

# Challenges and Opportunities for Interdisciplinary Oceanography

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U.S. JGOFS has greatly improved our understanding of geochemical fluxes in the ocean and their interaction with biological processes. Moreover, it has nurtured a community of researchers who cross traditional disciplinary boundaries to study the ocean in an integrated manner. The scientific achievements of U.S. JGOFS, documented in this issue of *Oceanography*, are paralleled by achievements in the way oceanographers work together on global-scale questions.

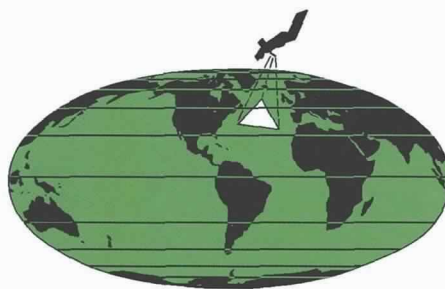
As new programs begin to emerge, it is worthwhile to consider some of the scientific activities necessary for a successful global ocean biogeochemistry program.

- ♦ Modeling is critically important, both to identify critical processes and regions of the ocean and to plan sampling strategies. It must be supported from the beginning of the program and have strong links to the field studies.
- ♦ Long time-series studies with high-quality ocean measurements are essential, given the time scales of ocean variability. Such programs must have strong and continuing scientific collaborations and oversight.
- ♦ International efforts to identify and develop standard reference materials and methods, such as those developed for measuring carbon dioxide in the ocean, are necessary for long-term, global studies.

There are also attributes of program management that are essential to success.

- ♦ It is important to develop a long-term strategy while retaining flexibility to pursue new issues and opportunities as our scientific understanding evolves. Such long-term planning and guidance for projects and expeditions should come from a scientific steering committee.
- ♦ Open data policies encourage collaboration. They are essential for an integrated research program.
- ♦ International partnerships and coordination must be developed for any global-scale program.
- ♦ Interdisciplinary ocean biogeochemistry studies require strong cross-program support within NSF as well as strong multi-agency partnerships.
- ♦ Synthesis of the results from the field programs, modeling projects and remote-sensing observations is essential if we are to obtain the maximum amount of scientific insight. Such synthesis efforts should also take place during the implementation phase of any future ocean biogeochemistry program.

This list is clearly not complete, but the overarching theme is the need to encourage and coordinate interactions among scientists, funding agencies and programs. The questions that we are asking today about the ocean's role in global systems and the predictions that we are striving to make about oceanic responses to environmental change require us to work together. ☐



J G O F S