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IAPSO/JGOFS Symposium IJ01

The Joint Global Ocean Flux Study

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The Joint Global Ocean Flux Study (JGOFS) was formed in 1987 under SCOR sponsorship and it subsequently became a Core Project in the IGBP. The objectives of JGOFS are: "To determine and understand on a global scale the processes controlling the time-varying fluxes of carbon and associated biogenic elements in the ocean, and to evaluate the related exchanges with the atmosphere, sea floor and continental boundaries" and "To develop a capacity to predict on a global scale the response to anthropogenic perturbations, in particular those related to climate change". (SCOR, 1990). JGOFS included 21 member nations with national JGOFS programs, and participation in one or more of the four large JGOFS elements:

1. A series of Process Studies internationally coordinated and interdisciplinary, in key ocean biogeochemical regimes, chosen for their sensitivity to climate change, and/or because they exhibit large carbon flux signals.
2. A network of Time Series Observatories for documenting seasonal to decadal scale variations in key biogeochemical, physical and ecological parameters.
3. A large-scale Survey of CO_2 and related properties, conducted with WOCE. The CO_2 Survey has realized the first comprehensive, high-precision global scale maps of surface pCO_2, allowing new estimates of carbon uptake by the oceans.
4. A Synthesis and Modeling Program, aimed at analyzing JGOFS and related observations over the past decade and formulating insights thus gained in a hierarchy of models. An early activity in the JGOFS SMP is the Ocean Carbon Model Intercomparison Project (OCMIP),

underway in collaboration with the IGBP Global Analysis and Interpretation Program. OCMIP's goal is to identify the key elements of coupled 3D models leading to convergence and divergence of global estimates of carbon uptake.

With these objectives it is clear that JGOFS is aimed at understanding and predicting the role of the ocean in the global carbon cycle. In particular JGOFS seeks to clarify the roles of the physical and biological carbon pumps which together store about 2 gigatons of carbon in the ocean annually.
In this session major results of the decade-long JGOFS program will be presented and critically assessed. These results illustrate great progress in our understanding of the patterns and trends in carbon flux, but also demonstrate that further study and new programs are needed to deepen our understanding and improve our ability to make climate prediction possible. For example, the oceans provide the principal constraint allowing us to estimate the terrestrial carbon sink and specify its geographic distribution. JGOFS will be ending in 2003. Key questions remain and new ones have come into prominence. JGOFS has provided the technical and human infrastructure to answer them.

By 2020 we would like to know, with confidence and precision:
* What are the geographical patterns of carbon uptake by the oceans, how and why do they change over time, and how can they be used to constrain terrestrial carbon storage on the continental landmasses?
* What will be the future course and ultimate capacity of oceanic carbon storage?
* How will ocean ecosystems respond to climate change, and how will the responses affect biogeochemical fluxes?
* What biogeochemical processes in which ocean provinces amplify or ameliorate global climate change?
* A new decadal scale program in ocean physics and biogeochemistry is needed to address these questions of critical importance to the planetary civilization.

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