

Integration of biogeochemistry and ecology to Mercator Ocean systems: Recent advances and future developments of the Green Mercator initiative.

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Building the capacity for monitoring and forecasting ocean biogeochemistry and ecology is a scientific challenge of strategic importance in the context of rapid environmental change and growing public awareness of its potential impacts on marine ecosystems and resources. Green Mercator takes up this challenge by integrating biogeochemistry and ecology to Mercator Ocean systems. Its main objective is to provide the community with the capacity for hind-casting, real-time monitoring and forecasting of the ocean biogeochemical state. It builds on an approach combining (1) the development of an assimilation system for biogeochemical observations; (2) the integration a biogeochemical component to the operational system. These efforts are paralleled by the development of metrics for the systematic comparison of model output to observations, as well as objective benchmarking of technical choices and new developments. The initiative is fully integrated at the national level within the coupled-physical biogeochemical modeling community. Expanding operational systems to biogeochemistry opens the possibility for wide ranging applications in environmental monitoring and research. Examples directly targeted by Green Mercator include the assessment of the variability of ocean biogeochemistry at inter-annual to decadal time scales; the development of a capacity for the monitoring of the ocean carbon cycle, the development of a framework for the science-based monitoring of marine ecosystems and resources. The scope of this communication is to present the project, its approach and present status, along with technical choices and future developmental steps. The second part of our presentation will focus on scientific applications by discussing examples for (1) model data integration through the assimilation of biogeochemical observations, (2) phytoplankton biomass monitoring, (3) monitoring of fishery resources.