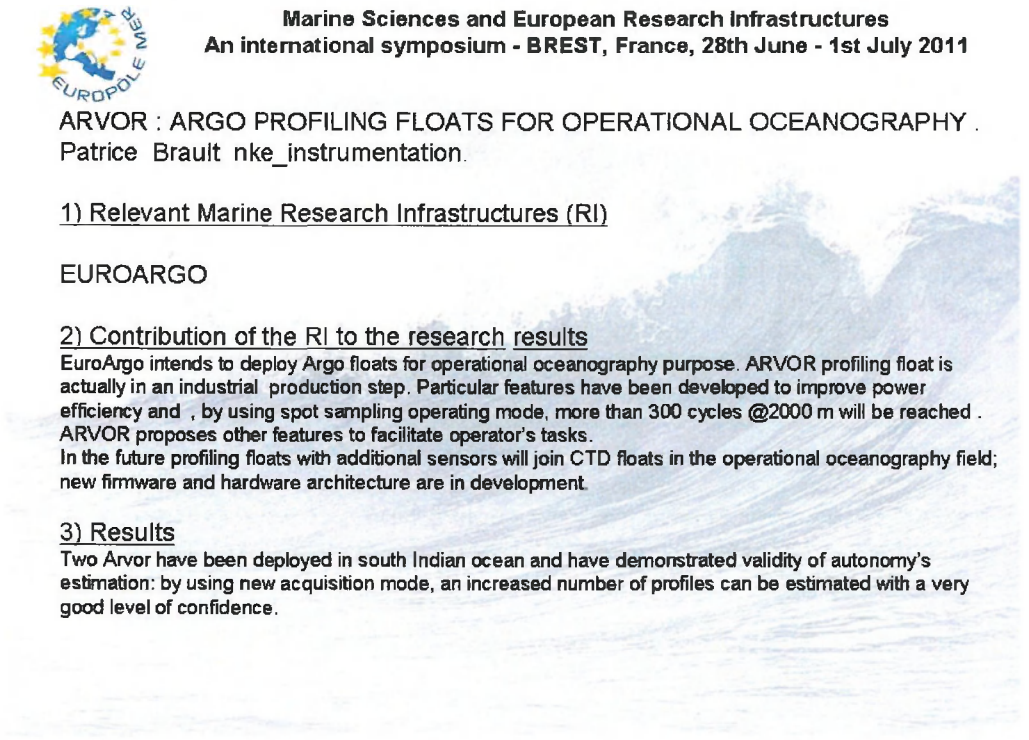
3) Results
Biobank: Worldwide Biological samples
Imaging and sequencing data
Contextual data

Tara Oceans: a holistic approach to marine biodiversity and ecosystems dynamics

de Vargas Colomban[1], Not Fabrice[1], Boutte Christophe[1] & Oceans consortium
[1]Station Biologique de Roscoff, Place Georges Teissier, 29680 Roscoff, France
boutte@sb-roscoff.fr

With biology becoming quantitative, systemic studies are now performed at spatial scales ranging from molecules to ecosystems. In many fields, the biological data generated consistently across scales can be integrated with contextual data (e.g. physico-chemical), for a truly holistic approach, with a profound impact on our understanding of life.

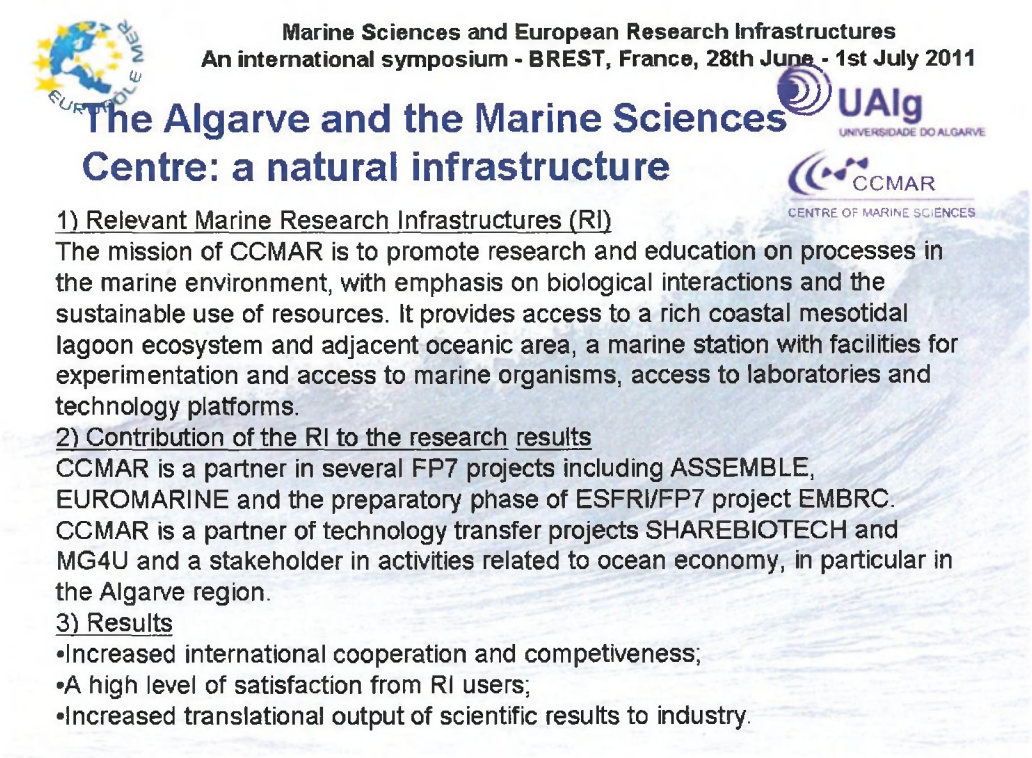
Marine ecosystems comprise the oceans' foodweb, and are crucial in the regulation of our atmosphere's dynamics and overall earth climate. Yet, their organization, evolution and dynamics remain poorly understood. The Tara Oceans Project has been launched in September 2009 for a 3 years exploration of the world's ocean plankton ecosystems aboard the ship TARA. This project is collecting and archiving coherent and comprehensive physico-chemical data sets, oceanographic, ecological and biological samples. Starting as a grassroot initiative of a few scientists, the project has grown into a global consortium of over 100 specialists from diverse disciplines, including oceanography, microbial ecology, genomics, molecular and cell biology, taxonomy, bioinformatics and physical modeling. This multidisciplinary community organizes and analyzes the Tara Oceans project samples and data with the aim of generating coherent, open access data sets, usable for ecosystems modeling and bioinformatics analyses. This initiative offers a roadmap for a new brand of science that requires making sense of vast amounts of data types with different data structures, to develop an integrated ecosystems-level understanding of our Oceans.



nke profiling floats update

Brault Patrice
nke, rue Gutenberg , 56700 Hennebont France
pbrault@nke.fr

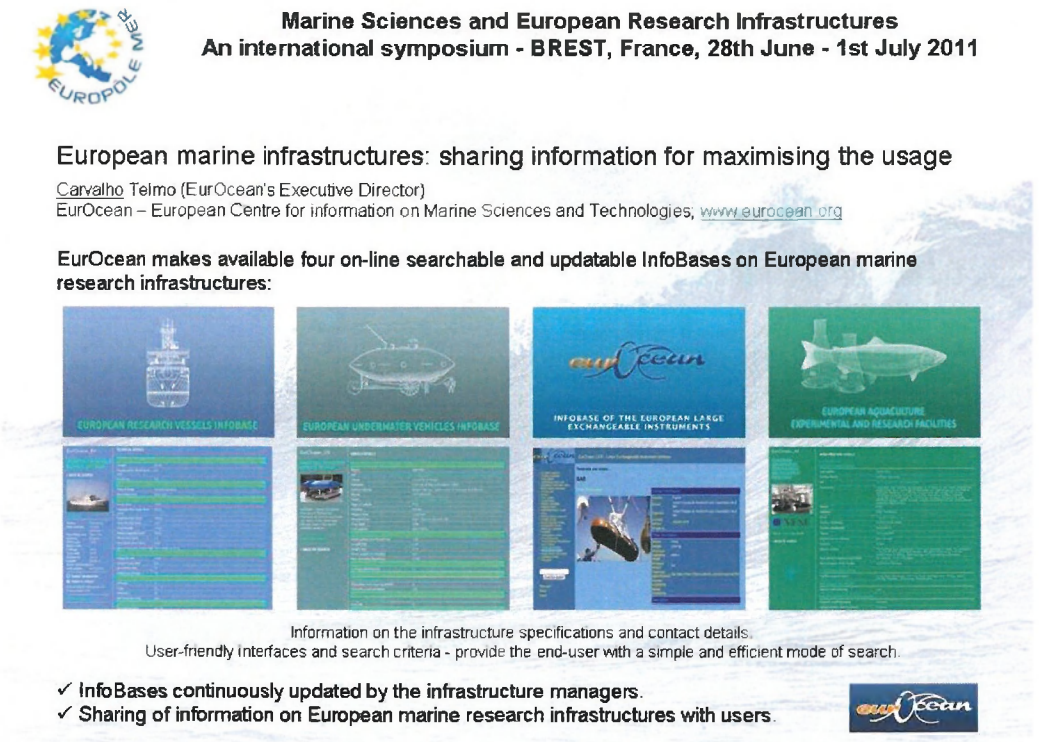
Nke Company manufactures and develops profiling float based on Provor and Arvor technology in industrial partnership with Ifremer since many years. Nke proposes standard Argo profiling floats in TS configuration, but also floats fitted with various sensors. One important feature of the Provor line is to not require preballasting operations before deployment in most parts of oceans. Provor are able to embed additional sensors such as dissolved oxygen and biogeochemical. Battery capability increasing and more powerfull satellite transmission mode are used for additional sensors supply and data collection.



The Algarve and the Marine Sciences Centre: a natural infrastructure

Canario Adelino, Pinto Andreia, Amaral Ana, Power Deborah
[1] Centre of Marine Sciences, University of Algarve, Gambelas, Building 7, 8005-139 Faro, Portugal.
acanario@ualg.pt

The Algarve Centre of Marine Sciences (ccmar.ualg.pt) is a non-profit research organization whose mission is to promote research and education on processes in the marine environment, with emphasis on biological interactions and the sustainable use of resources. It is part of the University of Algarve system and a partner of CIMAR (www.cimar.org), a consortium of recognized excellence status in Portugal. CCMAR features well equipped facilities for investigating marine biological systems at various levels, from biochemistry and molecular biology through genetics, physiology, behavior, ecology and oceanography. Easy access to the unique and extensive mudflats and ponds of Ria Formosa and coastal areas facilitate in situ studies. The Ramalhete Marine Station is a versatile infrastructure with tanks to keep to keep live organisms and large outdoor mesocosms. Ria Formosa, a unique coastal mesotidal lagoon, separated from the ocean by a system of barrier islands and inlets, with very high biodiversity and an ideal natural laboratory protected by national and international legislation. CCMAR serves as infrastructure for students and scientists from universities and institutes throughout Europe and is part of European initiatives providing user access to special facilities and biological models such as Assemble and EMBRC. CCMAR serves as a technological platform for innovative companies and has a strong outreach activity with schools and the wider public.



European marine infrastructures: sharing information for maximising the usage.

Carvalho Telmo (EurOcean's Executive Director)
EurOcean – European Centre for information on Marine Sciences and Technologies, Av. Dom Carlos I, Nº 126, 2º, 1249-074, Lisboa, Portugal.
eurocean@fct.mctes.pt

EurOcean is a focal point for information on marine science and technology in Europe and its Internet portal is aiming to provide information on topics related to marine science and technology in Europe having as one of its priorities, since 2002, to promote the exchange of information on European marine research infrastructures. In this context EurOcean assessed some of the major gaps of information on this field and tried to overcome them by developing interactive tools of support to marine policy and decision makers and the scientific community.

EurOcean has 4 on-line searchable and updatable infobases on European marine research infrastructures with information on the infrastructure specifications and contact details. The user-friendly interfaces of the infobases and its search criteria provide the end-user with a simple and efficient mode of search.

The EurOcean_RV InfoBase has information on 261 European research vessels operating in Europe and abroad, from the coastal to high seas (≥ 10 meters). It also includes information on planned and under construction vessels (6) and out of service vessels (40).

The EurOcean_UV InfoBase has information on 87 underwater vehicles used in Europe for scientific research, divided into four categories: Remotely Operated Vehicles (ROVs, 46); Autonomous Underwater Vehicles (AUVs, 19); Manned Submersibles (19) and Others (3).

The EurOcean_LEXI InfoBase has information on 97 large exchangeable instruments available for marine research in Europe, divided into 27 different categories.

The EurOcean_AF InfoBase has information on 56 European aquaculture experimental and research facilities. Exclusive freshwater facilities are not included in the infobase.

Marine Sciences and European Research Infrastructures
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French ocean observing system on coastal environment
Inter-Institute Working Group (IFREMER, INSU, SHOM, Météo-France, CETMEF)
(presented by Guillaume Charria)

1) Relevant Marine Research Infrastructures (RI)

FP7 Integrated Research Infrastructures – JERICO (France)
French National Coastal Observation Network - RESOMAR

2) Contribution of the RI to the research results

The JERICO RI will promote the pan-European network for exchanges and best practices. This will be the contribution to future research.

3) Results

Project to be built in the next months for the future of coastal operational oceanography

French ocean observing system on coastal environment

Charria Guillaume, Inter-Institute Working Group (IFREMER[1], INSU, SHOM, Météo-France, CETMEF).
[1] IFREMER, BP70, 29280 Plouzané, France.
guillaume.charria@ifremer.fr

In the frame of the coastal operational oceanography, different observing networks are implemented in coastal seas along the French coasts (Channel, Bay of Biscay and Mediterranean Sea). The Channel and Bay of Biscay Ocean Observing System on Environment (CBOOSE) and the Mediterranean Ocean Observing System on Environment (MOOSE) aim to monitor and to characterize the coastal hydrodynamics coupled with the environment (ecosystems, sediment transport, and water quality). The observing network is developed in agreement with the European strategy through the JERICO, FP7 European project and collaborations with European countries (e.g. Spain, Italy).
This system includes fixed stations (moorings, measurements of profiles on the whole water column, waverider buoys, and meteorological buoys), sensors on board ships of opportunity (Recopesca sensors on fishing boats and ferry boxes on cruise ships), HF radar, tide gauges, gliders, and coastal profilers. The platform ensemble is explained by a need to acquire long term time series (at high frequency) and spatial information to describe the 3D structures of coastal processes.
The networking of observation systems acquired through several independent projects and dedicated sensor purchase, coordinated between institutes, for sustained monitoring allows getting an improved global view of the coastal hydrodynamics, providing a more efficient monitoring of coastal seas, improving the numerical experiments for the ocean forecast.

Our shared sea: mechanisms of ecosystem change in the western Channel

Cock Mark[1], Colin Brownlee, Tim Smyth, Ian Probert, Frédérique Viard, John Bishop, Susana Coelho, Richard Pipe and Thierry Pilorge.
[1] Station Biologique de Roscoff – CNRS, Place Georges Tessier, 29680 Roscoff, France.
cock@sb-roscoff.fr

The English Channel is highly influenced by human activities through intense shipping traffic, fishing, aquaculture, recreational activities and coastal urbanisation. These human activities pose a range of challenges to sustainable development for both offshore and coastal areas, such as the impact of climate change and the issue of invasive species. Marinexus brings together research laboratories, outreach structures and tourism structures in Roscoff and Plymouth with

two aims: examining the response of marine ecosystems and species to human activity in the English Channel, and communicating the information generated by these studies to the public. To achieve these objectives, a central aspect of Marinexus is a joint research project based on the sharing of data by laboratories in the two sites. These datasets are obtained in the course of the project or comes from long term monitoring programs. They are used to provide insights into the effects of human activity over recent decades. The project has a synergistic effect on research programs in Roscoff and Plymouth by generating highly complementary datasets and expertise, by facilitating access to a broad range of ecosystems and by allowing the sharing of state-of-the-art tools between research groups. The objective of Marinexus outreach is to raise public awareness of the changes and the adaptations occurring in marine ecosystems. Outreach is not only aimed at the general public, but also at more specific public (schools, stakeholders...), and enable the latter to make informed decisions in order to promote sustainable marine development.

***Pelagia noctiluca* temporal evolution and feeding activity in the Western Mediterranean Sea**

Ferraris Martina[1], Daeden Jonathan, Stemmann Lars, Irisson Jean-Olivier and Gorsky Gabriel
Université Pierre et Marie Curie -Paris 6, UMR9073, Observatoire Océanologique de Villefranche sur Mer, BP 28, 06234 Villefranche sur Mer, France BP 28, 06234 Villefranche sur-Mer.
martina.ferraris@obs-vlfr.fr

This work was undertaken in the framework of the French regional project JELLYWATCH. The aim of this project is to contribute to the understanding of massive proliferation, aggregation, drift and biology of the Scypho medusa *Pelagia noctiluca* in the NW Mediterranean Sea. *In situ* observations, hydrodynamics, and IBM models will be used to achieve the projects'objectives.

Literature data will be used to reconstruct the long term evolution of this species and will be compared to the hydroclimatic conditions and zooplankton monthly time series in the Ligurian Sea.. The hypothesis that the presence of *P.noctiluca* is associated to years of high plankton concentration and dry climatic conditions will be tested. Here we report on 1) the P. noctiluca long time series and 2) the laboratory feeding experiments and motility observations carried out on young *P.noctiluca* and on ephyrae.

Future research infrastructures must include the use of closed 10m depth circuit aquariums where we can control hydrological parameter (pH, T°C, S‰, O2, light, pressure) and generate the natural effects (thermocline, oxycline, turbulence, etc). These aquariums will be equipped with integrated video cameras that allow the assessment of their behavior (prey predator interactions, swimming speed, ...) and will help to understand their impact on the pelagic ecosystem). The aim is to provide access within EMBRC pan-European program to models of jellyfish organisms.

Geo-Seas: a pan-European e-infrastructure for the management of marine geological and geophysical data.

Glaves, Helen[1] on behalf of the Geo-Seas consortium
[1]British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK
hmg@bgs.ac.uk

Geo-Seas is an Integrated Infrastructure Initiative (I3) project within the EU Framework 7 (FP7), its overall objective being to build and deploy a unified e-infrastructure which will facilitate the sharing of harmonised marine geoscientific data within Europe. This e-infrastructure will provide on-line access to discovery metadata and the associated federated marine geological and geophysical data and data products held by 26 national geological surveys and research institutes across Europe using a dedicated Geo-Seas portal. This will allow end users to locate, assess and access standardised marine geoscientific data from multiple sources which is also interoperable with other data types and which will in turn facilitate the multidisciplinary use of geoscientific data in combination with other data types. Common data standards will be implemented across all of the data centres and other geological and geophysical organisations will be encouraged to adopt the protocols, standards and tools which are developed as part of the Geo-Seas project.

Geo-Seas is building on the work done by the existing SeaDataNet project which currently provides a data management e-infrastructure for oceanographic data which allows users to locate and access federated oceanographic data sets. By adopting and adapting the SeaDataNet methodologies and technologies the Geo-Seas project will not only avoid unnecessary duplication of effort by reusing existing and proven technologies but will also facilitate multidisciplinary ocean science across Europe through the creation of a joint infrastructure for both marine geoscientific and oceanographic data.

Ocean observatories for understanding and monitoring Arctic change

Haugan Peter M[1], Hanne Sagen and Stein Sandven.
[1] Geophysical Institute, University of Bergen, Allegaten 70, N-5007 Bergen, Norway.
Peter.Haugan@gfi.uib.no

The Fram Strait between Svalbard and Greenland is the major oceanic pathway between the Arctic Ocean and lower latitudes. Moorings, repeat sections and stations constitute the backbone of the traditional observing system in the area. However the spatial and temporal coverage is limited. An acoustic tomography array and deep sea gliders are presently used in an experimental configuration providing data also from partially sea ice covered regions. In the future, continuous interactive presence from the shelf to the deep sea could be obtained via seafloor cabled observatories such as planned in the Norwegian COSMOS project. Integration with both EMSO and SIOS including national projects offers opportunities for gradual introduction of new observation technology from the Svalbard area into the deep Arctic Ocean. This opportunity should not be missed if we want to document the ongoing and expected changes in the physical, chemical and biological environment as climate change and regional human activities develop.

Marine Sciences and European Research Infrastructures
An international symposium - BREST, France, 28th June - 1st July 2011

ASSEMBLE, Michael Thorndyke, Niklas Andersson

ASSEMBLE is an EU FP7 research infrastructure project comprising a network of marine research stations. ASSEMBLE partners are developing an integrated infrastructure to optimize the possibilities for European scientists to excel in research using the most advanced approaches in modern biology.

The fundamental objectives are to enhance trans-national access to existing key infrastructures for marine sciences and improve these infrastructures with respect to the provision of marine model organism.

Networking - To increase coordination between marine stations both within and outside of the ASSEMBLE network.
Research - To improve the quality of provision of marine organisms with emphasis on models for marine genomics.
Transnational Access - To provide access to a comprehensive set of marine ecosystems, to a wide variety of marine organisms, and to state-of-the-art experimental facilities, technological platforms, research vessels etc.

ASSEMBLE - Association of European Marine Biological Laboratories

Hjelm Ulrika
University of Gothenburg, The Sven Lovén Centre for Marine Sciences, S-451 78 Fiskebäckskil, Sweden
ulrika.hjelm@loven.gu.se

Since the late 19th Century marine research stations have acted as international infrastructure sites to serve, enhance and develop collaborative marine research worldwide. Now the major marine research stations in Europe are developing new technologies and facilities that allow a higher quality of service, not only for the marine biologist community but also for other disciplines, like scientists that are turning to marine organisms as models.

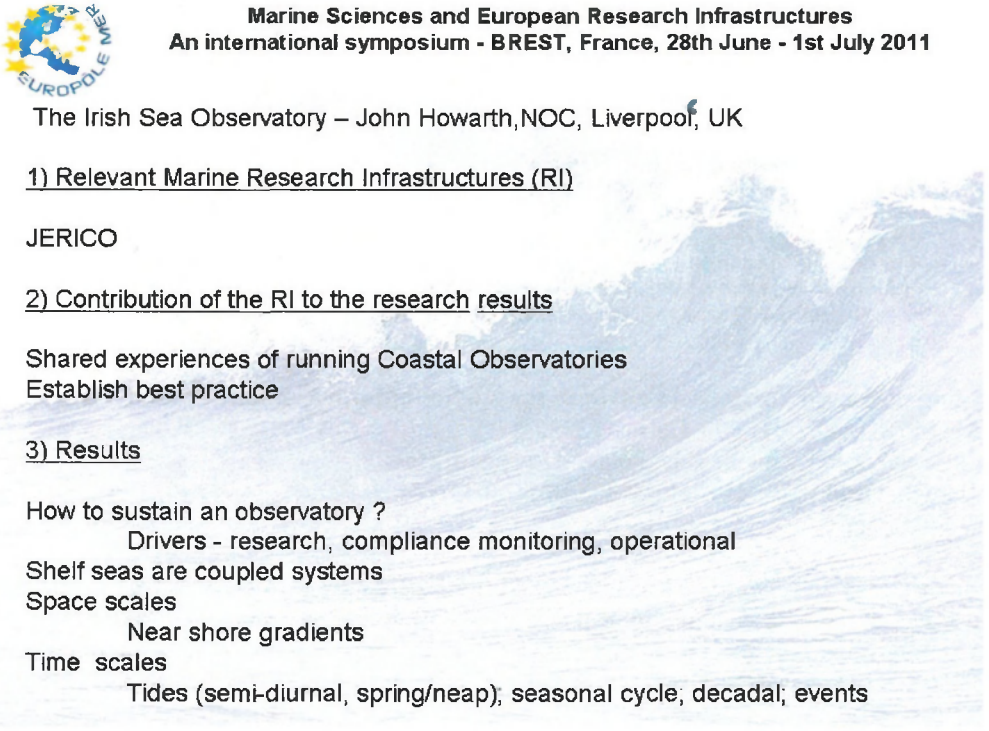
ASSEMBLE is an EU FP7 research infrastructure project comprising a network of marine research stations. ASSEMBLE partners are developing an integrated infrastructure to optimize the possibilities for European scientists to excel in research on marine ecosystems and marine biological models using the most advanced approaches in modern biology.

The fundamental objectives are to enhance trans-national access to existing key infrastructures for marine sciences and improve these infrastructures with respect to the provision of marine model organism. To this end this initiative comprises the following activities.

Networking
To increase coordination between marine stations both within and outside of the ASSEMBLE network. This includes organizing workshops, establishing a virtual tool-box of best practice guidelines as well as a common database for marine organisms.

Research
To improve the quality of provision of marine organisms with emphasis on models for marine genomics; this includes multi-cellular organisms, unicellular eukaryotic organisms and cell lines as well as genetic and molecular resources.

Transnational Access
To provide access to a comprehensive set of marine ecosystems, to a wide variety of marine organisms, and to state-of-the-art experimental facilities, technological platforms, research vessels etc.



The Irish Sea Observatory

Howarth John[1] and Palmer Matthew
[1] National Oceanography Centre, Joseph Proudman Building, 6 Brownlow St.,
Liverpool L3 5DA, UK
mjh@noc.ac.uk

An observing system has been maintained in the Irish Sea since August 2002 largely funded by research money. The objectives were

To understand, through effective continuous measurement and modelling, a coastal sea's response to natural and anthropogenic forcing.

To provide a framework for research into the functioning of a shelf sea in a changing climate.

The system, which is contributing to JERICO, consists of a combined set of measurements and numerical models. The measurements include in situ (two moorings, tide gauges, a meteorological station), a CTD / water sample grid visited eight times a year, an HF radar system and an instrumented ferry. As funding for the observations is now being reduced, emphasising the difficulty of maintaining sustained measurements, scientific benefits of the observatory can be reviewed.

Time series are valuable and scarce in the sea. 8.5 years is ample for determining seasonal cycles, for instance of temperature, but too short for longer variability, for instance of salinity, or for the statistics of events. The measurements were focussed on Liverpool Bay where it has become apparent that the important region close to the coast (less than 10 km), where the fresh water from rivers (principally the Dee, Mersey and Ribble) mixes with a macro-tidal sea, was under-sampled.

Network of leading mesocosm facilities to advance the studies of future aquatic ecosystems from the Arctic to the Mediterranean – MESOAQUA (FP7 - Ga no. 228224)

Jacobsen Anita[1], Berger Stella, Simonelli Paolo and Lappegård Heidi.
[1] University of Bergen, Department of Biology, PO Box 7803, N-5020 Bergen, Norway.
Anita.Jacobsen@bio.uib.no

In marine ecology there is an urgent need to understand the functioning of the lower part of the pelagic food web, its response to and effect on climate change, its response to pollution and environmental toxins, and its role in producing food for commercially important species at higher trophic level. This requires access for European scientists to tools allowing experimental approaches to near-natural pelagic systems. To meet this need, the MESOAQUA network of European marine mesocosm facilities will:

- Offer European researchers access to a range of mesocosm facilities in contrasting environments
- Develop and test new technologies that allow access to off-shore environments
- Improve the services of the facilities by exchange of technology and experience
- Facilitate cross-disciplinary fertilisation and a better coordination of mesocosm research
- Promote the training of young scientists in the use of experimental ecosystem research

MESOAQUA is a network of 6 partners located in different coastal regions throughout Europe from the Mediterranean Sea to the Arctic Ocean; University of Bergen, Norway • Leibniz Institute of Marine Science, Germany • CNRS-ECOSYM, University of Montpellier 2, France • Hellenic Centre for Marine Research, Greece • Umeå University, Sweden • Kings Bay Marine Laboratory, Norway.

The network provides new opportunities for scientists to undertake important investigations by considering natural gradients in environmental parameters such as temperature, salinity, and eutrophication. By development and testing of two alternative free-floating constructions, MESOAQUA will advance state-of the-art in mesocosm technology, thereby expanding the range of accessible environments to the open ocean.

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The mesocosm facilities of HCMR- Crete in the eastern Mediterranean
Anita Jacobsen

1) Relevant Marine Research Infrastructures (RI)
Land based concrete tank (300m^3) allowing for individual mesocosms up to a volume of 5m^3 with temperature control, offering experimentation opportunities at the ecosystem level.
Facility is complemented by access to the full use of HCMR equipment and laboratories including the research vessel (R/V Philia).

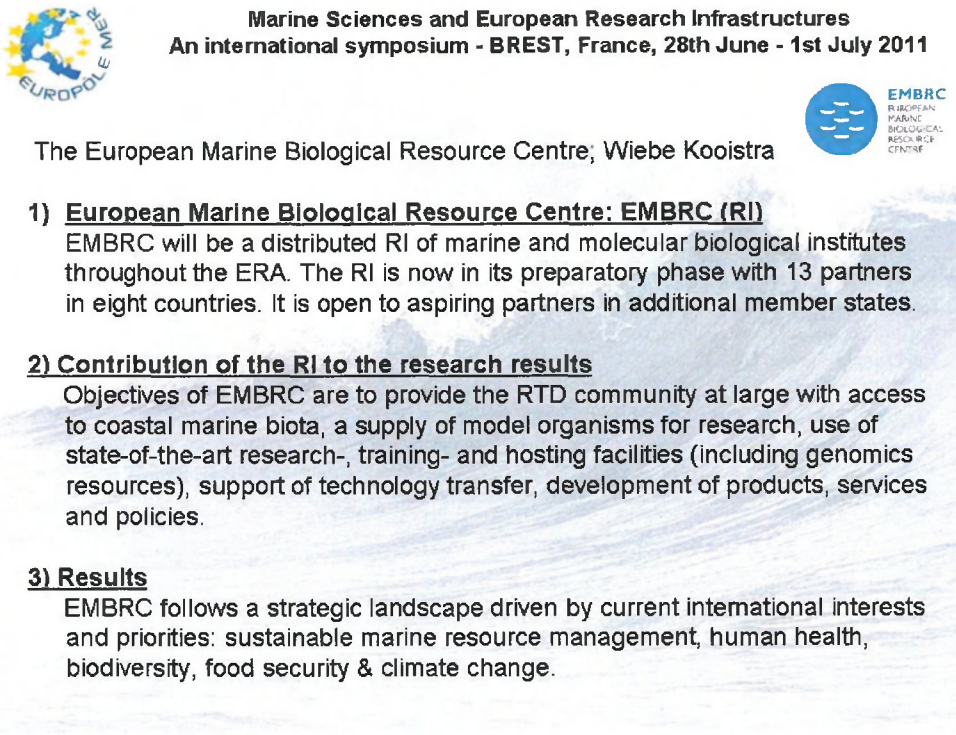
2) Contribution of the RI to the research results
So far 2 experiments have been conducted and 3 more are planned in 2011-2012.
37 Scientists have participated in these experiments of which 18 were funded directly by the MESOAQUA project.

3) Results
11 publications are planned resulting directly from the experiments conducted at the R.I. Three of these are already at the final stages of preparation.
Plans for the construction of a second concrete tank are underway allowing for further modifications of environmental factors (e.g. temperature, light).

Mesocosm facilities at HCMR, Crete in the eastern Mediterranean

Pitta Paraskevi[1], Tsagaraki Tatiana M.[1] and Jacobsen Anita[2]
[1]Institute of Oceanography, Hellenic Centre for Marine Research, P.O. Box 2214, 71003 Heraklion, Crete, Greece
[2]Department of Biology, University of Bergen, P.O. Box 7800, N-5020 Bergen, Norway, Anita.Jacobsen@bio.uib.no

The mesocosm facilities in Crete consist of a large concrete land-based tank with a 300 m^3 capacity and 5 m depth. The size of the tank allows for individual mesocosms having a volume of up to 5 m^3 while temperature is controlled through water flow in the large tank. This capacity enables experimentation at the ecosystem level and has already been used to this end during the Nutritunnel project in September 2009. The experiment aimed at examining whether phosphate addition in phosphate limited areas results in zooplankton biomass increase through alternative pathways, bypassing the phytoplankton biomass increase. In September 2010 the tank was used again during the LIGHTMIX project looking at the function of mixotrophic grazers under a range of light conditions. Future plans include participation in mesocosm experiments on ocean acidification in the framework of the MedSeA project which will include CO_2 enrichment and temperature manipulation. Plans are also underway to construct a second concrete tank for the needs of the aforementioned project. Currently, the facility is part of a mesocosm network in the framework of the MESOAQUA project which provides access to mesocosm installations, joint research opportunities and exchange and dissemination of know-how on mesocosm research.



The European Marine Biological Resource Centre (EMBRC)

Kooistra Wiebe[1], Fernandes Sandra, Di Lauro Roberto, Brown Euan, Kloareg Bernard, Johnston Ian, Canario Adelino, Portner Hans and Thorndyke Mike.
[1] Stazione Zoologica Anton Dohrn (SZN), Villa Comunale, 80121 Napoli, Italy.
info@embrc.eu

EMBRC is one of 13 Research Infrastructures (RI) on the Biological and Medical Sciences (BMS) ESFRI thematic working group roadmap http://ec.europa.eu/research/infrastructures/index_en.cfm. It will develop a high-level research infrastructure in marine biology through provision of marine models, "omics platforms" and other state of the art technology. EMBRC entered the preparatory phase (ppEMBRC) February 2011 with 3 years funding from the European Commission. The current partners are the Stazione Zoologica Anton Dohrn (coordinator), Gothenburg University, CNRS and UPMC with the Marine Stations of Roscoff, Villefranche and Banyuls, the Scottish Association of Marine Science, the University of St Andrews and the Marine Biological Association of the UK, the University of the Algarve, the Alfred-Wegner Institute for Polar and Marine Research, the Hellenic Centre for Marine Research, the Sars Centre and the European Molecular Biology Laboratory. ppEMBRC will identify the key scientific and technological themes relevant to EMBRC through workshops, outreach and recommendations from an International Advisory Board and a Reference User Group. Existing capacities and future infrastructure needs will then be established within each of the identified themes. EMBRC forms a bridge between the ESFRI BMS and ESFRI Environmental Sciences. It will contribute to creation of excellence needed to achieve the goals established in the "Europe 2020 Strategy" and the "2010 ESFRI Roadmap." EMBRC searches aspiring partners in relevant ecological/geographical locations and scientific areas not yet covered. Aspiring partners can participate in ppEMBRC and become full members during the construction (2014-2019) and operational phases (2016-2041).

Marine Sciences and European Research Infrastructures
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GDR ECCHIS : the french national network for research on the Biology of Deep-Sea Chemosynthetic Ecosystems
François H. Lallier – UPMC/CNRS – Station Biologique de Roscoff

1) Relevant Marine Research Infrastructures (RI)
•Leaders of oceanographic cruises using vessels and submersibles that are part of the **EUROFLEET** infrastructure
•involved in the emerging deep-sea floor observatories, NEPTUNE and MOMAR, the latter coordinated within the framework of **EMSO**
•active players of the past **Marine Genomics Europe** NoE, and present **MG4U** and **EuroMarine** networks
•contributors to **GBIF** and **WoRMS**

2) Contribution of the RI to the research results
We DO perform in situ analyses and collect biological samples from deep-sea chemosynthetic ecosystems...

3) Results
We analyze biological samples in the context of phylogeography, evolution biology, and adaptive biology at various levels of biological organization, from ecology to structural biology

GDR ECCHIS : the French national network for research on the Biology of Deep-Sea Chemosynthetic Ecosystems

Lallier François[1], Sarradin Pierre-Marie, Godfroy Anne and Higuet Dominique
1 UPMC & CNRS UMR 7144, Station Biologique de Roscoff, 29680 Roscoff, France
lallier@sb-roscoff.fr

Gathering more than an hundred french scientists working on various aspects of deep-sea chemosynthetic ecosystems, from ecology to structural biology, the Ecchis network is a substantial user of many Marine Research Infrastructures. Of course, dealing with deep-sea ecosystems means that we organize and/or participate to several oceanographic cruises every year, using vessels and submersibles that are part of the EUROFLEET infrastructure. Our feedback as scientific users helps improve these essential tools in the exploration of deep-sea floor, still largely unknown. We are also involved in the emerging deep-sea floor observatories, NEPTUNE and MOMAR, the latter coordinated within the framework of EMSO. Designing chemical sensors and long-term video acquisition devices that are relevant to biological studies increases the potential outcome of these observatories. Chemosynthetic ecosystems such as deep-sea hydrothermal vents and cold seeps are extreme environments where life paradoxically flourishes. Analysing biological samples in the context of phylogeography, evolution biology, and adaptive biology, we have been active players of the Marine Genomics Europe NoE and we continuously rely on sequencing infrastructures (e.g. GENOSCOPE) to gain primary genomic data. In addition to several extremophilic Archaea and Bacteria, animal models such as the Pompei worm *Alvinella pompejana*, or the Bathymodiolin mussels and their associated microbial symbionts are under detailed investigation. The EMBRC initiative will undoubtedly serve our objectives. Deciphering the adaptive strategies of these biological models down to the molecular level includes structural biology studies and use of synchrotron facilities.
The GDR ECCHIS (www.sb-roscoff.fr/Ecchis) is funded by Ifremer and CNRS, and supported by UPMC, MNHN, and UBO.

PREVIMER – Coastal Observations & Forecast covering the Bay of Biscay and Englsih Channel

Lecornu Fabrice[1].
[1] Ifremer, Centre de Brest, BP 70, 29280 Plouzané, France
Fabrice.Lecornu@ifremer.fr , info@previmer.org

Introduction
Since mid-2006, the PREVIMER website, www.previmer.org, provides information relevant to the general public and the professionals about the coastal environment, along the French coastlines bordering the English Channel, the Bay of Biscay, and the Mediterranean Sea.

This pre-operational system is based on observation data and numerical modelling which provide users with 4 to 6 day forecasts of sea states, currents, sea water levels, temperatures, salinity, primary production and nutrients. Scales range from the continental shelf to the bay, with a capacity for zooming-in to specific areas. All observations and results are available on the website.

A large number of numerical models

An increasing number of biological parameters is gradually completing this overview of coastal environment, and a 6-day forecast is already available on some sea state variables.

The emphasis is put on validating the maps produced, and their qualification by experts in the field, leading to the implementation and development of a coastal forecasting service, following the examples of meteorology, and more recently, of oceanic circulation.

PREVIMER already generates modelling results and displays in-situ and remote sensing data on diverse themes, through the following areas:

- English Channel, Bay of Biscay and Western Mediterranean circulation model,
- High resolution Circulation in Iroise Sea,
- High resolution Sea State and wave agitation parameters along the French Atlantic coast,
- Primary Production in the Bay of Biscay, ...

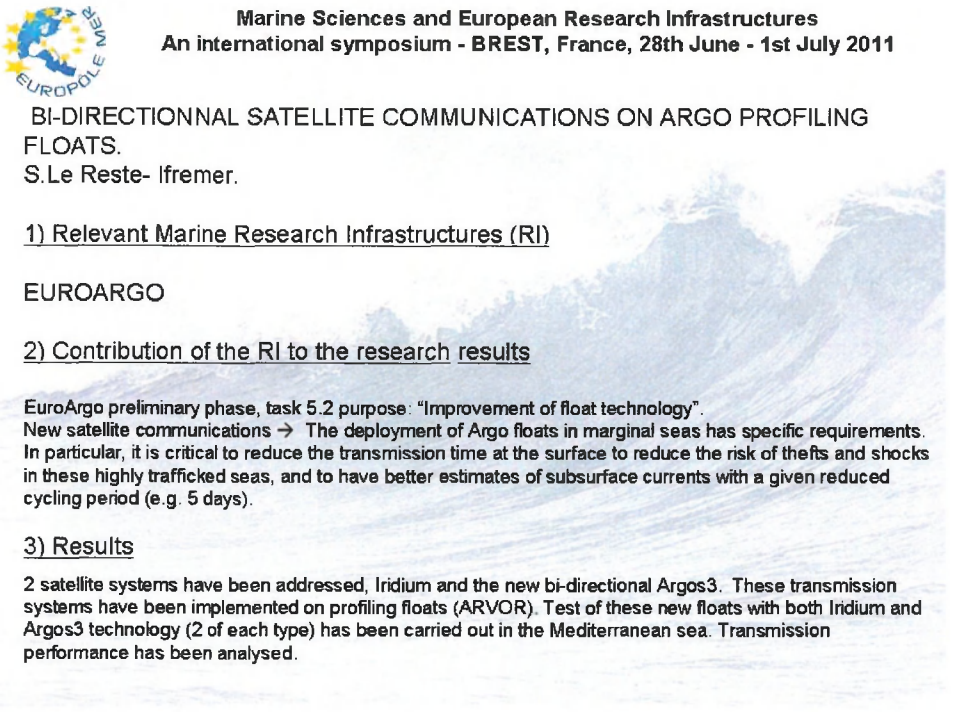
Observation systems and Research contribution

PREVIMER also contributes to the R&D of dedicated observation tools (buoys and autonomous sensors, some on ships of opportunity, coastal profilers, towed profiler, ferrybox, ...) and helps some experimental devices to become operational, especially over the Bay of Biscay and English Channel which acts as a testbed.

Mixing data and forecast will produce, for numerous marine leisure and activities, various indicators ranging from thematic comfort indices to actual warning maps. The continuous production of synoptic information and analyses builds progressively a coastal climatology, which constitutes a needed database for a rapid and secure detection of anomalies in the physical or biogeochemical environment, and to mitigate their consequences for the marine and maritime business.

Acknowledgements and services

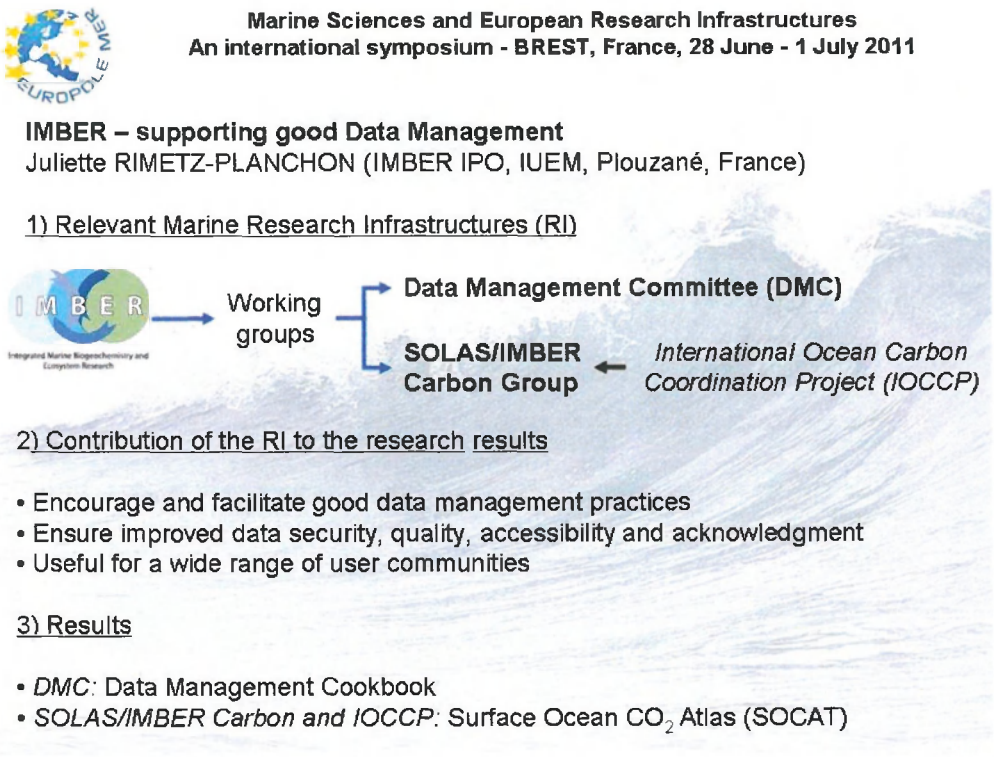
PREVIMER, a partnership of public institutions, with the French Naval Hydrographic Office (SHOM), Météo-France, the research institute for the development (IRD) and the European Institute of Marine Studies (IUEM), is coordinated by IFREMER (the French public institute for marine research), which supplies the technologies needed to ensure this pertinent information, available daily on Internet, and stored at the Operational Coastal Oceanographic Data Centre. Local SME's are strongly contributing to the development of the system, and they are associated for the design of value-added products for various end-users, especially in the second phase of the project (2008-2012).



Bi-directional satellite communications on Argo floats

Le Reste Serge[1] and André Xavier.
[1] Ifremer, centre de Brest, Technopole Brest Iroise, BP70, 29280 Plouzané, France.
serge.le.reste@ifremer.fr

New developments have been done to improve the performances of the "ARVOR" Argo profiling floats, particularly in marginal seas, where they can be affected. The reduction of the transmission duration at surface lowers the risk of thefts, trawling or impacts, delays the time of beaching, and improves the estimates of subsurface currents. The Arvor floats equipped with Iridium and Argos 3 satellite transmissions are presented, as well as some results at sea.



IMBER, supporting Data Management

Maddison Lisa[1], Piola Alberto, Bakker Dorothee, Gruber Nicolas, Rimetz-Planchon Juliette
[1] IMBER International Project Office, IUEM, Place Nicolas Copernic, 29290 Plouzané.
Lisa.Maddison@univ-brest.fr

The Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) Project is one of the global change research programmes sponsored by the International Geosphere-Biosphere Programme (IGBP) and the Scientific Committee on Oceanic Research (SCOR). The primary scientific goal of IMBER is to investigate the sensitivity of marine biogeochemical cycles and ecosystems to global change, on time scales ranging from years to decades. This goal is addressed through IMBER-related national and regional research programmes that focus on understanding the physical, biological and chemical oceanographic processes that regulate biogeochemical cycling and feedbacks to marine food webs.

Research undertaken by IMBER scientists requires the use of collaborative research infrastructure and data collection, management, and storage are integral components of this. The IMBER Data Management Committee (DMC) was established to encourage and facilitate good data management practices, thereby ensuring improved security, quality, accessibility and acknowledgment of data. The DMC recently completed a Data Management Cookbook which provides a guide to data practices that are designed to ensure that data collection and management result in the best possible science. Additionally, the International Ocean Carbon Coordination Project (IOCCP) and the joint working group formed between the Surface Ocean Lower Atmosphere Study (SOLAS) Project and IMBER (SOLAS/IMBER Carbon Working Group) closely collaborate in the Surface Ocean CO_2 ATlas (SOCAT), which provides a standard global surface carbon dioxide dataset that brings together all publicly available fCO_2 data in a common format. The SOCAT will serve a wide range of user communities upon its first public release, currently planned for September 2011. This poster provides an overview of the IMBER project and highlights the contributions that have been made to improving data collection, availability, quality, and management.

Euro-Argo: A new European Research Infrastructure

Mamaca[1] Emina and Pierre Yves Le Traon
[1]Ifremer, Institut Français de Recherche pour l'Exploitation de la Mer, Centre de Brest, Technopole de Brest Iroise, BP 70, 29280 Plouzané, France.
Emina.Mamaca@ifremer.fr

As a new European research infrastructure (RI), Euro-Argo (www.euro-argo.eu) started a preparatory phase funded through the EU 7th Framework Research Programme in January 2008. Euro-Argo preparatory phase includes all European Member States (France, United Kingdom, Germany, Ireland, Italy, Spain, Netherlands, Norway) involved in Argo and several potential new actors (Greece, Portugal, Poland and Bulgaria). The main objective of the Euro-Argo preparatory phase which ends in June 2011, is to undertake the work needed to ensure that by early 2012 Europe will be able to provide, deploy and operate an array of 800 floats and to provide a world-class service to the research (climate) and environment monitoring (e.g. GMES) communities. The maintenance of such an array would require Europe to deploy about 250 floats per year. Euro-Argo must be considered in its entirety: not only the instruments, but also the logistics necessary for their preparation and deployment at sea, field operations, the associated data streams and data centres. Maintenance, evolution and sustainability of European contributions to Argo require high level of cooperation between European partners.

The Euro-Argo RI structure should include a central facility (Central RI) and distributed national facilities. The central RI should have a European legal structure to receive EC and national (member states) funding, to procure floats (includes logistics and test facilities) and to provide funding to the international structure.

A governance model for the structure has been defined (council, board, scientific and technical advisory group) and its main characteristics have been agreed by all partners.

Its legal form will follow the new EU legal framework for European Research Infrastructure Consortium (ERIC). This legal form is designed to facilitate the joint establishment and operation of research facilities of European interest.

MEDIMEER LAgrangien Mesocosms Platform (LAMP) and the choice of automated sensors to study the marine plankton food web diversity and functioning under local and global changes. Field tests in the frame of MESOAQUA European project (2009-2012, www.mesoaqua.eu)

Mostajir Behzad[1,2], Le Floc'h Emilie, Mas Sébastien, Pete Romain, Parin David, Rocques Cécile, Geoffroy Thibault, Nouguier Jean*, Fouilland Eric and Francesca Vidussi
1. Centre d'écologie marine expérimentale MEDIMEER (Mediterranean centre for Marine Ecosystem Experimental Research), Université Montpellier 2-CNRS (UMS3301).
Station Méditerranéenne de l'Environnement Littoral, MEDIMEER, 2 Rue des Chantiers, 34200 Sète, FRANCE
Behzad.Mostajir@univ-montp.fr

2. Ecologie des systèmes marins côtiers (ECOSYM), Université Montpellier 2-CNRS-IFREMER-IRD- Université Montpellier 1 (UMR5119).
Université Montpellier 2, Place E. Bataillon, Case 93, ECOSYM, 34095 Montpellier, France
Behzad.Mostajir@univ-montp.fr

* J.N. is currently retired.

The LAgrangien Mesocosms Platform (LAMP) was developed by MEDIMEER team and collaborators to run experimentations in controlled conditions in offshore sites with the objective to test ecological hypothesis on future environmental changes. LAMP is an adjustable platform (up to 45 m long and 4 m wide) supporting up to 9 large *in situ* mesocosms (2 m in diameter, 10 m or more depth) in which the water column can be mixed using an automated pump and can be sampled at different depths. Three mesocosms are highly instrumented with a set of remote sensors including water temperature, conductivity, dissolved oxygen, turbidity, cDOM, chlorophyll fluorescence, phycoerythrine fluorescence, and two backscattering sensors with two different wavelengths. These variables are monitored automatically and continuously at high frequency during the mesocosm experiment. A weather station (wind, rain, down welling irradiance, temperature) is also set up on the platform.

In the frame of the European project MESOAQUA (Network of leading mesocosm facilities to advance the studies of future aquatic ecosystems from the Arctic to the Mediterranean), LAMP has been successfully tested twice in 2009 and in 2010 in a Northwestern Mediterranean coastal lagoon (Thau lagoon). The last LAMP field test will be carried out in the Eastern Mediterranean sea (Cretan Sea) in collaboration with HCMR and other MESOAQUA partners in September 2011. After this last test, LAMP can be deployed at other sites for mesocosm experimentations and also for evaluation of its lagrangien feature.

Development of a quasi-all-optical extension devoted for expandable submarine cabled observatories

Perhirin Steven [1], Audo Frédéric [1], Quintard Véronique [1], Guégan Mikael [1], Pérennou André [1] and Auffret Yves [2]
[1] Université Européenne de Bretagne, École Nationale d'Ingénieurs de Brest, Laboratoire RESO, C.S. 73862, F-29238 Brest cedex 3, France
[2] IFREMER, Brest Center,BP 70,F-23280 Plouzane,France
perhirin@enib.fr

Studying and understanding the ocean, particularly the ocean floor behaviour, are of great interest in large and various scientific sectors. Therefore, for the last 20 years, we observe an important development of submarine cabled observatories designed to collect valuable data for many multidisciplinary research projects where geophysics, chemistry, biotechnology, oceanography or biology are involved. The advantage of those kinds of observatories, linked with a shore station, is a real-time data access. However, many of them require complex structures, expensive equipments and important installation means.
Despite all the achieved technological progress, those observatories can't be easily relocated, and that is a major drawback to explore close areas of significant interest. To address this issue we investigate a quasi-all-optical architecture network of 10km long. This architecture can be directly connected with a previous observatory in place. One main advantage of this solution is that the deployment can be easily done by a Remotely Operated underwater Vehicle (ROV). This mean of deployment reduces significantly the extension cost and increases its flexibility.
The specificity of our quasi-all-optical extension architecture is the use of a single fibre optic to transmit both the energy and the up/down-stream data between the main observatory (via a junction box) and a low electrical consumption instrument. This type of extension could be used for the development of seismometer and hydrophone observatory networks.
In this paper, the feasibility and the limitation of our solution are presented and discussed.

COSYNA-An Integrated Coastal Observation System for Northern and Arctic Seas

Petersen, Wilhelm; Schroeder, Friedhelm; Stanev, Emil; Riethmüller, Rolf; Schulz-Stellenfleth, Johannes; Ziemer, Friedwart and Storch, Hans von Helmholtz-Zentrum Geesthacht, Institute of Coastal Research Max-Planck-Str. 1, D-21502 Geesthacht, Germany
wilhelm.petersen@hzg.de

The major focus of the "Coastal Observation System for Northern and Arctic Seas" (COSYNA) is to tightly combine data from a dense observational network with modelling via data assimilation. In this way, COSYNA will advance operational capabilities in analyzing and forecasting ecosystem state key variables. COSYNA will focus on daily-to-weekly processes providing objective measures of uncertainty in the state estimates and forecasts. The layout of COSYNA is based on the knowledge and open scientific questions of the German North Sea research carried out in the last two decades. The in-water observation modules comprise automated measuring systems on ships of opportunity (FerryBox), stationary platforms and undulating systems such as ScanFish and Glider. Coastal radar and remote sensing from satellites provide spatial information of the ocean surface. The observations are used for data assimilation into different numerical models starting with physical, but comprising chemical and bulk-biological state variables at the end of this decade.
The pre-operational concept of COSYNA is achieved by the implementation of "COSYNA products", i.e., combinations of measurements and assimilated model output that are provided routinely (every hour) and are disseminated by the internet. The first product delivers routinely current fields of the German Bight that are pre-operationally processed by hourly HF-radar current fields that are assimilated into a 3D circulation model (GETM).
In the poster the COSYNA observation network is shown, examples of measurements are presented and the first COSYNA product is described.

FerryBox – Nine years of experience of continuous water quality observations along transects in the North Sea

Petersen, Wilhelm and Schroeder, Friedhelm
Helmholtz-Zentrum Geesthacht, Institute of Coastal Research Max-Planck-Str. 1, D-21502 Geesthacht, Germany
wilhelm.petersen@hzg.de

The Helmholtz-Zentrum Geesthacht, Germany, started to use FerryBox automated monitoring systems on Ships of Opportunity to continuously record standard oceanographic, biological and chemical in-situ data in the North Sea. The poster presents the operational experience gathered since the beginning of this deployment and reflects on the potential and limits of FerryBox systems as a monitoring tool. The integration of the FerryBox observations in scientific applications and routine monitoring campaigns will be shown. Examples are presented that highlight the added value of the recorded data for the study of both long-term and short-term variability in water mass stability, plankton communities, and surface water productivity in the North Sea. Through the assessment of technical and scientific performance it is evident that FerryBoxes have become a valuable tool in marine research that help to fill gaps in coastal and open ocean operational observation networks.

Ocean flux and observing systems – the oceanic component of ICOS

Pfeil Benjamin[1,2,3], Johannessen Truls, Watson Andrew, Huertas Emma, Anderson Leif, Borges Alberto, Boutin Jaqueline, Ciais Philippe, de Baar Hein, Dolman Han, Fransson Agneta, González-Dávila Melchor, Heinze Christoph, Hydes David, Kelly-Gerreyn Boris, Körtzinger Arne, Lefèvre Nathalie, Metzl Nicolas, Ólafsson Jón, Olsen Are, Paris Jean-Daniel, Perez Fiz, Piera Jaume, Rios Aida, Schuster Ute, Santana-Casiano Magdalena, Skjelvan Ingunn and Rivier Leonard

[1] University of Bergen, Geophysical Institute, Bergen, Norway, [2] Bjerknes Centre for Climate Research, Bergen, Norway, [3] World Data Center For Marine Environmental Sciences (WDC-MARE/PANGAEA), Bremen, Germany.
Benjamin.Pfeil@gfi.uib.no

The ICOS (Integrated Carbon Observing System) is an European Research Infrastructure funded by the European Commission within FP7. It was selected by ESFRI (European Strategy and Forum for Research Infrastructures) in 2006. The mission of ICOS is to quantify and understand the greenhouse balance of the European continent and of adjunct regions by securing a long-term high precision carbon cycle observation network.

The ocean carbon cycle research and monitoring community joined the initiative in 2008.

The ICOS Ocean Thematic Centre (OTC) of ICOS will be established by the ICOS Preparatory Phase in 2011 and will be operational in 2013. The OTC will be a centralized service for defining the technical and scientific requirements for an effective ocean component of the ICOS observing system for marine carbon fluxes. A marine user group and scientific advisory committee will be drawn from the ICOS marine community.
In addition the OTC will define standard protocols for calibration of carbon and auxiliary variables.
The OTC will also develop standardized software for ocean data processing including near-real-time data transmission, visibility and access.

Furthermore, data access to the marine ICOS component will be via an OTC data portal and data warehouse. ICOS aims to feed its oceanic data streams into the data archives of GMES (Global Monitoring for Environment and Security) and GEOSS (Global Earth Observation System of Systems) for enabling sustained global syntheses of oceanic carbon data.

ShareBiotech: sharing life science infrastructures and skills to benefit the Atlantic Area biotechnology sector.

Quéron Céline[1] on behalf of the ShareBiotech consortium
[1] CRITT Santé Bretagne, 2 avenue du Pr Léon Bernard, CS 34317, 35043 Rennes Cedex, France.
celine.queron@biogenouest.org

ShareBiotech is a European project (www.sharebiotech.net) aimed at facilitating access to Technology Core Facilities (TCFs) for both basic researchers and companies taking up R&D activities in life sciences and biotechnology. ShareBiotech was developed and initiated by Biogenouest, the life science and environment core facility network in Western France and brings together ten partners from France, Ireland, Spain and Portugal. It aims to create a network of research infrastructures in the Atlantic Area. ShareBiotech promotes spreading of knowledge and technology across life science fields (health, marine research, agro-food, nutrition, etc.) and between academia and industry. One of the key objectives of ShareBiotech is to foster multidisciplinarity across the life sciences. As such, marine biotechnology is seen as a key discipline as it adopts the same tools and shares common targets with all other life sciences domains. Interactions among marine and life sciences are expected to rapidly increase, with more life scientists targeting marine life for the application of their investigation tools and product development opportunities. The actions promoted by Sharebiotech - such as workshops, training, facilitation of access to infrastructures and mobility plan, are designed to stimulate this synergy and contribute to the full development of the marine biotechnology promise across the Atlantic Arc area. ShareBiotech is a project co-financed with the support of the European Union ERDF – Atlantic Area programme.

Marine Sciences and European Research Infrastructures
An international symposium - BREST, France, 28th June - 1st July 2011

SOCIB, a new internationally open glider infrastructure in the Balearic Islands,
Simón Ruiz

1)Relevant Marine Research Infrastructures (RI)
Coastal Ocean Observing and Forecasting System – SOCIB (Spain)

2) Contribution of the RI to the research results
More than 20 glider missions have been performed, collecting ~15.000 hydrographic and biogeochemical profiles. Gliders have specifically contributed to the better understanding of mesoscale and sub-mesoscale process (1-20 km) in the upper ocean, including the coupling between the physical and bio-geochemical process of the marine ecosystem.

3) Results
- Sub/meso-scale processes, vertical motion and air-sea interactions
  - Ruiz et al., 2009 GRL, Ruiz et al., 2011 SM (review glider activities), Ruiz et al., 2011 (GRL submitted)
- Data fusion (glider, altimetry, drifters, CTD ship)
  Alvarez et al., 2007, IEEE; Ruiz et al., 2009 JMS; Bouffard et al., 2010, JGR,
- Ocean variability from routine monitoring - Heslop et al., 2011, in prep.
- Technology development

SOCIB, a new internationally open glider infrastructure in the Balearic Islands

Ruiz Simón[1], Tintoré Joaquín[1,2], Heslop Emma[1], Garau Bartolomé[2], Casas Benjamín[1], Torné Marc[2], Simó Cusi[2], Vizoso Guillermo[1], Renault Lionel[2], Pascual Ananda[1] Jerome Bouffard.
[1] IMEDEA (CSIC-UIB), C/ Miquel Marqués, 21, 07190 Esporles, Spain, simon.ruiz@uib.es
[2] SOCIB (Balearic Islands Coastal Observing and Forecasting System). Parc Bit, E-07121, Palma de Mallorca, Spain.

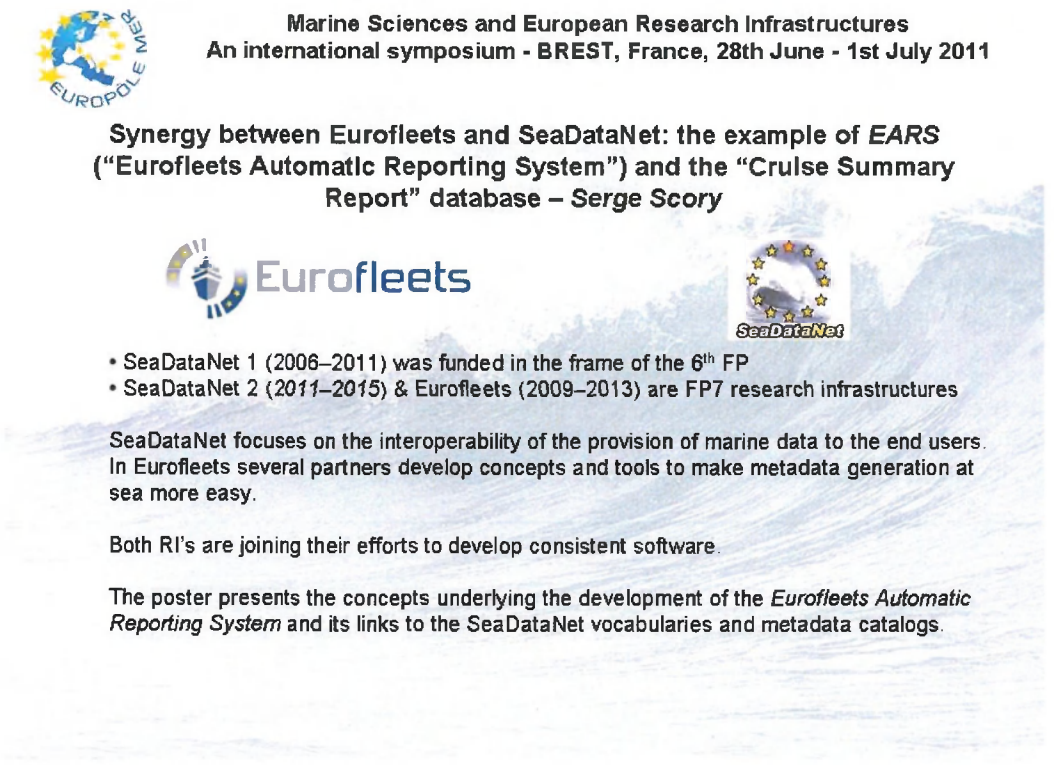
Following the glider developments at IMEDEA (CSIC-UIB) since 2005 and now in the framework of the SOCIB, the new Balearic Islands Coastal Observing and Forecasting System, we are developing a new glider facility for routine glider operations establishing a "gliderport" in the Balearic Islands. SOCIB has improved the existing glider infrastructures providing new glider units, new electronics, ballasting and operations labs, a new 1000 m pressure chamber as well as a coastal 10 m rib for glider deployment and recovery. The actual IMEDEA/SOCIB glider fleet consists of 4 Slocum gliders and it will be expanded to 10 units (7 Slocum and 3 Seagliders) in 2012. Additionally, the IMEDEA facilities at Calanova harbor (Bay of Palma) include a coastal ship and a warehouse/coastal laboratory available to support glider operations.

Since 2005, a major effort has been carried out at IMEDEA to assess and demonstrate the use of gliders for ocean monitoring. More than 20 glider missions have been performed, collecting ~15.000 hydrographic and biogeochemical profiles. Gliders have specifically contributed to the better understanding of mesoscale and sub-mesoscale process (1-20 km) in the upper ocean, including the coupling between the physical and bio-geochemical process of the marine ecosystem. In combination with remote sensing observations, high-resolution glider data have allowed to advance on new methodologies to improve coastal altimetry. The more recent SOCIB/IMEDEA glider operations have focused on the routine monitoring (since January 2011) in the Ibiza Channel. First results have reported a new view of the temporal and spatial variability of the Atlantic and Mediterranean N/S exchanges through the channel. This glider track will be maintained in a routine basin and additional permanent glider sections will be progressively considered in the Balearic sub-basin.

Coastal Observing and Forecasting System for the German Bight. Estimates of Hydrophysical States

E.V. Stanev[1], J. Schulz-Stellenfleth[1], J. Staneva[1], S. Grayek[2], K. Wahle[1], J. Seemann[1], W. Petersen[1]
1) Institute for Coastal Research, Helmholz Centre Geesthacht (HZG), Max-Planck-Strasse 1, Geesthacht, Germany
2) Institute for Chemistry and Biology of the Sea (ICBM), University of Oldenburg, Carl-von-Ossietzky Strasse 9-11, D-26111 Oldenburg

A Coastal Observing System for Northern and Arctic Seas (COSYNA) aims at construction of a long-term observatory for the German part of the North Sea, elements of which will be deployed as prototype modules in Arctic coastal waters. At present a coastal prediction system deployed in the area of the German Bight integrates near real-time measurements with numerical models in a preoperational way and provides continuously state estimates and forecasts of coastal ocean state. The measurement suite contributing to the pre-operational set up includes in situ time series from stationary stations, High-Frequency (HF) radar system measuring surface currents, a Ferrybox system and remote sensing data from satellites. The forecasting suite includes nested 3-D hydrodynamic models running in a data-assimilation mode, which are forced with up-to-date meteorological forecast data. This paper reviews the present status of the system and its recent upgrades focusing on developments in the field of coastal data assimilation. Model supported data analysis and state estimates are illustrated using HF radar and FerryBox observations as examples. A new method combining radial surface current measurements from a single HF radar with a priori information from a hydrodynamic model is presented, which optimally relates tidal ellipses parameters of the 2D current field and the M2 phase and magnitude of the radials. The method presents a robust and helpful first step towards the implementation of a more sophisticated assimilation system and demonstrates that even using only radials from one station could substantially benefit state estimates for surface currents. Assimilation of FerryBox data based on an optimal interpolation approach using Kalman filter and a stationary background covariance matrices derived from a preliminary model run which was validated against remote sensing and in situ data demonstrated the capabilities of the pre-operational system. Data assimilation significantly improved the performance of the model with respect to both SST and SSS and demonstrated a good skill not only in the vicinity of the Ferry track, but also over larger model areas. The examples provided in this study are considered as initial steps in establishing new coastal ocean products enhanced by the integrated COSYNA-observations and numerical modelling.



Synergy between Eurofleets and SeaDataNet: the example of *EARS* ("Eurofleets Automatic Reporting System") and the "Cruise Summary Report" database.

Che–Bohnenstengel Anne, De Cauwer Karien, Fichaut Michele, Manzella Giuseppe, Maudire Gilbert, Nast Friedrich, Nokin Marc, Schaap Dick, Scory[1] Serge and Sorribas Jordi
[1] Royal Belgian Institute of Natural Sciences, Belgian Marine Data Centre, Gulledelle 100, B–1200 Brussels, Belgium. S.Scory@mumm.ac.be

The SeaDatanet Consortium gathers marine data centres and teams specialized in data and information processing from 35 countries bordering the European seas. It is actively operating and further developing a Pan-European infrastructure for managing, indexing and providing access to ocean and marine data sets and data products, acquired from research cruises and other observational activities in European marine waters and global oceans.

The Eurofleets Alliance brings together 24 marine exploration fleet owners and specialized teams with the objective of building a coherent pan–European approach to research vessels management. It is enhancing the coordination between fleets (18 vessels in total) and promotes the cost–effective use of these facilities, by providing ship time and training, and by fostering the development of common software for facilitating transnational access.

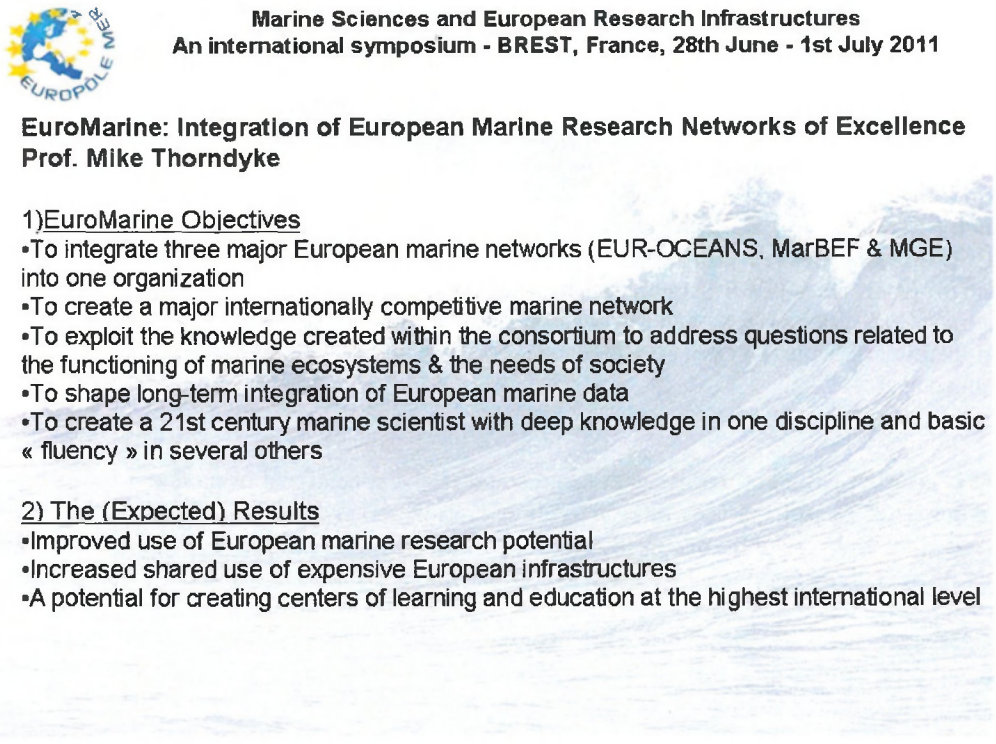
In this poster, Eurofleets and SeaDataNet partners exemplify how their common standardization efforts provide added–value to both infrastructures, using the case of "EARS", the "Eurofleets Automatic Reporting System".

The first goal of EARS is to help in logging and documenting events that occur while measurements are made at sea. A specific ontology is currently being defined that will make use, a.o., of the SeaDataNet Common Vocabularies (for the list of gears, for example). On the other hand, EARS will gather the necessary information to set up the Cruise "Summary Report" corresponding to the campaign, in order to feed as automatically as possible the CSR database, the very first knowledge base of oceanographic measurements made and samples taken during cruises, maintained by SeaDataNet.

Marine Infrastructure in the Western English Channel underpinning centennial scale research

Smyth Tim[1], Fishwick James, Gallienne Chris, Mason Paul, Morin Pascal, Aoustin Yannick and Auffret Yves
[1] Plymouth Marine Laboratory, Prospect Place, Plymouth, Devon, PL1 3DH, UK.
tism@pml.ac.uk

The biological time-series maintained in the western English Channel by the Plymouth and Roscoff marine laboratories are some of the longest in the world, with some records going back to the end of the 19th century. The 20th century saw rapid changes in technology with the development of electronic instrumentation which has given us an unprecedented view of the global ocean. This has been particularly marked in our ability to view the ocean from space, predict the ocean using numerical models, and observe the ocean using in situ measurements. Within the western English Channel and Western Approaches, the laboratories of PML, Roscoff and IFREMER have embraced these technological advances with high frequency measurements using autonomous buoys, a ferry box on the Plymouth – Roscoff route and, scheduled for a pilot deployment in October 2011, a cabled observatory. These high temporal frequency data elucidate processes that have previously been unresolved by traditional boat sampling methods which are typically carried out on a weekly basis. Using traditionally gathered in situ data, satellite remote sensing and ecosystem models in a synergistic sense with data from these new, high frequency data will allow a cascade of time-scales, from hours to centuries to be constructed.



EuroMarine - Integration of European Marine Research Networks of Excellence

Thorndyke Michael
University of Gothenburg, the Sven Lovén Centre for Marine Sciences, S-451 78 Fiskebäckskil, Sweden
mike.thorndyke@marecol.gu.se

The 20th century has been called the *"The Century of the Gene"*, while the prediction for the 21st century is the emergence of *"From Genes to Ecosystems and beyond"*. Several marine research questions need a multidisciplinary approach to address ecosystems on a molecular level with both genomics and other new emerging technologies. The challenge of EuroMarine will be to bring marine sciences into the multidisciplinary perspectives of the 21st century.

EuroMarine aims to integrate three major European marine networks (EUR-OCEANS, MarBEF and Marine Genomics Europe) into one organization, bringing together leading European marine scientists to create a major internationally competitive network. The goal is to exploit the knowledge created within the consortium to address questions related to the functioning of marine ecosystems. This project also aims to engage the European marine data management and scientific communities in shaping the long-term integration of data. Moreover, EuroMarine aims to create a 21st century

marine scientist, with deep knowledge in one discipline and basic "fluency" in several. Taken together, EuroMarine aims to have a leading role in structuring and driving forward marine biological research and technical development in Europe and beyond.

The impact of EuroMarine will be an improved use of European research potential, a much better proactive representation of the scientific community in policy and decision making, increasing the shared use of expensive infrastructures at the European level the creation of networks of marine observatories and the potential for creating centers of learning and education at the highest international level.

Ecokelp: A multidisciplinary project about ecosystem services and future for kelp forests

Valero Myriam.
UMR CNRS/UPMC 7144, Adaptation et Diversité en Milieu Marin, Station Biologique de Roscoff, France.
valero@sb-roscoff.fr

Kelps form huge underwater forests, hosting an exceptional diversity of species. For the temperate to boreal coastal areas, kelp ecosystems have ecological, economic and patrimonial value similar to corals or mangroves in tropical areas. The goal of the project ECOKELP was to utilize a multidisciplinary approach in order to better understand the dynamics and to predict changes in biodiversity of these forests, and to evaluate their environmental, economic and social impacts. The challenge of this project was to raise awareness among a large public about the problems of resource management and conservation issues, using kelps as a model system of cold-temperate coastal waters.
The project opened new perspectives for research on various fundamental aspects of biology and ecology, such as the discovery of remote signaling mechanisms thus far unknown, which could play a role in the ability of algae to resist environmental stresses. This project also represents the first study of ecosystem services provided by marine algae, an issue which has managed to unite a partnership both regionally and internationally and is the source of new projects (see IDEALG). Finally, in the context of creating the first marine park, ECOKELP provided basic knowledge needed for the delineation of Marine Protected Areas and for sustainable management of marine resources, but also pointed out the need for reliable early warning systems for marine invasive species.

AQUAEXCEL: Aquaculture infrastructures for excellence in European fish research

Vandeputte Marc[1], Reuver Marieke
[1] INRA UMR1313 GABI, Domaine de Vilvert, 78352 Jouy en Josas cedex, France
marc.vandeputte@jouy.inra.fr

Today, aquaculture technology is one of the areas where Europe has the edge and can make a difference in the future. Nevertheless, the European aquaculture industry is facing increasing challenges due to a more demanding and selective market combined with competition from outside the EU. AQUAEXCEL, a FP7 Infrastructures project (17 partners, 11 countries, 2011-2015) aims to integrate key European aquaculture research infrastructures and to promote their coordinated use and development. AQUAEXCEL will provide the European aquaculture research community with a platform of top class research infrastructures, which will encompass all European fish production systems (recirculation, flow-through, hatchery, cage, and pond systems), all major species (sea bass, sea bream, salmon, cod, trout and carp) and freshwater, marine, cold, and warm water environments. The goals of the project are 1) to coordinate the main aquaculture research infrastructures in Europe, favoring resource and know-how sharing, to create conditions for joint research projects, 2) to offer European research teams access to the partner infrastructures, 3) to improve the services of aquaculture research infrastructures through remote access and monitoring, phenotyping, limitation of live animals use, upscaling of results for industry, and development of isogenic lines. The global aim is to contribute to the development of sustainable aquaculture production in Europe, producing high quality fish with low environmental impact. Through partnerships with other initiatives (especially the European Aquaculture Technology and Innovation Platform – EATiP), the project is expected to bridge the gap between European aquaculture research infrastructures and the needs of the European aquaculture industry.

Participants list

LAST NAME	First name	Organisation	Country
AHSAINE	Monique	IFREMER	France
ALLAIN	Coralie	CRITT Santé Bretagne	France
ANDERSSON	Niklas	University of Gothenburg	Sweden
APPELTANS	Ward	VLIZ, Flanders Marine Institute, Oostende	Belgium
APWEILER	Rolf	EMBL-EBI	United Kingdom
ARCHAMBEAU	Anne-Sophie	GBIF France	France
ASJES	Jakob	IMARES	The Netherlands
AUDO	Frédéric	École Nationale d'Ingénieurs de Brest (ENIB) , Laboratoire	France
BAHUREL	Pierre	MERCATOR OCEAN	France
BAISNEE	Pierre-Francois	EUR-OCEANS / IRD	France
BANKI	Olaf	LifeWatch	The Netherlands
BARNES	Christopher	NEPTUNE Canada, University of Victoria	Canada
BATHMANN	Ulrich	Alfred Wegener Institute for Polar and Marine Research	Germany
BENCHIKH	Mohamed	CNRS	France
BENJAMINSEN	Arne	Norwegian Ministry og Fhiseries and coastal Affairs	Norway
BENZIE	John	University College Cork	Ireland
BERANZOLI	Laura	Istituto Nazionale di Geofisica e Vulcanologia	Italy
BERNARD	Yann	CLS	France
BERTRAND	Philippe	CNRS	France
BIEBOW	Nicole	Alfred Wegener Institute for Polar and Marine Research	Germany
BINOT	Jacques	IFREMER	France
BLANC	Frédérique	CLS	France
BOUETEL	Virginie	OOB	France
BOURBIGOT	Marie-Marguerite	Pôle Mer Bretagne	France
BOUSSOUFA	Dhouha	Faculté des Sciences de Tunis	Tunisia
BOUTTE	Christophe	CNRS	France
BOYD	Ian	Scottish Oceans Institute	United Kingdom
BOYEN	Catherine	CNRS	France
BRAULT	Patrice	nke	France
BREHMER	Patrice	Institut de Recherche pour le Développement (IRD)	France
CANARIO	Adelino	Centre of Marine Sciences - University of Algarve	Portugal
CARBONNIERE	Aurélien	Marine Board-ESF	Belgium
CARVALHO	Telmo	EurOcean	Portugal
CLAUSTRE	Herve	CNRS	France
COCHONAT	Pierre	IFREMER	France
COOK	Chuck	EMBL-EBI	United Kingdom
CORMAN	David	SHOM	France
COTTY	Pierre	IFREMER	France
COUSIN	Mariam	Université Pierre et Marie Curie (UMPC)	France
CURD	Amelia	IFREMER	France
CURY	Philippe	Institut de Recherche pour le Développement (IRD)	France
DANOBEITIA	Juanjo	Unidad Tecnologia Marina- CSIC	Spain
DE STIGTER	Henko	NIOZ - Royal Netherlands Institute for Sea Research	The Netherlands
DELORY	Eric	Plataforma Oceánica de Canarias	Spain
DESAUBIES	Yves	Mersea Conseil	France

DI LAURO	Roberto	Stazione Zoologica Anton Dohrn	Italy
DIKE	Ifeanyi, Gabriel	WMO Regional Office for West Africa	Nigeria
DONEV	Vassil	Institute of Oceanology, Bulgarian Academy of Sciences	Bulgaria
DOSDAT	Antoine	IFREMER	France
DOUMAZ	Fawzi	Istituto Nazionale di Geofisica e Vulcanologia	Italy
DURAND	Dominique	Norwegian Institute for Water Research	Norway
ELDIN	Gérard	CNRS	France
FARCY	Patrick	IFREMER	France
FERNANDES	Sandra	Stazione Zoologica Anton Dohrn	Italy
FRANCESCHINI	Pier Luigi	Istituto Nazionale di Geofisica e Vulcanologia	Italy
FUKASAWA	Masao	Research Institute for Global Change/ JAMSTEC	Japan
GAILLARD	Fabienne	IFREMER	France
GENCHEVA	Aleksandra	Sofia University	Bulgaria
GERNEZ	Caroline	IFREMER	France
GILLOOLY	Michael	Marine Institute	Ireland
GIMPEL	Peter	L-3 Communications ELAC Nautik GmbH	Germany
GLAVES	Helen	British Geological Survey	United Kingdom
GLOCKNER	Frank Oliver	Max Planck Institute for Marine Microbiology	Germany
GOTA GOLDMANN	Susana	Ministère de l'enseignement supérieur et de la recherche	France
GOTENSPARRE	Susan	Institute Marine Ecology	Sweden
GRANT	Fiona	Marine Institute	Ireland
GREMARE	Antoine	Université Bordeaux 1	France
GRUNDWALD	Maik	Helmholtz-Zentrum Geesthacht (HZG)	Germany
GUEGAN	Mikael	Ecole Nationale d'ingénieurs de Brest	France
GUIFFANT	Damien	CNRS-UPMC	France
GUILLOUX	Bleuenn	Centre de Droit Maritime et Océanique	France
HANSEN	Georg	Research Council of Norway	Norway
HAUGAN	Peter	Geophysical Institute, University of Bergen	Norway
HEINRICH	Hartmut	BSH - Federal Maritime and Hydrographic Agency	Germany
HEIP	Carlo	Royal Netherlands Institute for Sea Research	The Netherlands
HERAL	Maurice	ANR	France
HERNANDEZ	Francisco	VLIZ, Flanders Marine Institute, Oostende	Belgium
HIRSEKORN	Marius	Alfred Wegener Institute for Polar and Marine Research	Germany
HORN	Lars	The Research Council of Norway	Norway
HOWARTH	John	National Oceanography Centre	United Kingdom
IKONEN	Eeva	Academy of Finland	Finland
JACOBSEN	Anita	University of Bergen, Department of Biology	Norway
JAK	Robbert	IMARES	The Netherlands
JEANDEL	Catherine	CNRS	France
JOHANNESSEN	Truls	University of Bergen (GFI and BCCR) and UNI-Bjerknes	Norway
JOHNSTON	Ian	Scottish Oceans Institute	United Kingdom
JOLIVET	Aurélie	IUEM	France
JUGIE	Gérard	CNRS - UPMC	France
KARLESKIND	Pierre	Conseil Régional de Bretagne	France
KELLERMAN	Adolf	ICES	Denmark
KERVELLA	Anne-Emmanuelle	CNRS - UPMC	France

KLEIN	Birgit	Bundesamt fuer Seeschifffahrt und Hydrographie	Germany
KLOAREG	Bernard	CNRS - UPMC	France
KOBLINSKY	Chester	NOAA	USA
KOHLER	Elisabeth	CNRS	France
KONOVA	Lora	Ministry of Education, Youth and Science	Bulgaria
KOOISTRA	Wiebe	EMBRC	Italy
KOPF	Achim	University of Bremen / MARUM	Germany
KORRES	Gerasimos	Hellenic Centre for Marine Research	Greece
KOTTMANN	Renzo	MPI Marine Microbiology	Germany
KRELL	Andreas	Alfred Wegener Institute for Polar and Marine Research	Belgium
LALLIER	François	Université Pierre et Marie Curie (UMPC)	France
LAMPITT	Richard	National Oceanography Centre	United Kingdom
LAVIN	Alicia	Instituto Español de Oceanografía	Spain
LE BLEIS	Jean claude	nke	France
LE GUEN	Annaïg	Ministère de l'enseignement supérieur et de la recherche	France
LE TRAON	Pierre Yves	IFREMER	France
LEAU	Helene	IPEV	France
LEBARON	Philippe	CNRS - UPMC	France
LEBRETON	Nathanaële	SHOM	France
LECORNU	Fabrice	IFREMER	France
LYKOUSIS	Vasilios	Hellenic Centre for Marine Research	Greece
MAMACA	Emina	IFREMER	France
MASSET	Jean-françois	IFREMER	France
MAUDIRE	Gilbert	IFREMER	France
McDONOUGH	Niall	Marine Board-ESF	Belgium
MEISSNER	Gesine	European Parliament	Belgium
MEVEL	Catherine	ECORD	France
MIENERT	Jurgen	University of Tromsø	Norway
MILANOVA	Milena	University of Sofia	Bulgaria
MORIN	Pascal	CNRS	France
MORTIER	Laurent	ENSTA	France
MOSTAJIR	Behzad	Laboratoire ECOSYM (UMR 5119 UM2-CNRS-IRD-IFREMER-UM1)	France
MSELLEM	Zied	Master Erasmus Mundus TPTI	France
MURAVA-SEREDA	Aurika	Vernadsky University, Head of Innovation and Information Department	Ukraine
NABILA	Ghazali	FACULTÉ DES SCIENCES DE TUNIS	Tunisia
NAUDTS	Lieven	Management Unit of the North Sea Mathematical Models (MUMM)	Belgium
NEPSTAD	Tore	Institute of Marine Research, Bergen	Norway
NIEUWEJAAR	Per Wilhelm	Institute of Marine Research, Bergen	Norway
NITTIS	Kostas	HCMR	Greece
NOTARSTEFANO	Giulio	OGS	Italy
ODEKUNLE	Samson Adetola	Bayelsa State government of Nigeria	Nigeria
OJUKA	Mike	WMO Regional Office for West Africa	Nigeria
O'SULLIVAN	Geoffrey	Marine Institute	Ireland
PAASCHE	Øyvind	Bergen Marine Research Cluster	Norway
PADE	Nicolas	The Marine Biological Association of the UK	United Kingdom

PAULET	Yves-Marie	IUEM	France
PENAULT	Gaëlle	CNRS	France
PEREIRA	Rita	Centre of Marine Sciences - University of Algarve	Portugal
PERHIRIN	Steven	École Nationale d'Ingénieurs de Brest (ENIB)	France
PERISSE	Damien	CPMR Conference of Peripheral and Maritime Regions	France
PERO	Hervé	European Commission	Belgium
PERSON	Roland	IFREMER	France
PESANT	Stéphane	University Bremen / PANGAEA	Germany
PETERSEN	Wilhelm	Helmholtz-Zentrum Geesthacht (HZG)	Germany
PIECHURA	Jan	Institute of Oceanology, Polish Academy of Sciences	Poland
PINARDI	Nadia	Istituto Nazionale di Geofisica e Vulcanologia (INGV) and UN	Italy
PIWOWARCZYK	Joanna	Institute of Oceanology, Polish Academy of Sciences	Poland
POULAIN	Pierre-Marie	OGS	Italy
POZACHENYUK	Katerina	Head of Oceanology Department	Ukraine
PROCTOR	Roger	Integrated Marine Observing System	Australia
PUILLAT	Ingrid	IFREMER	France
QUINTARD	Véronique	Ecole Nationale d'Ingénieurs de Brest / RESO	France
RENIERS	Nadine	IUEM - EUROPOLE MER	France
REUVER	Marieke	AquaTT	Ireland
RICHIER	Laurent	Altran OUEST / ATLANTIDE	France
RIEDLINGER	Torsten	European Commission - DG Enterprise and Industry (GMES Bureau)	Belgium
ROBIN	Agnès	European Commission	Belgium
ROHN	Michael	European Commission - DG Enterprise and Industry (GMES Bureau)	Belgium
ROLIN	Jean-Francois	IFREMER	France
RUELLAN	Etienne	CNRS	France
RUHL	Henry	National Oceanography Centre	United Kingdom
SCHAAP	Dick	MARIS	The Netherlands
SCHOLTEN	Herman	Stichting Deltares	The Netherlands
SCHULZ-STELLENFLETH	Johannes	Helmholtz-Zentrum Geesthacht (HZG)	Germany
SCORY	Serge	Management Unit of the North Sea Mathematical Models (MUMM)	Belgium
SHAHEEN	Nazeeh	L-3 MariPro	USA
SHAWYER	Peter	Texcel Technology Plc	United Kingdom
SHEPHERD	Iain	European commission	Belgium
SMYTH	Tim	Plymouth Marine Laboratory	United Kingdom
SOMMER	Angela	Alfred Wegener Institute for Polar and Marine Research	Germany
STAWARZ	Marek	BSH - Federal Maritime and Hydrographic Agency	Germany
STEPHAN	Ronan	Ministère de l'enseignement supérieur et de la recherche	France
THEUILLON	Gwladys	SHOM	France
THIES	Annika	European Commission, DG RTD B.3	Belgium
THOMAS	Severine	Europole Mer	France
THORNDYKE	Michael	Royal Swedish Academy of Sciences	Sweden
TINTORE	Joaquin	IMEDEA (CSIC-UIB)	spain
TREGUER	Paul	Europole Mer	France
TREGUIER	Anne Marie	CNRS	France

VALERO	Myriam	CNRS	France
VANDEPITTE	Leen	VLIZ, Flanders Marine Institute, Oostende	Belgium
VANDEPUTTE	Marc	INRA UMR1313 GABI - Genaqua	France
VAVASSORI-FUNDIS	Marie	Ubifrance	USA
VISBECK	Martin	Leibniz Institute of Marine Sciences IFM-GEOMAR	Germany
WALDMANN	Christoph	Bremen University/ MARUM	Germany
WEEXSTEEN	Antoine	CNRS	France
WEHDE	Henning	Institute of Marine Research, Bergen	Norway
WICHOROWSKI	Marcin	Institute of Oceanology, Polish Academy of Sciences	Poland
WILLIAMS	Charity	Bayelsa State government of Nigeria	Nigeria
WILLIS	Zdenka	NOAA US IOOS	USA
WOELNEBERG	Kjersti	Norwegian Ministry of Fisheries and Coastal Affairs	Norway
YOUSUO	Amalanyo Afatel	Bayelsa State government of Nigeria	Nigeria