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EUR-OCEANS

European Network of Excellence for Ocean Ecosystems Analysis

Network of excellence

Priority 6.3 “Global change and ecosystems”

Periodic activity report

Publishable executive summary

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Publishable executive summary

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The EUR-OCEANS (2005-2008) Network of Excellence (NoE) addresses the objectives of the thematic priority 1.1.6.3. (Section III.3.2) of the Sixth Framework Programme (FP6) of the European Commission (EC). It integrates the efforts of 160 Principal Investigators (PIs) from 66 Members Organisations (MOs) in 25 countries.

EUR-OCEANS *overall networking objective* is to achieve lasting integration of European research organisations on *global change and pelagic marine ecosystems*, and of the relevant scientific disciplines (i.e. pelagic ecosystems, biogeochemistry, and ecosystem approach to marine resources; Figure 1).

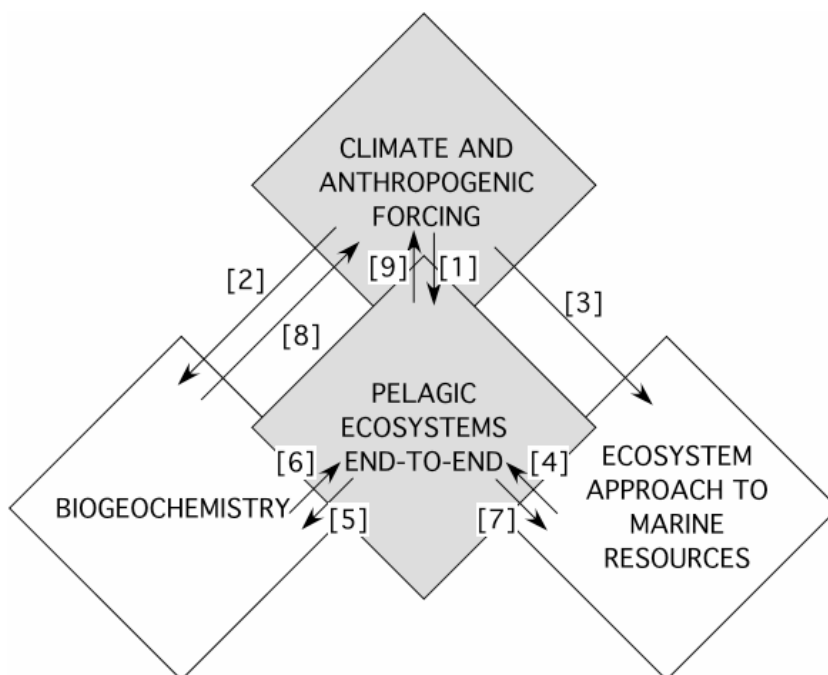


Figure 1. EUR-OCEANS addresses four main aspects of the Earth System: climate and anthropogenic forcing on the pelagic marine environment, pelagic ecosystems end-to-end, biogeochemistry and exploited populations (i.e. ecosystem approach to marine resources). The arrows represent bottom-up, top-down and feedback effects between the four major components of the NoE's scientific programme.

In the Work Programme, the EC specified that the networking effort should be carried out within the framework of international science co-operation, in particular with the US. The *overall scientific objective* of EUR-OCEANS is to develop models for assessing and forecasting the impacts of climate and anthropogenic forcing on food-web dynamics (structure, functioning, diversity and

stability) of pelagic ecosystems in the open ocean. The long-term goal of the NoE is to create a multi-site *Institute for European Research on Ocean Ecosystems under Anthropogenic and Natural forcings*, i.e. the *EUR-OCEANS Institute*. The four terms of reference of lasting integration, international co-operation, model development, and multi-site Institute are addressed in turn, followed by consortium management.

1 Lasting integration of European research organisations and of the relevant scientific disciplines

1.1 Integrating science

1.1.1 Publications on key issues. EUR-OCEANS is too young to have already led to major papers. However, EUR-OCEANS PIs from several research organisations have published in 2005 papers on key issues relevant to the scientific themes of the NoE. Three examples are: a paper on anthropogenic ocean acidification over the 21st century at the global scale (*Nature*, 437: 681-692), a study dealing with phosphorus limitation in the ultra-oligotrophic Eastern Mediterranean Sea (*Science*, 296: 1064-1066), and a paper on inclusion of marine ecosystem processes in global climate change models (*Global Change Biology*, 11: 2016-2040).

1.1.2 New specific initiatives. Because there is no money for research in the EC funding for NoEs, groups of EUR-OCEANS PIs teamed for writing specific proposals in 2005. Two examples are METAOCEANS and SESAME, briefly described here.

Six EUR-OCEANS research organisations (five countries) developed a proposal for a Marie Curie Early Stage Training, which was accepted for funding by the EC. This is the METAOCEANS initiative, which aims at training PhD researchers in elucidating the structure and functioning of marine ecosystems, through synthesis and comparative analysis.

EUR-OCEANS participated very actively in the development of a first-stage proposal for the Integrated Project SESAME (Southern European Seas: Assessing and Modelling Ecosystem changes). The nucleus of SESAME was provided by the SSA IASON (International Action for Sustainability of the Mediterranean and Black Sea EnvirOnmeNt.). The first-stage proposal of SESAME was submitted within FP6 fourth call for proposals and approved by the EC in December 2005; the full proposal is due in early March 2006. SESAME integrates the efforts of 32 research organisations, 14 Universities and two SMEs, from 24 European countries.

1.2 Integrating European Research Organisations

1.2.1 EUR-OCEANS PhD Programme (2006-2008). The EUR-OCEANS PhD Programme is an important tool for integration. Eighteen projects and PhD students were selected based on reviews by international experts and comments from WP and System Leaders within EUR-OCEANS; the criteria included excellence of the projects, the laboratories and the students. To foster integration, the projects are supervised by advisors belonging to two or more Institutes in different countries, and the selected students originate from another country than those where the Institutes are located. One third of the PhD projects are related to Theme I (Impacts of global change on the ecosystems end-to end), another third to Theme II (Impacts on ocean's biogeochemistry), a quarter to Theme III (Ecosystem approach to marine resources), and the remainder to global scale modelling (Dynamics Green Ocean, and Earth System). The advisors are from France (28%), the United Kingdom (20%), the Netherlands (16%), Germany (14%), Belgium, Denmark, Norway, South Africa, Spain, Switzerland, Greece and Italy. Interestingly, DIFRES (Denmark) and the French Ministry of Research added one scholarship each to the EUR-OCEANS PhD Programme.

1.2.2 Sharing facilities Programme. EUR-OCEANS has identified major facilities (mesocosms, mass spectrometers, equipments at sea, etc.; total of >70 facilities) available in different members organisations of the NoE, and has started to organise the sharing of these facilities during the

second half of 2005. Facilities have already been shared among EUR-OCEANS researchers for a total of more than 1000 working days.

1.2.3 Public Outreach Programme. Public outreach is implemented by a network of 11 aquaria and scientific centres located in Belgium, France, Greece, Italy, Monaco, Poland, Spain, Sweden, and the UK. It held its first European press conference on the Internet in September 2005, to present the scientific challenges of EUR-OCEANS; this activity involved nine countries. It also produced two films, illustrating EUR-OCEANS science for the general public, in cooperation between France, Norway and the UK.

2 Developing international co-operation, in particular with the US

2.1 BASIN Initiative. EUR-OCEANS PIs contributed to launch the initiative *Basin-scale Analysis, Synthesis, and Integration of oceanographic and climate-related processes and the dynamics of plankton and fish populations in the North Atlantic Ocean* (BASIN). A workshop was held in Reykjavik in March 2005, co-organised by GLOBEC, IMBER, EUR-OCEANS and North American researchers supported by the NSF and Canadian research organisations. The decision was made to develop a science and implementation plan, to be submitted in parallel to the EC (within FP7) and the NSF.

2.2 ICED Initiative. Within the framework of the International Polar Year (IPY, 2007-2009) EUR-OCEANS PIs launched the programme *Integrated analyses of circumpolar Climate Interactions and Ecosystems Dynamics in the Southern Ocean* (ICED). It involves 14 European and non-European countries (Australia, Japan, Korea, Russia, USA). The IPY Committee appointed ICED to co-ordinate the biogeochemical and biological components of the IPY.

2.3. Eastern Boundary Upwelling System Initiative. The EUR-OCEANS Eastern Boundary Upwelling System held a meeting in Casablanca (Morocco) in September 2005, to organise international cooperation on the impact of climate change and anthropogenic forcing on coastal African and American upwelling systems. Non-European countries involved are Morocco, Mauritania, Namibia, Peru, Chile and the US.

3 Developing models for assessing and forecasting the impacts of climate and anthropogenic forcing on food-web dynamics in the open ocean

Integration over the food web from end to end is a key target of EUR-OCEANS. This includes model integration. The strategy to reach this objective is based on state-of-the art modelling expertise in the NoE, workshops at general and regional levels, to favour exchange of expertise and complementarities among PIs, and post-docs on model integration.

3.1 EUR-OCEANS modelling expertise. EUR-OCEANS conducted a survey in 2005 to map the modelling expertise and model users' needs; it attracted participation from 75 PIs. It shows that the NoE's modelling expertise is biased towards lower trophic levels, with few available products for fish stocks management and few developers working on all trophic levels. Despite the few projects interfacing upper and lower parts of the food web, participants agreed on increased trophic level coupling. The survey points to the needs of *identifying generic products* that are both user-friendly and operational across software (numeric) environments, and *unifying the terminology* that describes the structure of modelling tools. The data will be constantly updated, with the aim of constructing an interactive online tool to find ready modelling products and identify areas that need further cooperation within the NoE.

3.2 Modelling Symposia and Workshops. Five EUR-OCEANS PIs co-steered, with other colleagues, a symposium on *Advances in Modelling Ecosystem Modelling Research* (AMEMR), held in Plymouth, UK, June 2005. It was sponsored internationally by GLOBEC, IMBER and EUR-OCEANS. More than 150 scientists from European and non-European countries attended the

symposium, which covered the EUR-OCEANS scientific domains. EUR-OCEANS led two key sessions dealing with the modelling of biogeochemistry and ecosystem approach to marine resources. The next AMEMR Symposium will be held in 2007. EUR-OCEANS plans to make a major contribution to this second symposium, in co-operation with GLOBEC and IMBER, with a focus on interfacing models at different trophic levels.

In November 2005, EUR-OCEANS PIs from seven countries held a modelling workshop in Napoli, Italy. The workshop addressed three topics: (1) identification of key biogeochemical processes in the Mediterranean basin, (2) possible merging of existing models or modules to implement an end-to-end Mediterranean ecosystem model, (3) identification of specific features of this ecosystem that make the Mediterranean a good site for generic biogeochemical process studies. Field and laboratory researchers contributed expertise, and there was a significant number of students whose participation was supported by the NoE.

3.3 Post-doctoral fellows on model interfacing. There will be a call for post-doc projects focused on interfacing models at different trophic levels in early 2006. This will be continued during following years.

4 Towards a multi-site European institute

4.1 Three-Network approach. During a meeting held in Paris in November 2005, the three marine Networks of Excellence (i.e. EUR-OCEANS, MarBEF and Marine Genomics Europe) decided to join their efforts to develop and promote the concept of a long-lasting, multi-site Institute at the European level. Four joint working groups were created to address the following topics: new challenges for marine sciences, European Doctoral School (PhD Programme), sharing of scientific facilities, and mobility of personnel. Ideas from the four WGs will be discussed in the coming months. The EC will be kept informed.

4.2 ERANet MarinERA. The ERANet MarinERA received support from the EC to coordinate the policies of 15 European countries in marine sciences and technology. Although the three marine NoEs and this ERANET work at different levels (i.e. integration of research organisations for the former, and integration of national policies for the latter), there are obvious, and potentially productive, relationships between the two approaches. Following a recommendation from the EC, EUR-OCEANS and the two other marine NoEs started to work with MarinERA in 2005. They will continue to do so in 2006, with the aim of identifying scientific challenges for the next decade.

5 Consortium management

During the first year of EUR-OCEANS, considerable efforts were devoted to manage the NoE. The first, major tasks were to implement and activate the Governing Bodies of the NoE, launch the activities of the 14 Working Groups and Sub-Working Groups and of the 7 geographical Systems, and set up the EUR-OCEANS Office (located in Brest, France). In addition, the NoE did not hesitate to change some internal modes of operation that proved inefficient after a few months of activity. After less than one year of operations (the contract with the EC was signed on 21 March 2005, and the funds were not received until mid-May 2005), the management of the Consortium is fully operational.