1070-92-23 **Andrew D Barton*** (adbarton@mit.edu), Massachusetts Institute of Technology, 77 Massachusetts Ave, 54-1511, Cambridge, MA 02139, **Stephanie Dutkiewicz** (stephd@ocean.mit.edu), Massachusetts Institute of Technology, 77 Massachusetts Ave, 54-1412, Cambridge, MA 02139, **Glenn Flierl** (mick@ocean.mit.edu), Massachusetts Institute of Technology, 77 Massachusetts Ave, 54-1426, Cambridge, MA 02139, **Jason Bragg** (Jason.Bragg@csiro.au), CSIRO Plant Industry, Canberra, ACT 2601, Australia, and **Mick Follows** (mick@ocean.mit.edu), Massachusetts Institute of Technology, 77 Massachusetts Ave, 54-1514, Cambridge, MA 02139. *Patterns of Diversity in Marine Phytoplankton.*

Marine microorganisms, including phytoplankton, regulate the biogeochemical cycles of important elements in the climate system (C, N, P, Fe, and others), and there is an increasing appreciation that the total species diversity, in addition to the relative abundance of different species, determines the biogeochemical function of the ecosystem. Here, we examined the patterns and causes of marine phytoplankton diversity in a three-dimensional, time-varying global ocean circulation, biogeochemistry, and ecosystem model. Consistent with observations of marine and terrestrial ecosystems, the model indicated a decrease in phytoplankton diversity with latitude, which resulted from the seasonal variability of the physical environment. The relatively stable tropical and subtropical oceans allowed for the extended coexistence of phytoplankton with similar fitness, whereas the higher seasonality at higher latitudes led to the competitive exclusion of phytoplankton with slower growth rates and to lower diversity. Additionally, local "hot spots" of enhanced diversity were predicted in regions of energetic ocean circulation such as the Gulf Stream. These local diversity maxima reflected the role of ocean currents and mixing processes in the lateral dispersal of phytoplankton. (Received December 13, 2010)