

# Forecasting phytoplankton bloom extreme events across the global ocean

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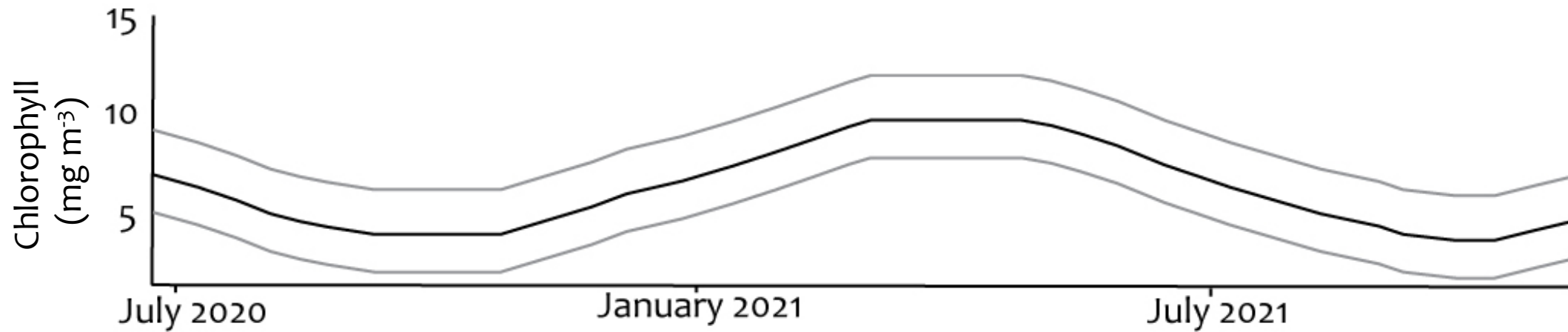
Sam Mogen, Genevieve Clow

University of Colorado Boulder

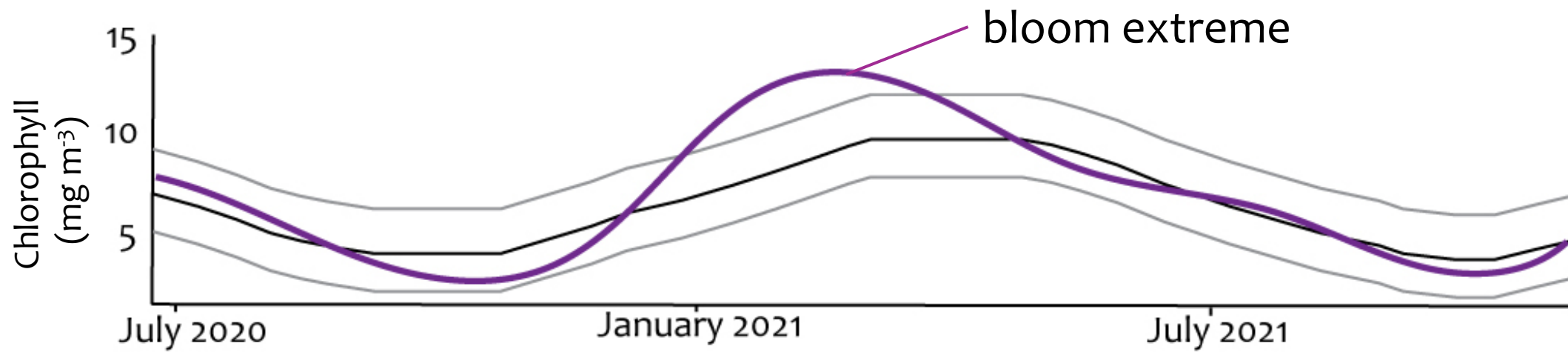
Keith Lindsay, Mike Levy, Dan Amrhein, Moha Gharamti

National Center for Atmospheric Research

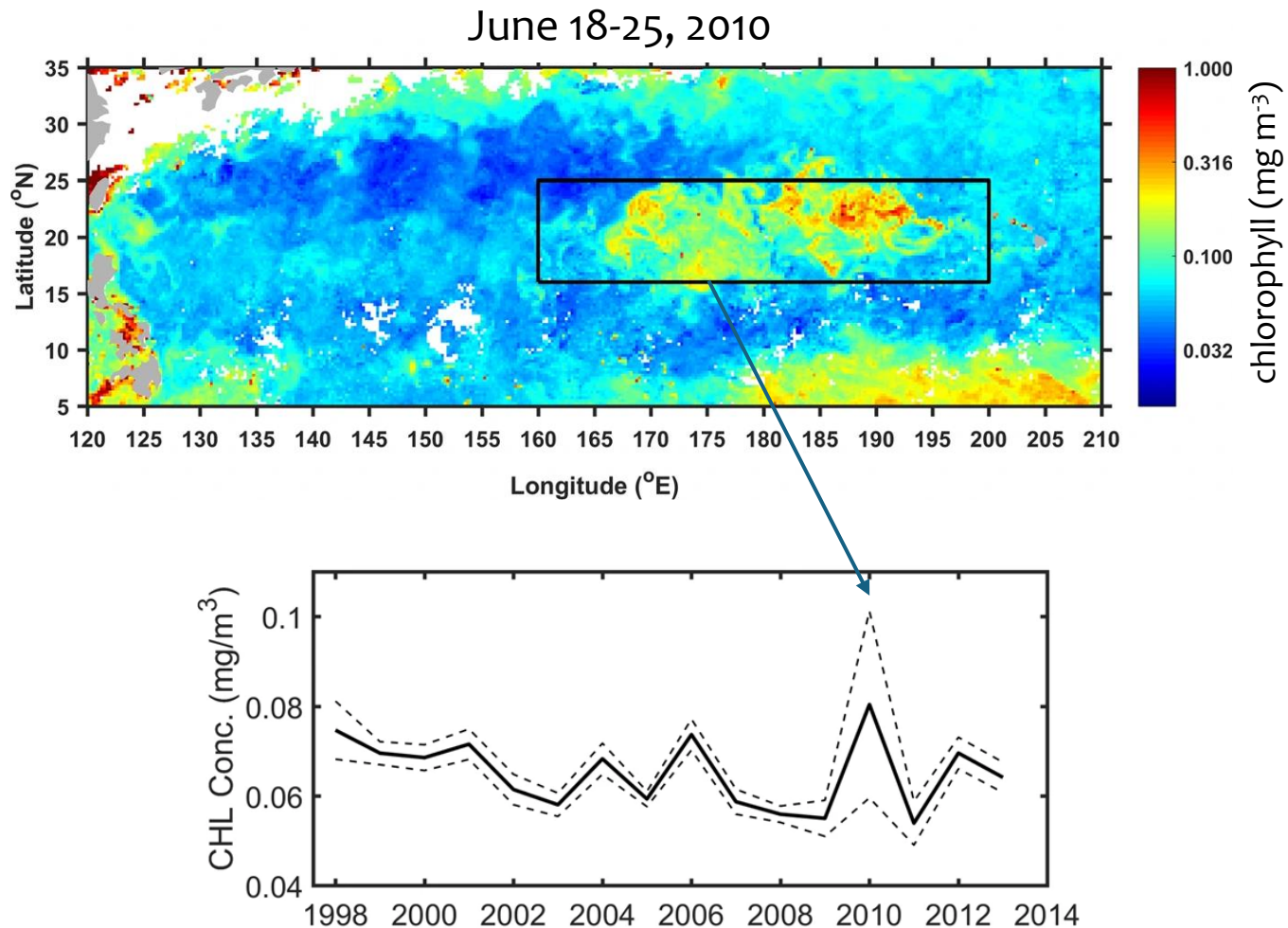
# Phytoplankton bloom extremes



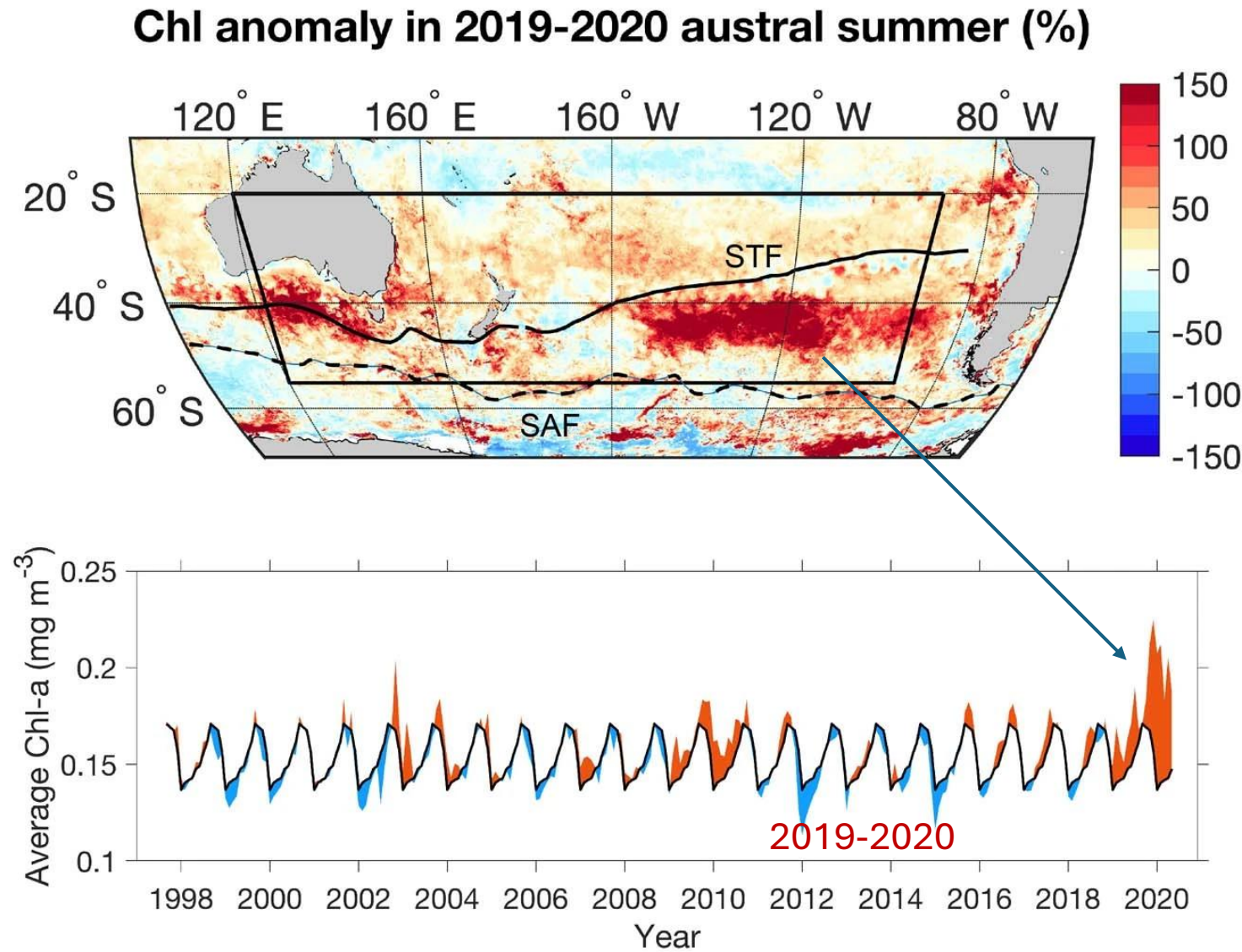
# Phytoplankton bloom extremes



# North Pacific subtropical gyre bloom extreme



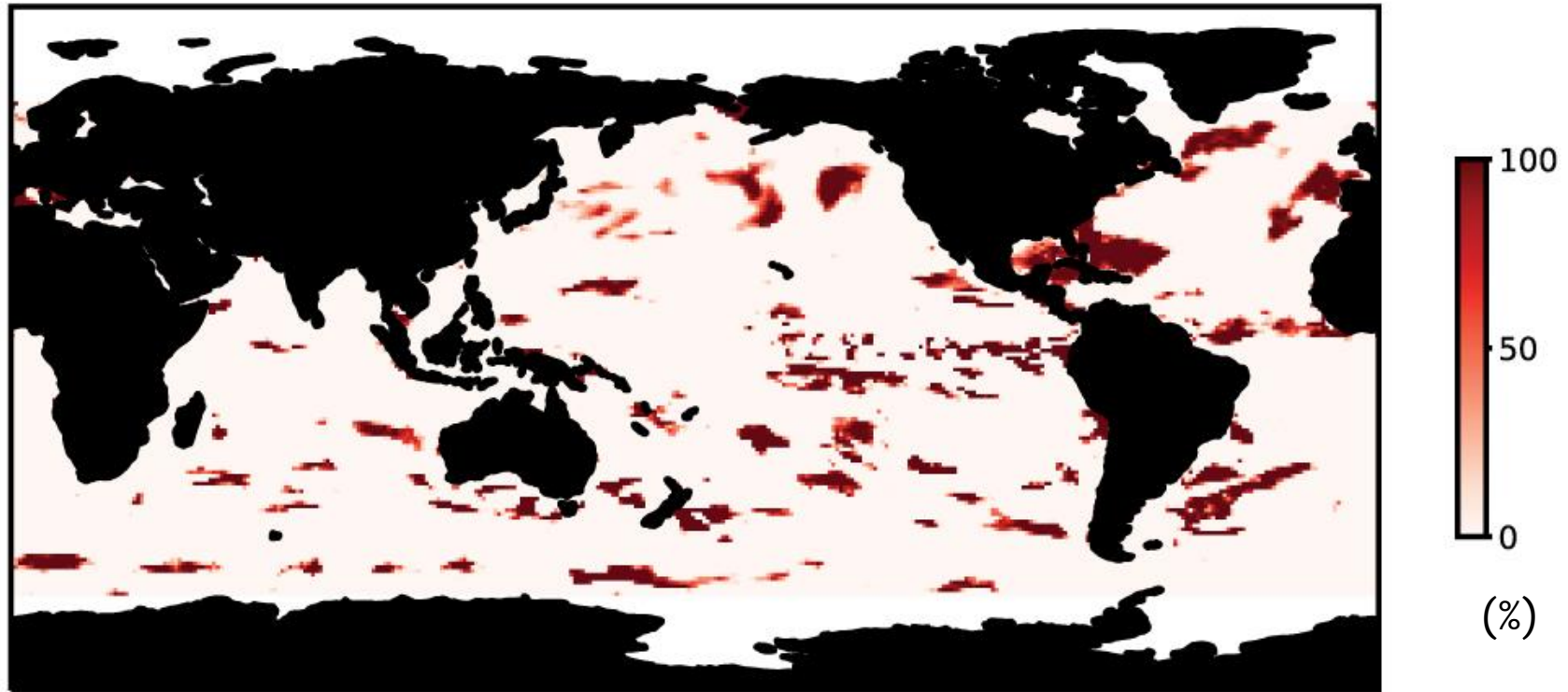
# Southern Ocean bloom extreme





# CESM2-SMYLE predicts phytoplankton extremes

Likelihood of extreme event  
February 2, 1985

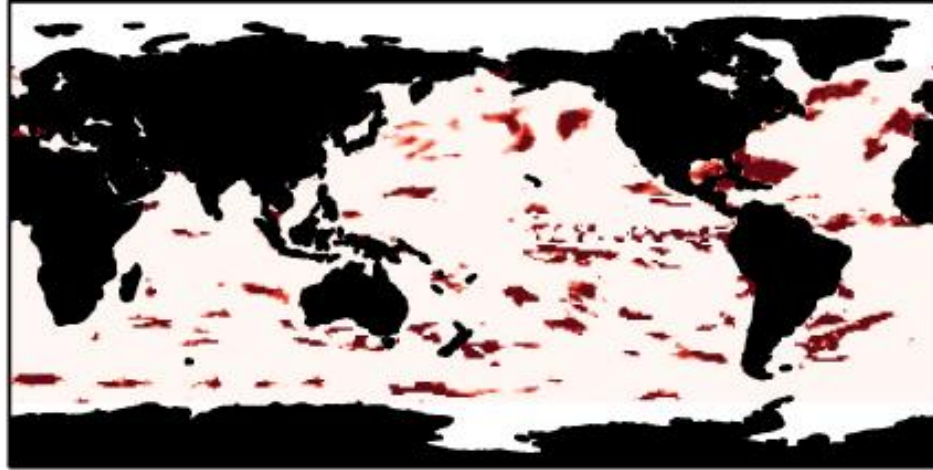


# Predictions of extremes may be skillful

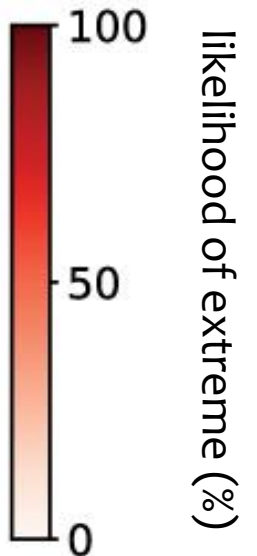
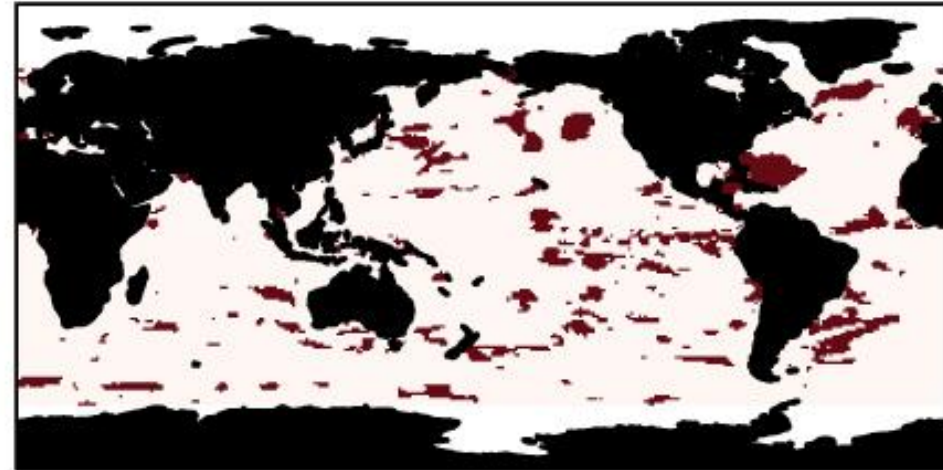
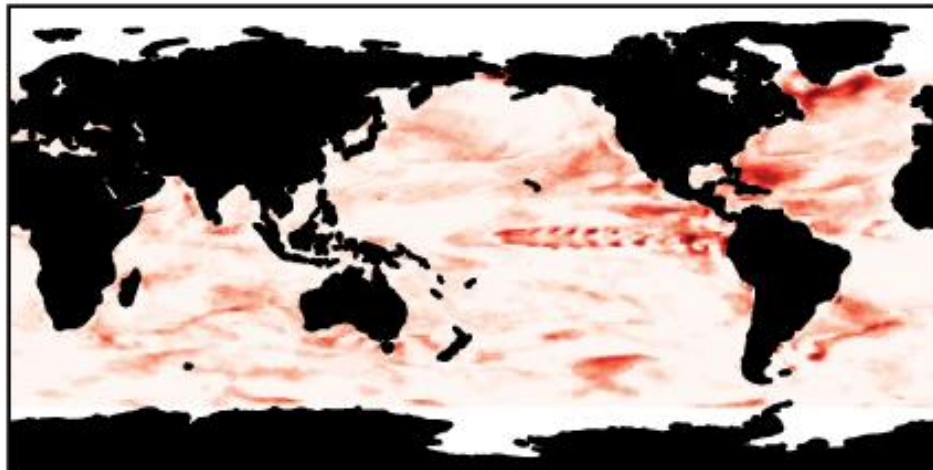
Forecast

Model reconstruction

Forecast lead:  
2 days



Forecast lead:  
30 days



# Bloom extremes are potentially predictable

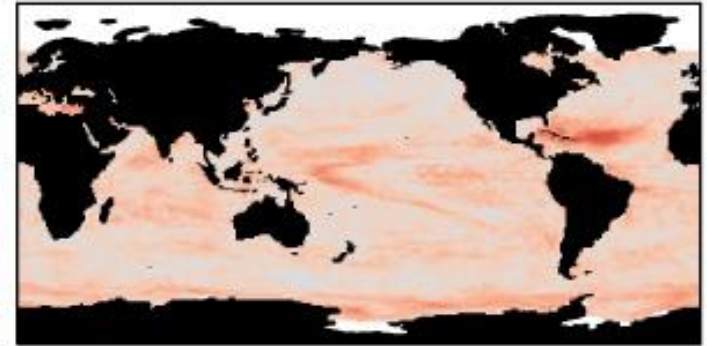
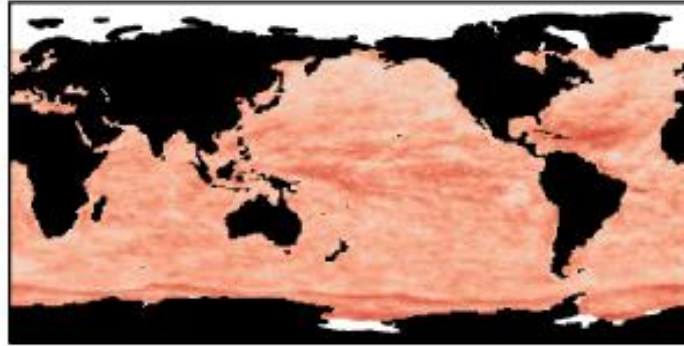
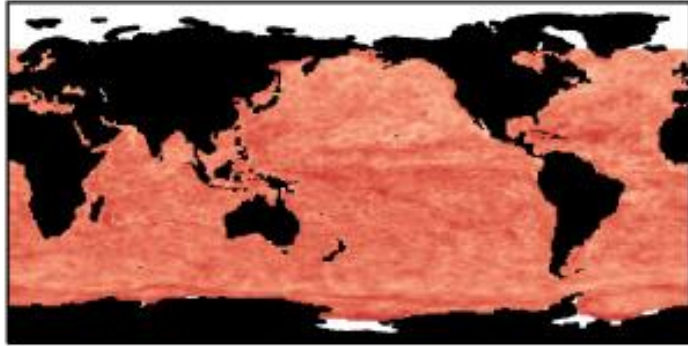
CESM2-SMYLE bloom extreme predictability

Forecast lead: 2 days

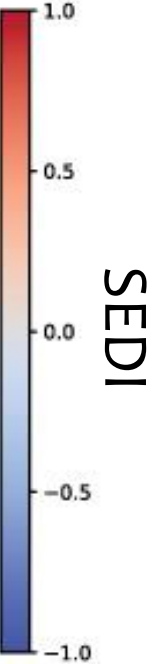
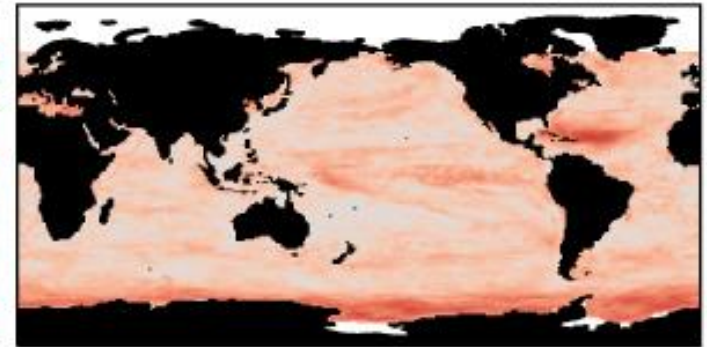
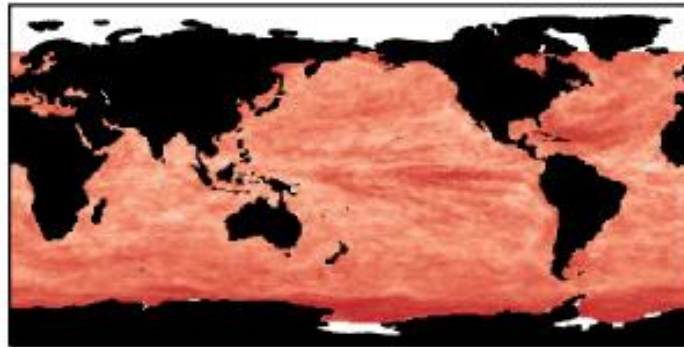
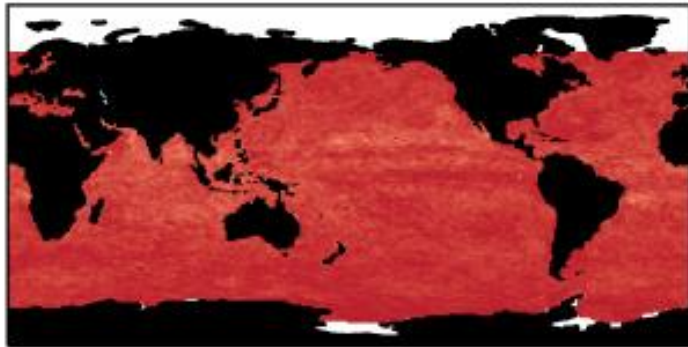
Forecast lead: 9 days

Forecast lead: 30 days

net primary  
production



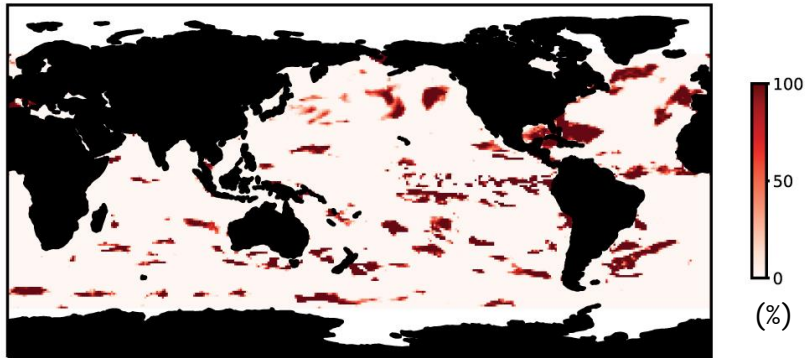
biomass



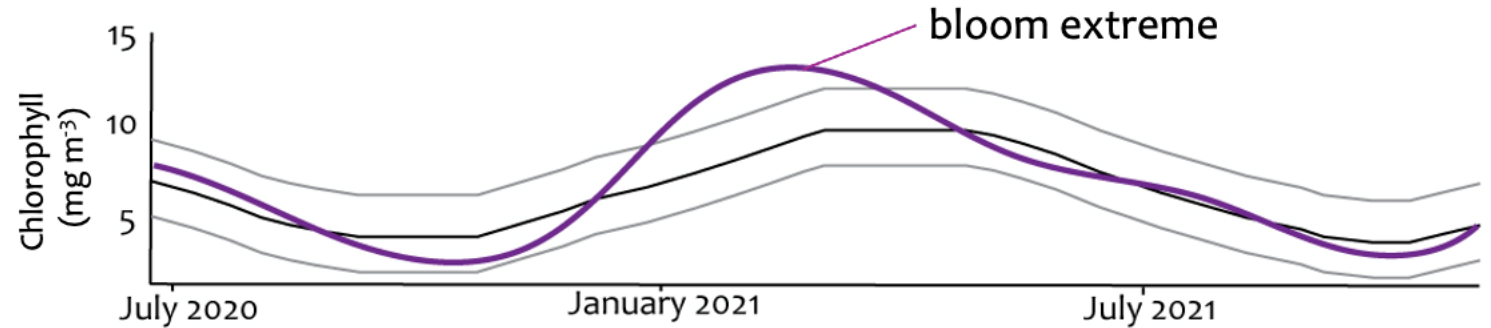


# Summary

Phytoplankton extremes can have significant impacts on productivity and ecosystems.



Extremes in phytoplankton biomass have higher predictability than extremes in net primary production.



CESM2-SMYLE can predict bloom extremes across the global ocean. In some places, bloom extremes are predictable over 30 days in advance.

