Using re-analysis products to drive ocean ecosystem and biogeochemistry models

Stephanie Dutkiewicz[1], Mick Follows[1], Andrew Barton[1], Jason Bragg[2], Oliver Jahn[1], Christopher Hill[1]

1. Earth, Atmosphere, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge MA, USA
2. CSIRO Plant Industry, Canberra, Australia

The ecology and biogeochemistry of the world's oceans are to a large part shaped by the highly variable physical environment. Yet, it is only relatively recently that global three dimensional coupled physical-biogeochemical models to explore this link have become feasible. Initial results established that the quality of biogeochemical fluxes in those models was strongly dependent on the fidelity of the underlying ocean physics and dynamics. Needing good physical representation has become even more of an issue with increasing complexity of the biogeochemistry and ecosystem parameterizations. Here we describe results from our global ecosystem/biogeochemical model that utilizes the reanalysis ECCO-GODAE products to drive (advect and diffuse) inorganic carbon, plankton biomass, nutrients and organic matter. We will discuss how the physical environment helps to establish the global patterns of phytoplankton community structure, and the biodiversity of disparate regions of the ocean. The type of phytoplankton assemblage has a key impact on biogeochemical fluxes, such as carbon to the deep ocean. We will also highlight the importance of mesoscale processes on biogeochemistry and ecosystems with recent work by ourselves and others with high spatial resolution products such those from ECCO2 and a Southern Ocean state estimate.