

# Assessing the role of eastern boundary upwelling regions and their ecosystems on climate variability using a NRCM

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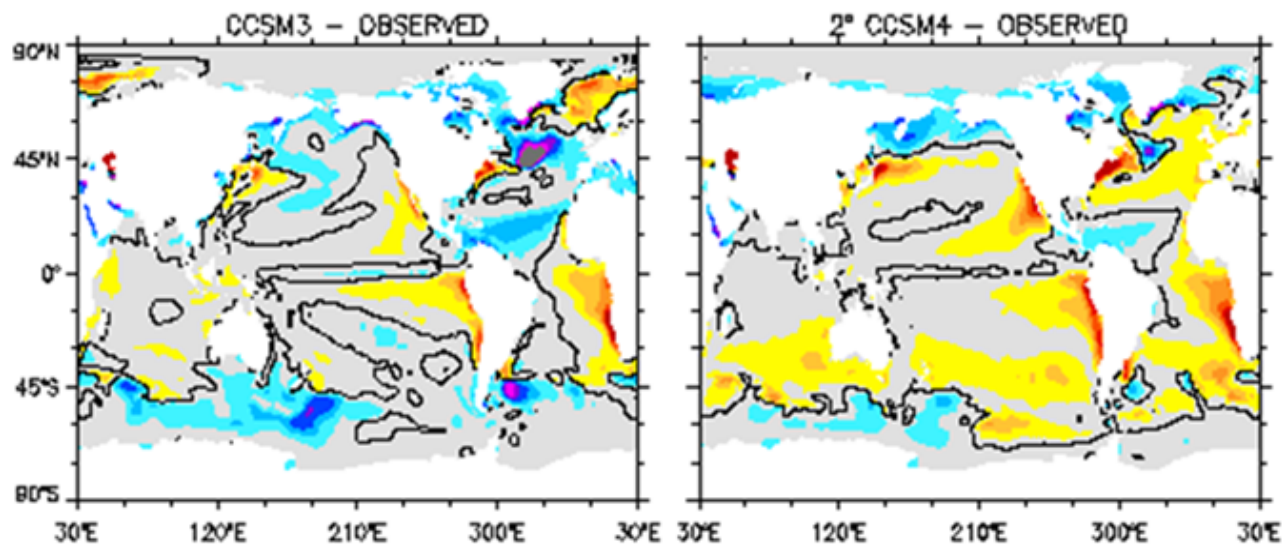
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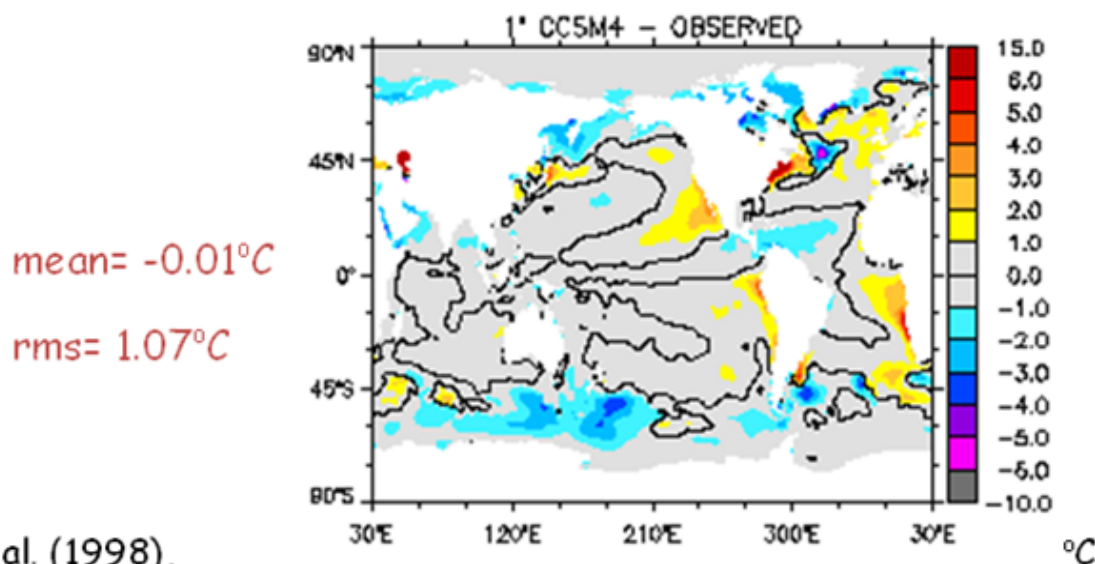
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# SST DIFFERENCES FROM OBSERVATIONS

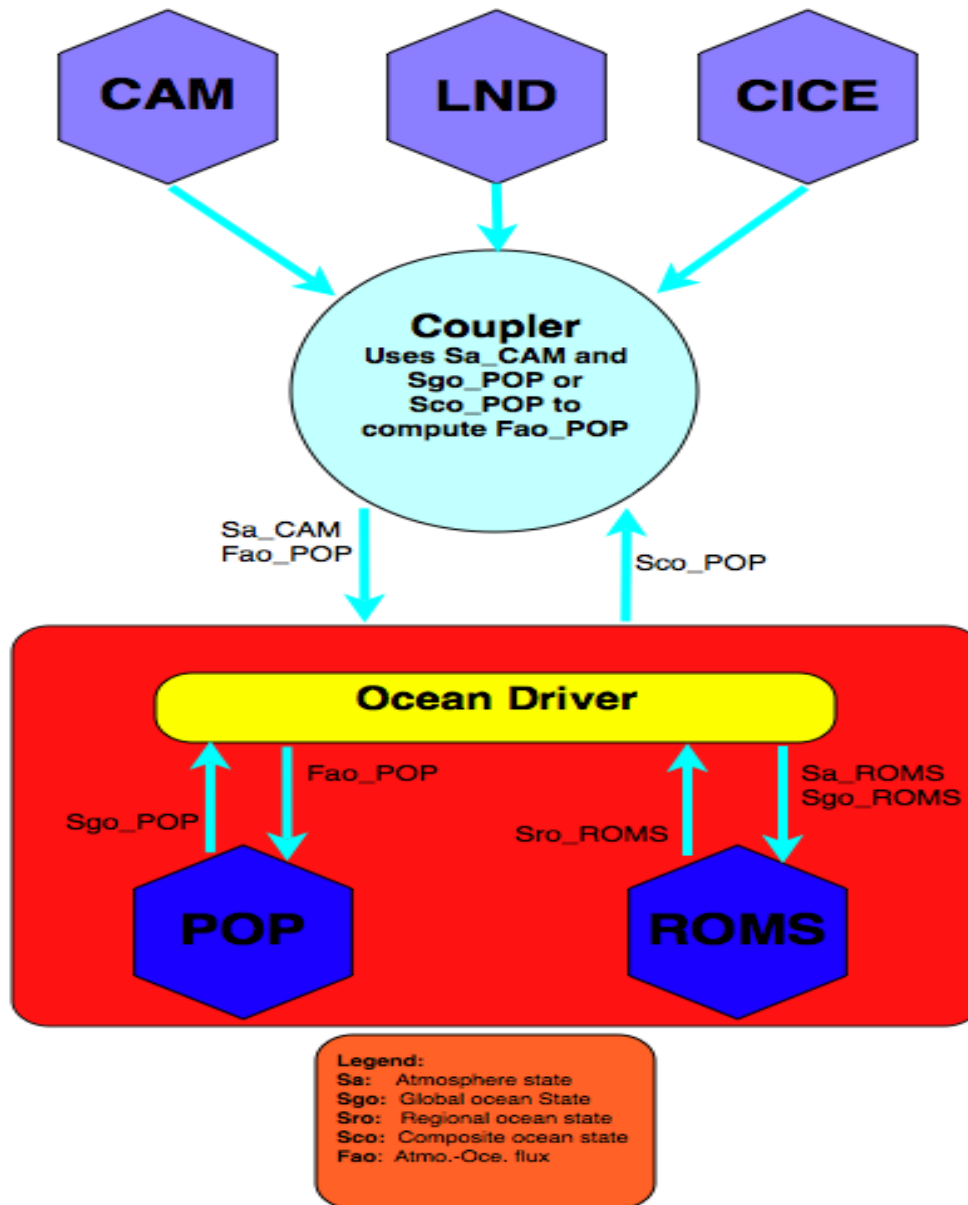


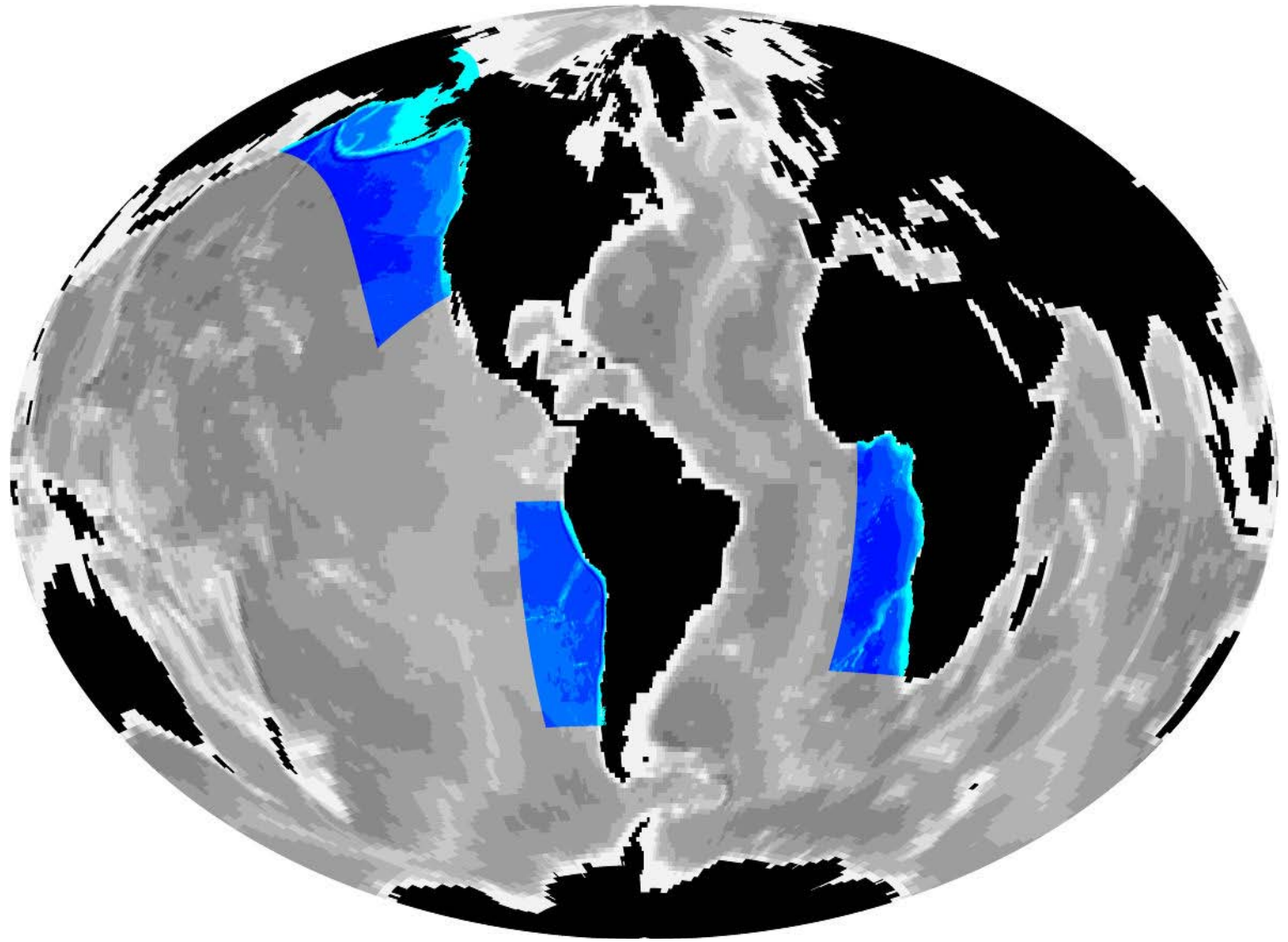
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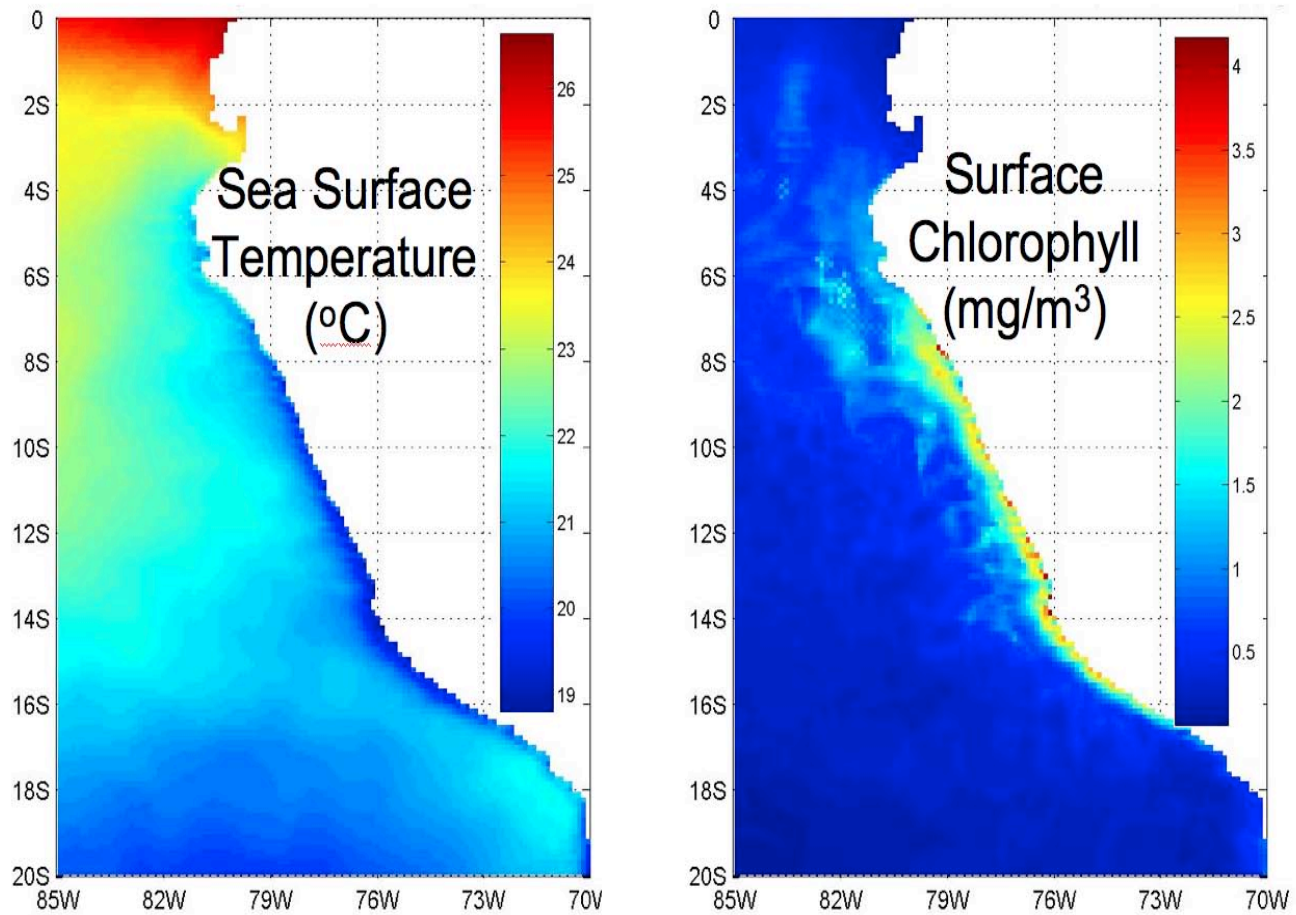
rms= 1.44°C



Obs: Levitus et al. (1998),  
Steele et al. (2001)







**Figure 3.** The Pacific basin ROMS-CoSINE simulated annual mean sea surface temperature (left) and surface chlorophyll (right) for the Peru upwelling system.

# *1: On the role of coastal upwelling regions in the climate system:*

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- What are the effects of upwelling on the regional and global air temperatures, precipitation and wind patterns.
- How will these patterns evolve under climate change.
- What are the dynamical mechanisms linking the upwelling regions with the large-scale climate patterns.
- How important are the atmosphere/ocean feedbacks in the upwelling regions.

**2:** *How does resolving the upwelling affect existing biases in a climate model.*

- Sea surface temperature patterns.
- Global precipitation patterns.

### ***Q3: On the role of upwelling systems in CO<sub>2</sub> air-sea exchange:***

- What are key physical and biological processes controlling air-sea CO<sub>2</sub> flux and carbon export in the eastern boundary upwelling systems.
- How will the natural and anthropogenic factors change the carbon cycle and ocean acidity in the eastern boundary upwelling systems.



## *4: On the dynamics of oxygen in the upwelling regions:*

- What are the relative contributions of regional biological productivity and basin-wide circulation to the extent and intensity of oxygen minimum zones in the eastern boundary upwelling systems.
- What is the sensitivity of the oxygen minimum zones to climate variability, such as ENSO and PDO, and to future global warming scenarios.
- Anything else we should look at: Clouds? Radiation balances? Is this the right place to pose this question?