

BASIN: Basin-scale Analysis, Synthesis, and Integration: Resolving the impact of climatic processes on ecosystems of the North Atlantic Basin and shelf seas

Publishable Executive Summary

The principle objective of the BASIN Specific Support Action is to develop a joint EU North American research programme in the field of ocean ecosystems in support of the Global Earth Observation System of Systems (GEOSS) initiative. In order to do so, the BASIN SSA supports four workshops to identify and document the state of the art of climate-related ecosystem research in the North Atlantic Basin and associated shelf seas, assess the feasibility of developing a joint EU-North American basin-scale research programme focusing on the ecosystems of the North Atlantic, and seek to develop an implementation plan where by joint research initiatives involving the EU and other nations (*e.g.* USA, Canada,) can be developed and funded. To date, two of these meetings have been held.

The justification for the BASIN program is the scale of influence of global change and the added value of co-coordinating the scientific activities of the EU and North American countries to assess, predict, and mitigate the impact of climate and anthropogenic forcing on marine ecosystems and services of the North Atlantic. A crucial step towards such a coordinated approach is the development of an implementation plan whereby jointly funded international projects can be supported. The development of such a plan is the first key goal of BASIN. The second goal of BASIN is to develop an integrated basin scale North Atlantic science plan. The BASIN program will seek

- “to understand and simulate the population structure and dynamics of broadly distributed, and trophically and biogeochemically important plankton and fish species in the North Atlantic ocean,
- to resolve the impacts of climate variability on marine ecosystems and the feedbacks to the climate system, and
- to develop understanding and models that will advance ocean management.”

The development of the program goals began at the meeting in at the University of Hamburg, Germany 23 -25 January 2007 followed by a second meeting University of North Carolina’s Friday Center, Chapel Hill, North Carolina, 1 to 3 May 2007. These meetings involved open discussion in working groups with experts from both the EU and North America. The final meeting to develop the International Science plan was held in Amsterdam from the 27th to 30th of January 2008. The approach taken towards the development of a science plan at these meetings was focused on

- the assessment of the status of climate-related ecosystem research in the North Atlantic Basin and associated shelf seas,
- identification of the gaps in systematic observations and process understanding of atmospheric and oceanic parameters, and
- identification of the potential for consolidation of long-term observations from EU and international databases for modelling and prediction.

Based on these meetings, the BASIN aim is to understand and simulate the impact of climate variability and change on key species of plankton and fish, as well as community structure as a whole, of the North Atlantic and to examine the consequences for the cycling of carbon and nutrients in the ocean and thereby contribute to ocean management. During discussions a number of questions for potential examination have evolved, these include;

Question 1. How will climate variability and change – for example changes in temperature, stratification, transport, acidification – influence the seasonal cycle of primary productivity, trophic interactions, and fluxes of carbon to the benthos and the deep ocean? How will the response to these changes differ across the basin and among the shelf seas?

Question 2. How are the populations of phytoplankton, zooplankton, and higher trophic levels influenced by large scale ocean circulation and what is the influence of changes in atmospheric and oceanic climate on population dynamics.

Question 3. What are the consequences of changes in ecosystem structure and dynamics to climate?

Question 4. How do life history strategies of target organisms, including both vertical and horizontal migration, contribute to observed population dynamics and community structure and how are these life history strategies affected by climate variability. How will life history influence the response of key species to anthropogenic climate change?

Question 5. How does the removal of exploited species influence marine ecosystems? Under what conditions can such harvesting result in substantial restructuring of shelf or basin ecosystems, i.e. regime shifts? Do such changes extend to changes in primary productivity and nutrient cycling? How is resilience of the ecosystem affected?