

Wednesday, 4 December 2025 at 11:00 EST / 16:00 UTC

Registration Link: <https://washington.zoom.us/meeting/register/sRsVP45gSHGdr7z-aRlwng>

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SCOR Working Group 168 Webinar #6

Title: Causality Analysis of Positive Trend in Southern Ocean Chlorophyll-a

Presenter:

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The positive trend in Southern Ocean chlorophyll-a (Chl-a) concentrations remains a central and unresolved question in ocean biogeochemistry and climate research.

Satellite records have suggested regional increases in surface Chl-a, yet the underlying drivers remain debated due to sparse in situ observations and the complex interplay of physical and biogeochemical processes. Here we have used satellite observations with a data-assimilating biogeochemical state estimate (B-SOSE) to investigate the mechanisms shaping the observed positive trend in Southern Ocean Chl-a over the past decade. We perform a suite of diagnostics, including trend analyses, iron budget decomposition, and causality analyses to separate the roles of physical forcing (e.g., freshwater fluxes, mixed layer depth, mesoscale diffusion, and advection) and ecosystem processes (light and iron limitation). Our results highlight a latitudinal difference in terms of what originates the Chl-a trend. In the ACC region, enhanced mixing leading to changes in mixed layer depths and changes in wind stress amplitude are the main causes of the Chl-a increase. In the low-latitude Pacific and near the Antarctica Coast, reduction in light limitation is the main driver.

Webinar Series Information

The [4D-BGC Working Group](#) seeks to enhance access and utility of Biogeochemical (BGC) Argo observations through four-dimensional (4D) data products. These advanced data products aim to refine our understanding of ocean biogeochemistry, improve biogeochemical models and reanalysis products, and provide valuable insights for policy-making. The goal of this webinar series is to introduce new and in-development BGC data products, review techniques used to develop data products from in situ observations, and to explore ways in which 4D-BGC products are leveraged to answer scientific questions.