Integration of plankton abundance data for the evaluation of marine biogeochemical models; Cambridge, UK, 3-5 October 2008

It has long been recognised that biological activity has a large influence on biogeochemical cycles in the ocean. However, the recognition that the ecosystem composition may also be significant is more recent. The newest generation of biogeochemical models used to study climate-ocean interactions represents the diversity of planktonic ecosystems by grouping similar species into "Plankton Functional Types" (PFTs). These models can thus include specific biogeochemical processes mediated by distinct PFTs, such as the ballasting effect of mineral shells, the aggregation effect of some organic material, and the packaging effect of grazing by large zooplankton.

For over a century, plankton composition has been a core measurement for the study of plankton biogeography and ecology, leading to countless numbers of data points dispersed in marine laboratories around the globe. However, most plankton data are not available to the modelling community.

A workshop funded by the European Network of Excellence for Ocean Ecosystems Analysis (EUR-OCEANS) was held at the British Antarctic Survey (UK) to find ways to gather existing plankton observations in order to evaluate models. Sixteen experts on marine plankton, including field/lab scientists, modellers and data managers, discussed the determination, safeguarding and access to PFT data from eight distinct sources: metagenomics, flow cytometry, HPLC, microscopic identification of pico- to microplankton from bottle sampling, microscopic identification of meso- to macroplankton from net sampling, automated image analysis of meso- to macroplankton from net sampling, underwater automated image analysis of meso- to macroplankton, and remote sensing.

The primary issues identified were that (1) many marine scientists do not realise their data may be useful to modellers; (2) for each group of plankton there is a large variety of sampling, variable and analysis protocols; and (3) most plankton observations are reported as presence/absence, numbers or pigment concentrations, whereas models usually require carbon biomass.

The group recommended to set up small communities for each source of PFT data, composed of field/lab scientists, modellers and information system managers. The goals of these communities would be to:

- Facilitate the submission of biological data into designated National Oceanographic Data Centres (NODCs) or to a World Data Centre (WDC), notably WDC-MARE.
- Promote the extraction of data from NODCs and WDCsinto information systems available to the modellers, such as OBIS (biogeography), NMFS-COPEPOD (zooplankton), NOMAD (HPLC), EMBL-EBI (genetics), and PANGAEA (other marine data).
- Develop standard vocabularies describing variables, sampling protocols and analytical methods, building up on existing initiatives such as those undertaken by the Intergovernmental Oceanographic Commission's IODE programme, the NERC Data Grid programme, the SeaDataNet programme, and the Marine Metadata Interoperability network.
- Recommend best practices to harmonise existing data through the comparison of sampling and analytical methods.

- Identify new techniques and protocols to estimate PFT distribution, abundance and biomass, such as emerging molecular techniques and algorithms for the detection by satellite.
- Plan the collection of new PFT data using preferred sampling and analytical protocols, including complementary measurements required to compute carbon biomass (e.g. wet weight, size, biovolume or carbon content).

The full list of contributors to the workshop can be found in the electronic supplement to this Eos issue (http://www.agu.org/eos_elec/).