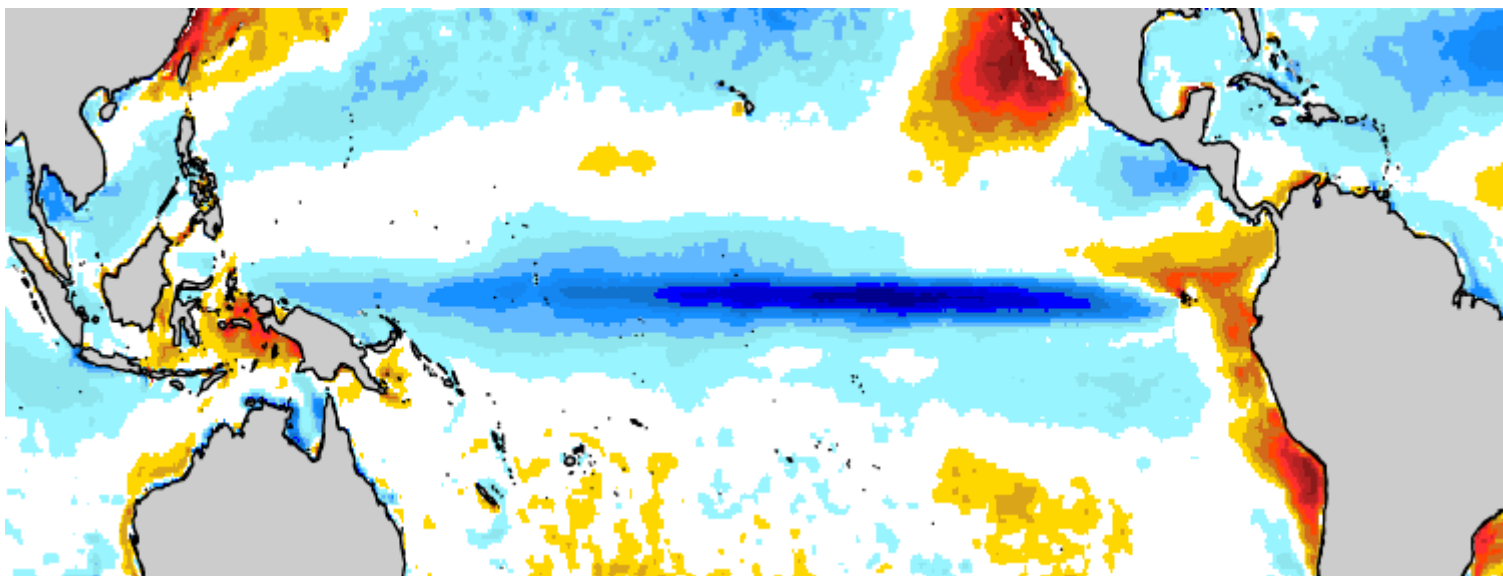


## Bias development mechanisms



Certain limitations, such as imperfect parameterizations and inaccurate initial conditions, introduce biases in the climate models, i.e. cause them to have differences with the observations. By trying to understand the model biases, we are able to contribute to the continuous progress of the climate models.

## Summary

All models exhibit to some extent biases. These arise from model shortcomings (such as imperfect model parameterizations), from inaccuracies in the initial conditions (for example in the deep ocean), or from inaccuracies in the boundary conditions (for example in the aerosol concentrations). Systematic biases in a model occur when these biases are present in all model versions, or in all model ensemble members, which are routinely used in the seasonal to decadal prediction framework. Examples of typical systematic model biases that are present in most climate models are the cold equatorial Pacific bias and the warm biases at the eastern boundaries of the oceanic basins.

Here at the Climate Prediction Group of BSC we explore the model systematic biases by analyzing the plethora of seasonal predictions performed by the group. Using seasonal predictions allows us to assess biases that develop in short time scales (from few weeks up to few months). Such biases contribute to the long term biases that the equilibrated climate simulations exhibit. By using additional ocean-only and atmosphere-only experiments, we can learn more about the biases of the separate model components that comprise the climate model, and assess whether these biases are amplified or suppressed by the atmosphere-ocean coupling. Our approach aims at understanding better the origins of the biases, the mechanisms that sustain or amplify them, and ultimately allows us to identify model shortcomings and give feedback to the model developing communities.

## Objectives

Within the scopes of the PREFACE project, which focuses on the Tropical Atlantic (PREFACE, <http://preface.b.uib.no/>), and under the framework of seasonal to decadal prediction, the objectives are to

- Identify and describe model biases
- Evaluate sources of biases (ocean, atmosphere, atmosphere-ocean coupling)
- Provide insights for model improvement

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

---

**Source URL (retrieved on 1 jun 2025 - 14:50):** <https://www.bsc.es/ca/research-development/research-areas/climate-prediction/bias-development-mechanisms>