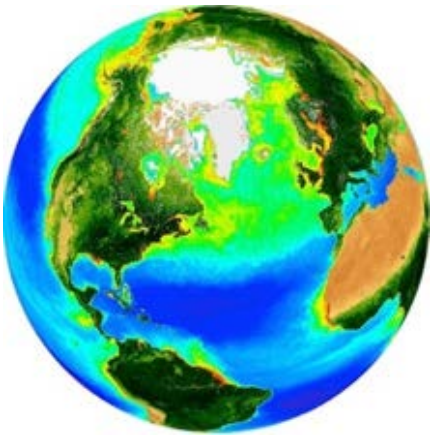
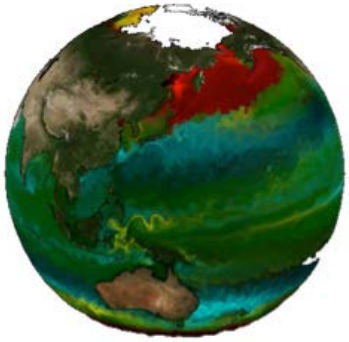
Andrew Irwin
Environmental Statistics

Dr. Irwin's research is in applied statistics and mathematics, with a particular focus on applications to biological oceanography, ecology, and climate change.

Microbial Models: A major goal of his research is to describe the distribution of microbial species in the ocean. Satellite remote sensing provides data about the state of the ocean (including chlorophyll concentration from the SeaWiFS project, shown to the right) essential for developing insight into marine ecology. Models that describe the temporal and spatial distributions of marine microbes can be used to project likely changes due to climate change over the coming century.





Data are used throughout the modeling process. (1) Model parameters are estimated using analysis of observational time series. (2) Model predictions are tested by comparison with observations at a range of spatial and temporal scales. (3) Predictions from alternative model formulations are compared to investigate sensitivity to differences in mechanistic descriptions of biological processes. A long-term goal is to update dynamic models of microbial biogeography such as those shown to the left (Follows et al, MIT Darwin project.)

Bioinformatic analysis: Molecular sequencing tools can quantify the composition of the message RNA in a cell, known as the transcriptome, which allows us to develop new insight into the physiology of marine microbes. Dr. Irwin collaborates with experimentalists to obtain new transcriptomes and develop new statistical tools for inferring changes in biological function.

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