



# ECCOv4r4-Based Analysis of Cooling Trends in the Upper Tropical Eastern Pacific (CROCODILE)



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## Overview

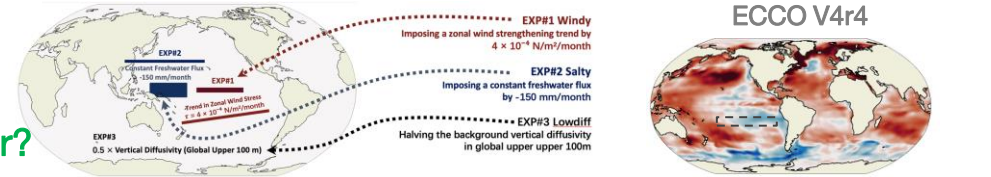
- ❖ There is a cooling trend over the tropical Pacific despite the global warming in recent decades, and reanalysis data does not have a clue.
- ❖ Understanding the cooling by using budget/ sensitivity experiment in ECCO.

## Products/Resource Used

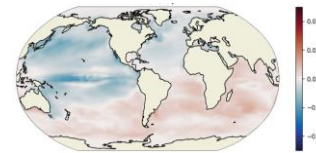
- ❖ ECCO v4r4: temperature, salinity, currents, sea surface height, temperature flux, and heat flux etc.
- ❖ OSS and p-cluster.
- ❖ ecco\_v4\_py, ecco\_accees, ECCO\_v4\_Heat\_budget\_closure, and EMU.

## Sensitivity Experiment

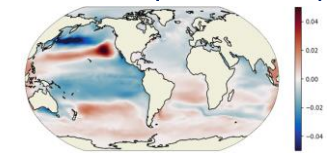
How to get the cold tongue colder?



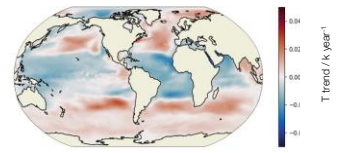
Difference (EXP#1 - V4r4)



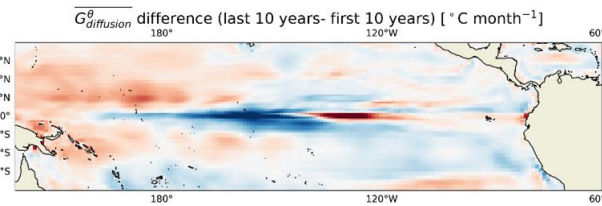
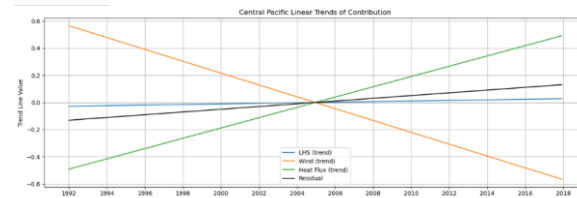
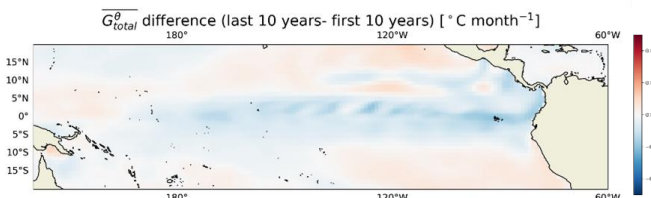
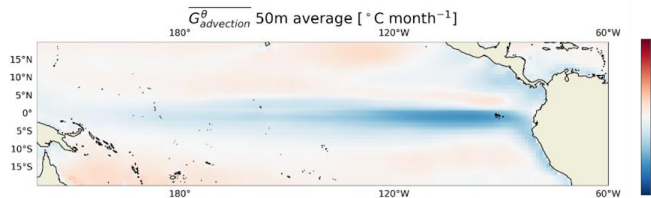
Difference (EXP#2 - V4r4)



Difference (EXP#3 - V4r4)



## Heat budget and Attribution



(1) Budget closes; (2) Advection and mixing lead to cold tongue cooling climatologically; (3) And they also contribute to the cooling trend.

## Summary

- ❖ Mixing matters and needs to be archived.
- ❖ Many processes contribute to the long-term cooling.

## Challenges Faced

- ❖ Some of us shifted from MATLAB/NCL to python.
- ❖ Understanding/Conducting sensitivity experiment.

## Future Work

- ❖ Physical interpretations of sensitivity experiments and test these using EMU tools.

