Forecasting phytoplankton bloom extreme events across the global ocean

Phytoplankton bloom extremes in the open ocean (super-blooms or busts) occur relatively infrequently, yet have the potential to cause major disruption of the ocean ecosystem. If such bloom extremes were predictable in advance, they could transform marine resource management practices. Here, we use the Community Earth System Model Seasonal to Multi-Year Large Ensemble (CESM-SMYLE) to quantify and diagnose phytoplankton extreme forecast predictability and skill on timescales ranging from 1 month to 2 years in advance across the global ocean. Our study suggests a high potential for bloom extreme predictability in dynamic regions such as the eastern Tropical Pacific. We also find high potential predictability in bloom extremes in the Caribbean Sea Large Marine Ecosystem, a highly productive fisheries region.

Nicole Lovenduski, University of Colorado Boulder; Samuel Mogen, University of Colorado Boulder; Genevieve Clow, University of Colorado Boulder; Keith Lindsay, National Center for Atmospheric Research; Michael Levy, National Center for Atmospheric Research; Dan Amhrein, National Center for Atmospheric Research; Moha Gharamti, National Center for Atmospheric Research