We have created **alternate evolutions** of **ocean chlorophyll** over time.

Using a synthetic ensemble to evaluate the role of internal variability on marine phytoplankton

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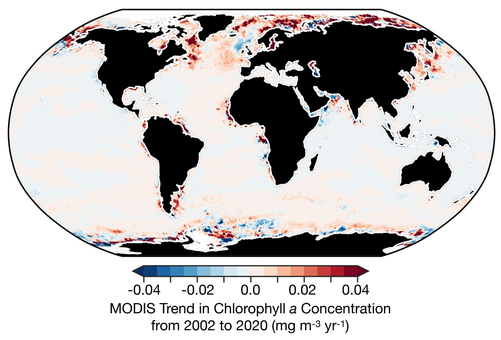
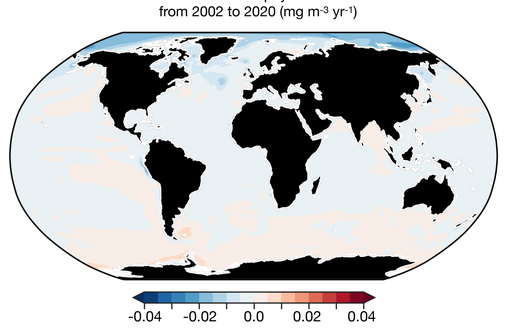
INTRODUCTION

Are the effects of anthropogenic climate change on marine phytoplankton already visible?

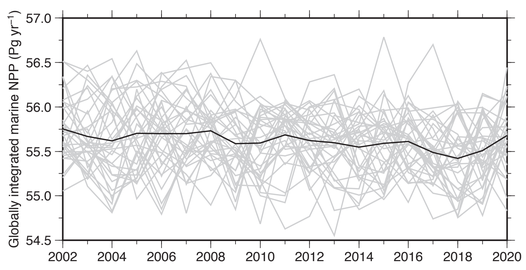
Satellite-derived remote sensing datasets suggest the effects can be observed already.



Large ensembles of ESMs indicate the effects have not yet emerged over the historical period.



We aim to reconcile this conflict by constructing a synthetic ensemble to constrain the effect of internal climate variability on phytoplankton.



METHODS

How to create a synthetic ensemble.

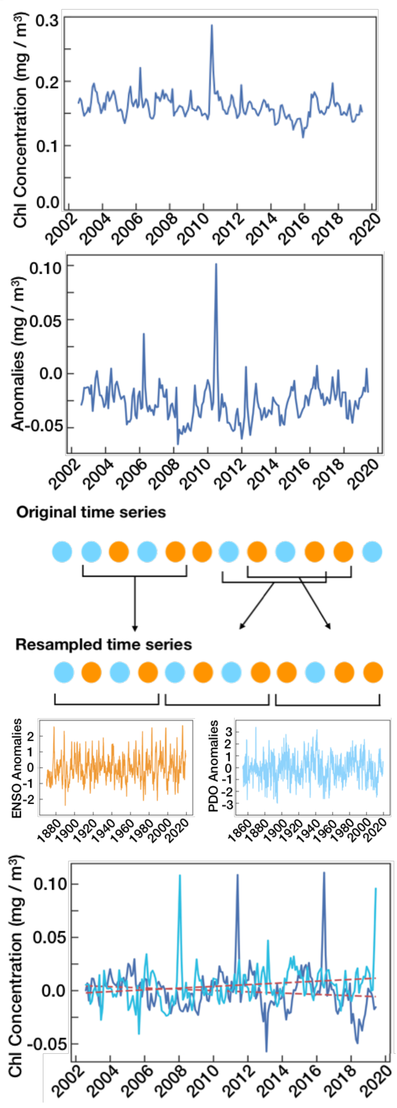
Generate a time series

Remove the linear trend, seasonal cycle, and climate modes

Block bootstrap the anomalies

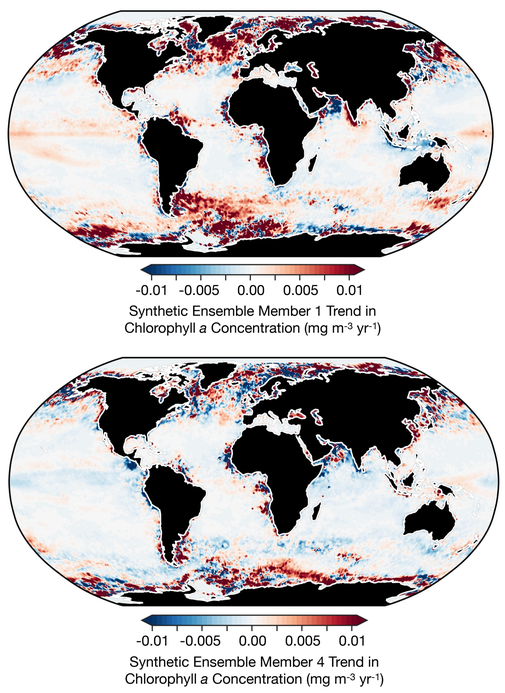
Generate surrogate climate modes

Combine the linear trend, seasonal cycle, block bootstrapped anomalies, and surrogate modes



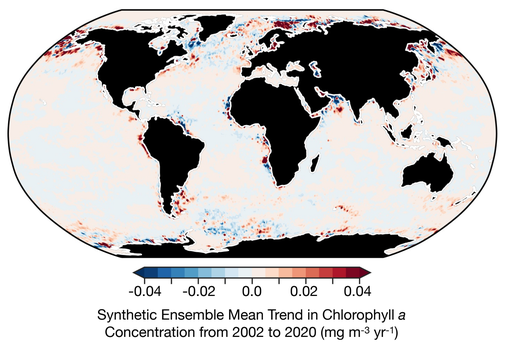
RESULTS

We created a synthetic ensemble of global chlorophyll concentration.



CONCLUSION

The synthetic ensemble reveals the important role of internal climate variability on the ocean biosphere's evolution.



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