

**Format**

The workshop will follow the format of the Dahlem conferences. Participation is by invitation only. There will be no presentations during the meeting. However, some participants have been asked to provide background papers which will be available to the participants well in advance of the workshop and which will be the basis of the discussions during the workshop. These background papers together with the summaries of the discussions will be published in a special volume of the Journal of Marine Systems after peer-review shortly after the meeting.

**Themes**

The discussions will be held in four working groups focusing on:

- Climate variability and teleconnection patterns of marine populations
- Impacts of past climate variability on marine ecosystems (over the past two millenia)
- Mechanisms linking climate variability to marine ecosystems
- Sensitivity of marine ecosystems to climate and human exploitation.

The working titles of the background papers are:

- Synchronies in fish population fluctuations within and between ocean basins
- Global comparisons of zooplankton time series
- Climatic teleconnection patterns forcing marine ecosystems
- Paleo evidence for the variability of upwelling and other systems prior to industrialised fishing
- Historical evidence for the variability of fish populations prior to industrialised fishing
- Linking climate to population dynamics: integrative concepts and novel constructs
- Major routes by which climate signals force marine populations
- How does human exploitation alter marine populations and ecosystem sensitivity to climate?

The workshop will be chaired by Jürgen Alheit, Ken Drinkwater and Ian Perry, which is a contribution to GLOBEC's Integration and Synthesis. If you would like to be informed of the outcome of the meeting please contact the chairs or the GLOBEC IPO.

**GLOBEC Focus 2 Process Studies Working Group meets at Dartington Hall**

Roger Harris, Plymouth Marine Laboratory, Plymouth, UK (rph@pml.ac.uk)

The historic Dartington Hall in Devon, UK, parts of which date back to 1388, was the venue for a recent meeting of the Focus 2 Working Group. Full details of the meeting can be found in the report at <http://www.globec.org>. This short article summarises selected aspects of the WG meeting.

WG members contributed a wide range expertise on geographical regions and ecosystem types as well as providing relevant specialist knowledge of calanoid copepods, euphausiids, gelatinous zooplankton and microzooplankton. Attending the Dartington Hall meeting were (Fig. 1), Uli Bathmann, Ulf Båmstedt, Francois Carlotti, Sanae Chiba, Dian Gifford, Roger Harris, Serge Poulet, Marina Sabatini, Sun Song and Mike St John. They were joined by Manuel Barange and Dawn Ashby from the GLOBEC IPO.

The Process Studies Working Group helps to facilitate international implementation of the research on process studies outlined in the GLOBEC Implementation Plan. The group works with the definition, "an organised, systematic investigation of a particular process designed to identify all of the state variables involved and to establish the relationships among them. Process studies yield numerical algorithms that connect the state variables and determine their rates of change; such algorithms are essential ingredients of Earth system models". This working definition illustrates the importance of such studies for GLOBEC and their particular relevance for models and for the Integration and Synthesis phase of the programme. Throughout the Dartington Hall meeting the emphasis was on the role that the group could play in Integration and Synthesis.

The WG reviewed progress on the review article on "Feeding, growth, reproduction and mortality of copepods: a GLOBEC review". This project reviews these four processes for a subset of target species studied over a range of physical system types addressed in national and regional GLOBEC programmes. Also the group agreed to begin a new activity considering process studies with a focus on Antarctic krill with the provisional title, "Euphausia superba as a key species for small- and mesoscale processes and population dynamics in Antarctic ecosystems: The SO-GLOBEC perspective". Rather



Figure 1. The Working Group members outside the Dartington Great Hall.

than duplicating recent krill reviews, the aim will be to focus on charting new directions for future research on Antarctic krill. Progress on another initiative on GLOBEC process studies of small scale biology-physics interactions (turbulence, mixed layer dynamics, patchiness) was also reviewed. Finally, it was decided to begin new writing activities on gelatinous zooplankton and processes. The database of GLOBEC publications maintained by the IPO as well as the recently published GLOBEC Special Contribution No. 7, "Update of GLOBEC National, Multinational and Regional Programme Activities, 2004." formed a valuable basis for these discussions and the associated writing work.

In addition to considering key processes, the concept of key species is critical in attempting to tackle the complexity of marine ecosystem dynamics. Key species are important for the work of the WG and for the Integration and Synthesis effort. To ensure that the group's work is most effectively linked with major national and regional programmes the Focus 2 group tries to assimilate information on target species from these programmes. To aid this it was decided that a small F2WG writing team would draft an

article for the GLOBEC Newsletter discussing the key species concept and its application within the GLOBEC I&S effort

A new initiative within IMBER on "End-to-end food-webs" was presented and this links with plans for a EUR-OCEANS meeting on "Parameterization of Ecosystem Models". Plans for the joint workshop with F3WG on "Mathematical modelling of zooplankton dynamics", to be held at CIRM, Luminy, Marseille, France, 2-5 May 2006 were reviewed. Development of major potential programmes in the North Atlantic and North Pacific were also discussed. In the North Atlantic the planned BASIN program would further the capacities necessary to predict the structure and dynamics of the North Atlantic and related shelf ecosystems under the influence of climate variability.

The proposed Oceanic Ecodynamics COmparison in the Subarctic Pacific (OECOS) may develop in parallel to BASIN providing the opportunity for Pacific-Atlantic comparisons and synthesis. OECOS would make "An east-west comparative study of lower trophic level pelagic ecology in the sub-arctic Pacific Ocean".

Detailed plans for a 2006 Roscoff workshop on "Influence of phytoplankton on herbivore reproductive success – impact of infochemicals and food quality?" were discussed by the group. Finally advice and input was sought on the session topics for the 2007 4th International Zooplankton Symposium to be held 28 May – 1 June 2007 in Hiroshima sponsored by ICES, PICES and GLOBEC and the Plankton Society of Japan and the Japanese Society of Fisheries Oceanography.



Figure 2. Sun Song, Dawn Ashby and Manuel Barange at the wine tasting (top) and Uli Bathmann discusses the finer points of Devon wine (bottom).



Figure 3 Japanese garden at Dartington Hall.

The Dartington Hall meeting began by revisiting the *GLOBEC International Integration and Synthesis Blueprint* and subsequent discussion throughout the meeting concentrated on how future work on process studies might best contribute to the programme-wide effort. As part of its role the Focus 2 WG will continue to foster comparative studies including both contrasts among key species within regions, between regions, and also across system types and processes. The wide range of writing activities, research proposals, workshop and symposium plans discussed at the meeting should all contribute to the overall Integration and Synthesis. As mentioned previously full details are in the F2WG report on the GLOBEC website.

Dartington Hall provided a beautiful and tranquil environment for what was a productive meeting. In addition to long days of presentations and discussions, time was found for a wine tasting visit to a local Devon vineyard (Fig. 2) and there was also opportunity for reflection in the Japanese garden (Fig. 3).

The Focus 2 Working Group works with and supports the whole GLOBEC community. It is not a closed group and anyone interested in the activities covered at Dartington Hall and who would like to become involved the work on GLOBEC process studies is encouraged to get in touch with one of the WG members. A full membership list with contact details is on the GLOBEC website.

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## **GLOBEC Focus 3 (predictive and modelling) working group meets in Scotland**

Brad de Young, Memorial University, St. John's, Canada ([bdeyoung@physics.mun.ca](mailto:bdeyoung@physics.mun.ca))

Our working group met last September in Aberdeen following the ICES Annual Science Conference. This was our first full group meeting since Qingdao in October of 2002 and was an opportunity to review progress on different projects and to plan for the coming years. We reviewed our approach and again endorsed the need to ensure that our meetings are as productive as possible and that we should avoid meeting just to meet and that work subgroups and tasks should all aim to produce papers in the primary literature. Much of the discussion at our meeting would be of interest to the broader GLOBEC community and key aspects are presented here. If you would like to hear more, or contribute to any of our activities, you are encouraged to contact the chair – Brad de Young ([bdeyoung@physics.mun.ca](mailto:bdeyoung@physics.mun.ca)).

### **Mathematical modelling of zooplankton dynamics**

Together with Focus 2, we will be holding a workshop early this May (2006) to review and discuss the mathematical modelling of zooplankton dynamics. This effort is led by Francois Carlotti (France) and David Mackas (Canada). The meeting will be held at the International Center for Mathematical Meetings (<http://www.cirm.univ-mrs.fr>) outside Marseille, France. We will define some key processes for discussion that are central to marine zooplankton and for which progress can be made in a workshop environment. It is expected that about twenty people will attend with interests that cover mathematical modelling, population modelling, spatially explicit modelling, process studies, observational and data collection and evolution and ecology. We propose to review five key issues:

1. Feeding functional responses
2. Metabolism and growth
3. Mortality

4. Predator-prey interactions and
5. Habitat selection.

Publications for the primary literature will be prepared following the meeting. We will report on the meeting in a future newsletter.

### **Spatial modelling of fish populations**

Models of fish population dynamics have a long history in marine science, generally motivated by the needs of stock assessment and advice. Most the models have been spatially aggregated to the scale of management units (e.g. the Norwegian Sea), delivering advice on regional scale integrated abundance and projected changes in species numbers at age under different scenarios of spatially integrated fishing mortality rate. However, as the demand to incorporate a wider range of ecological considerations into fisheries management increases, with the aim of both responding to the effects of climate change and minimising collateral effects of fishing on habitats and other species, so there is a requirement for new models which will explicitly resolve the spatial structure of fish populations.

Models to predict the consequences of spatial management measures on a spatially structured stock will need to represent the physical oceanographic features and fish behaviour patterns that maintain spatial organisation, as well as the spatial patterns of production (recruitment and growth) and mortality (natural and fishing) and how all of these may have changed over time in response to climate fluctuations and human interventions. This type of modelling represents a significant departure from the current modelling approaches as applied to fish stocks.

Population dynamics of any species are fundamentally governed by rates of reproduction, growth and mortality. Protozoan and metazoan populations differ in that for metazoans these rates