

How Tibetan Plateau Affects the PMOC ? Part III

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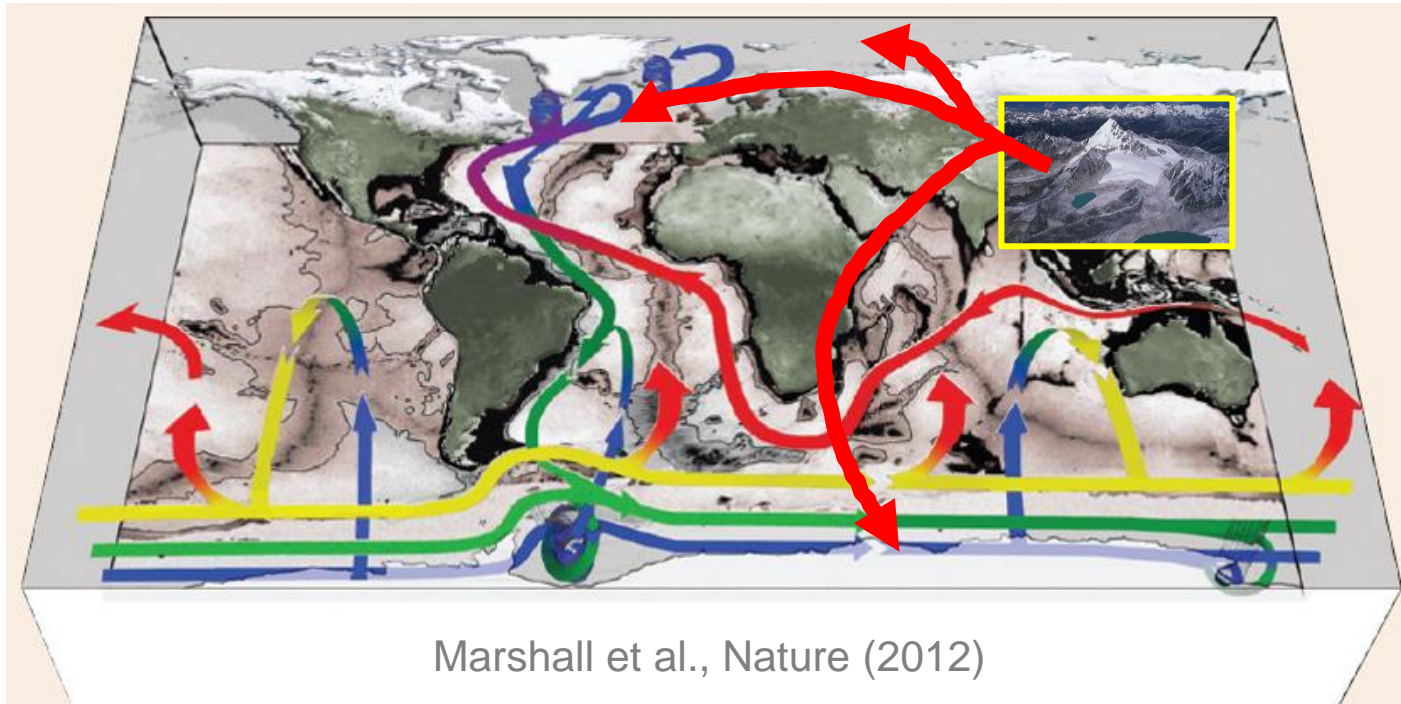
Tibetan Plateau (TP): the 3rd Pole

Total Area: 2.5 million km², Elevation: 4000 m



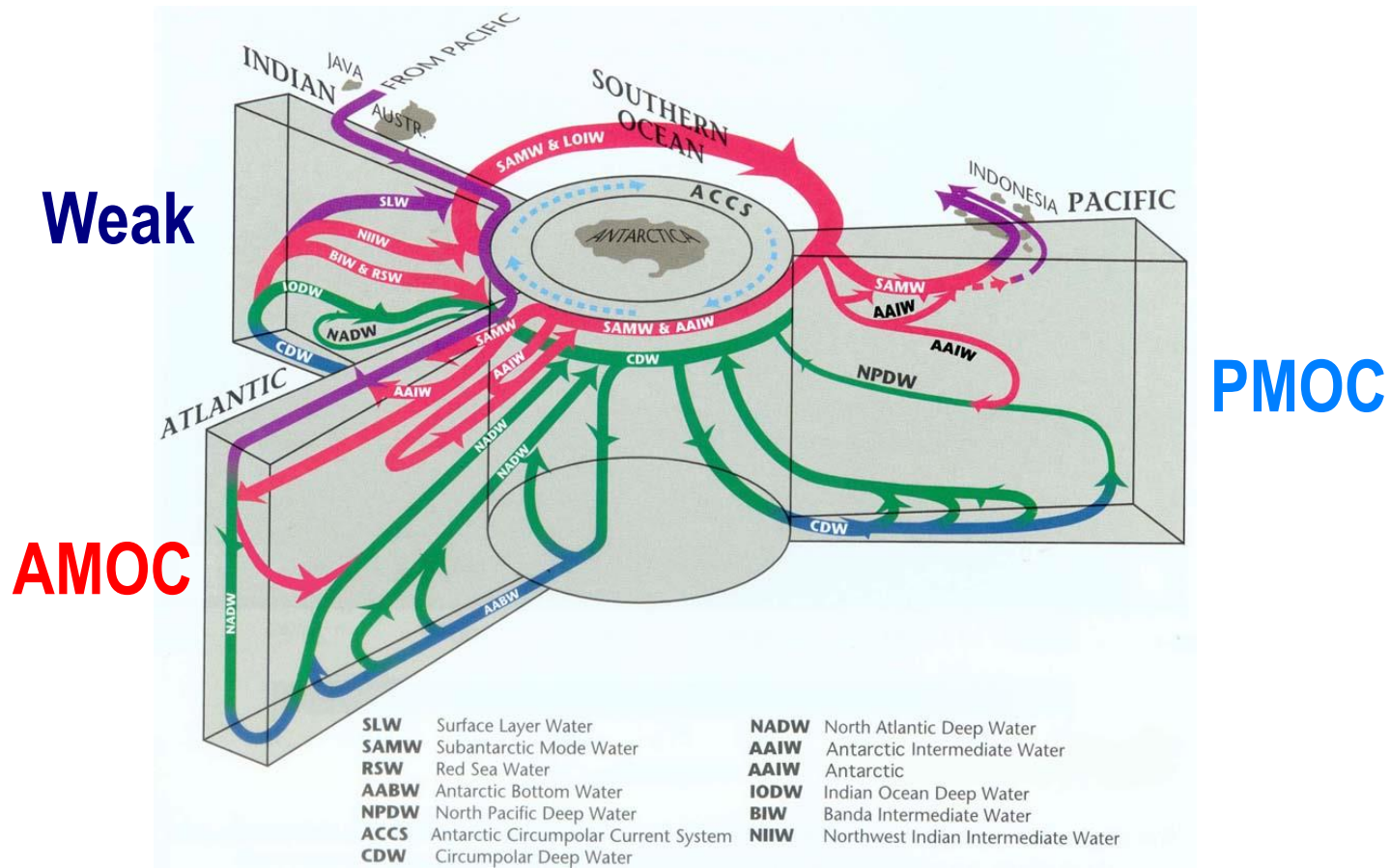
TP: A *Global* Perspective

How and to what extent?



Global Meridional Overturning Circulation

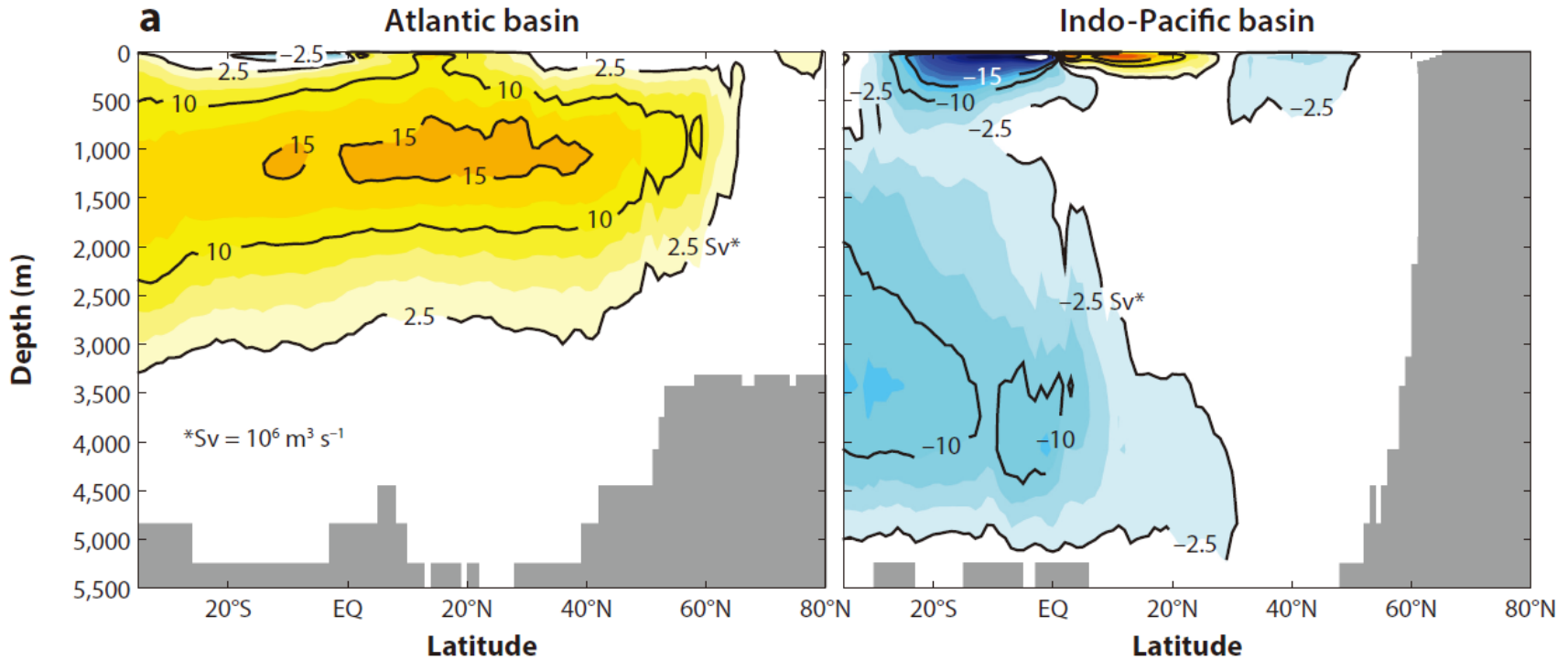
Energy and Freshwater Balance



Schmitz (1997) Overturning circulation: Southern Ocean View

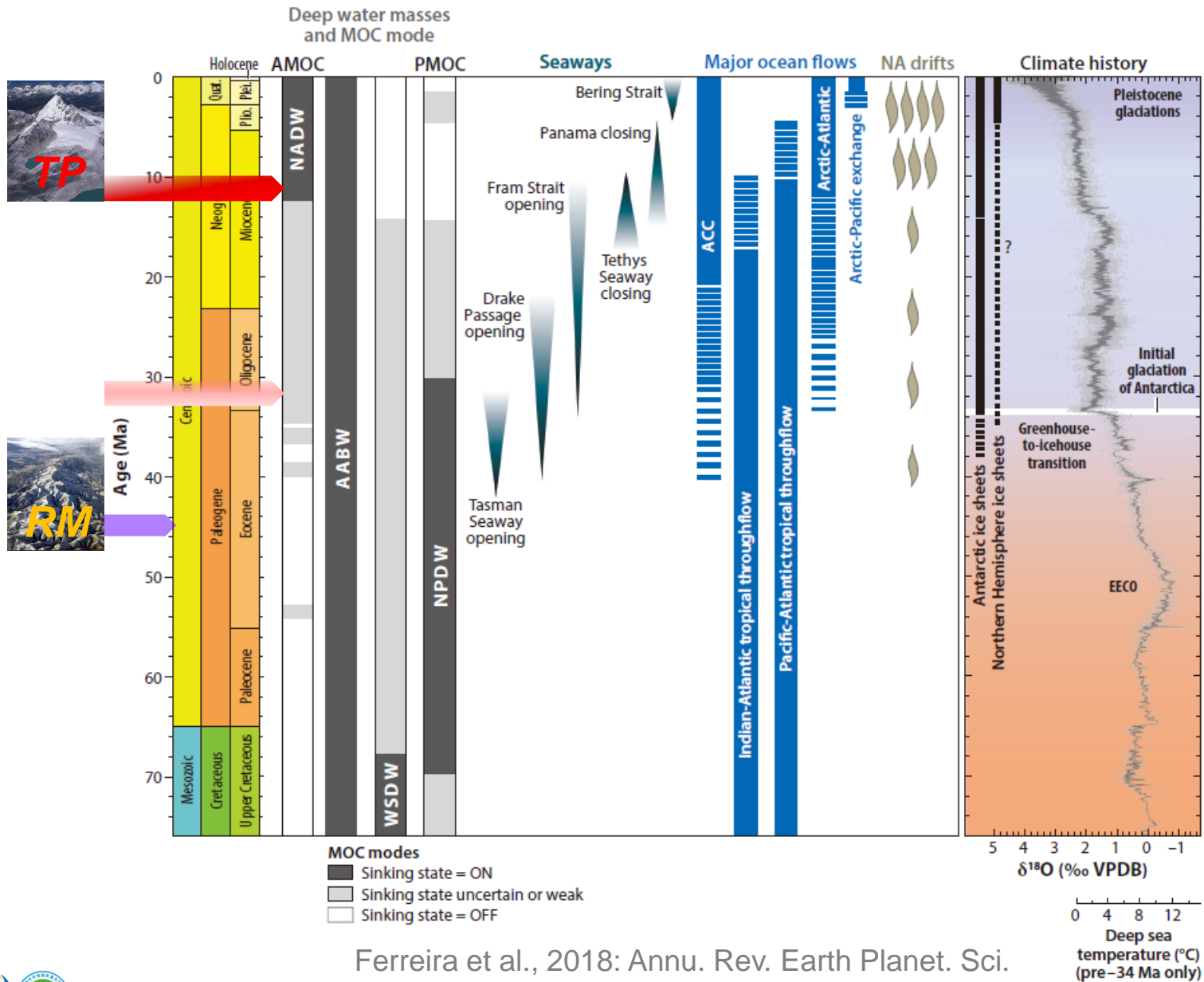
Strong AMOC

Weak PMOC



Ferreira et al., 2018: Annu. Rev. Earth Planet. Sci.

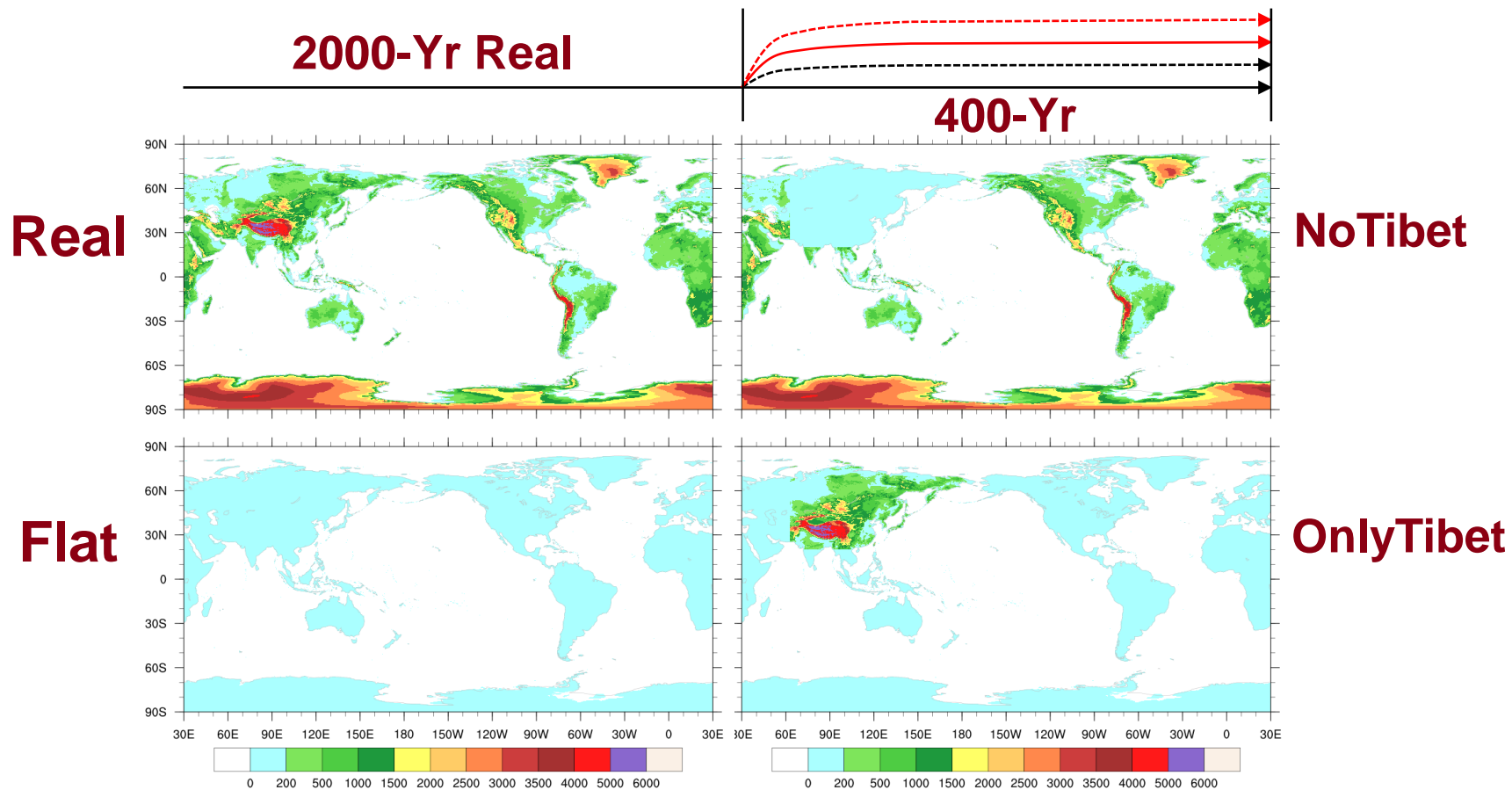
Geological History of *GMOC*



Ferreira et al., 2018: Annu. Rev. Earth Planet. Sci.

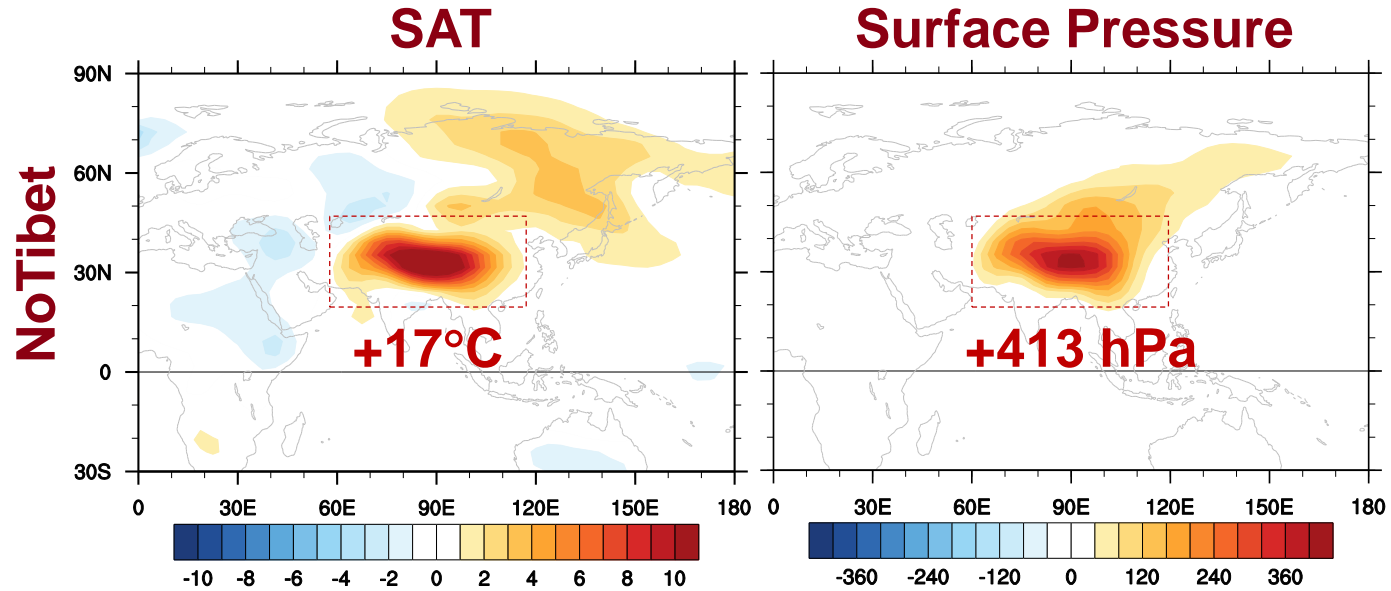
中国科学院南海所LTO学术年会, 2019.01.18-19, 广州

Coupled Earth System Model

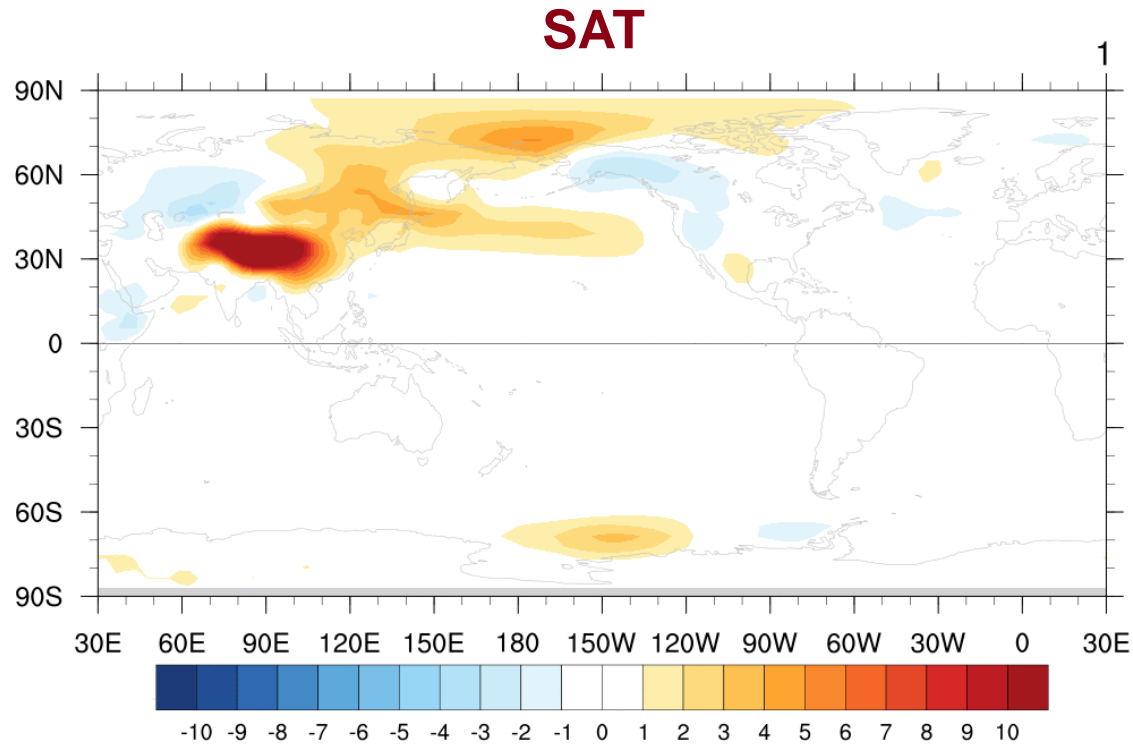


NCAR CESM1.0: CAM5 / POP2 / CLM4 / CICE4 / Glimmer-CISM

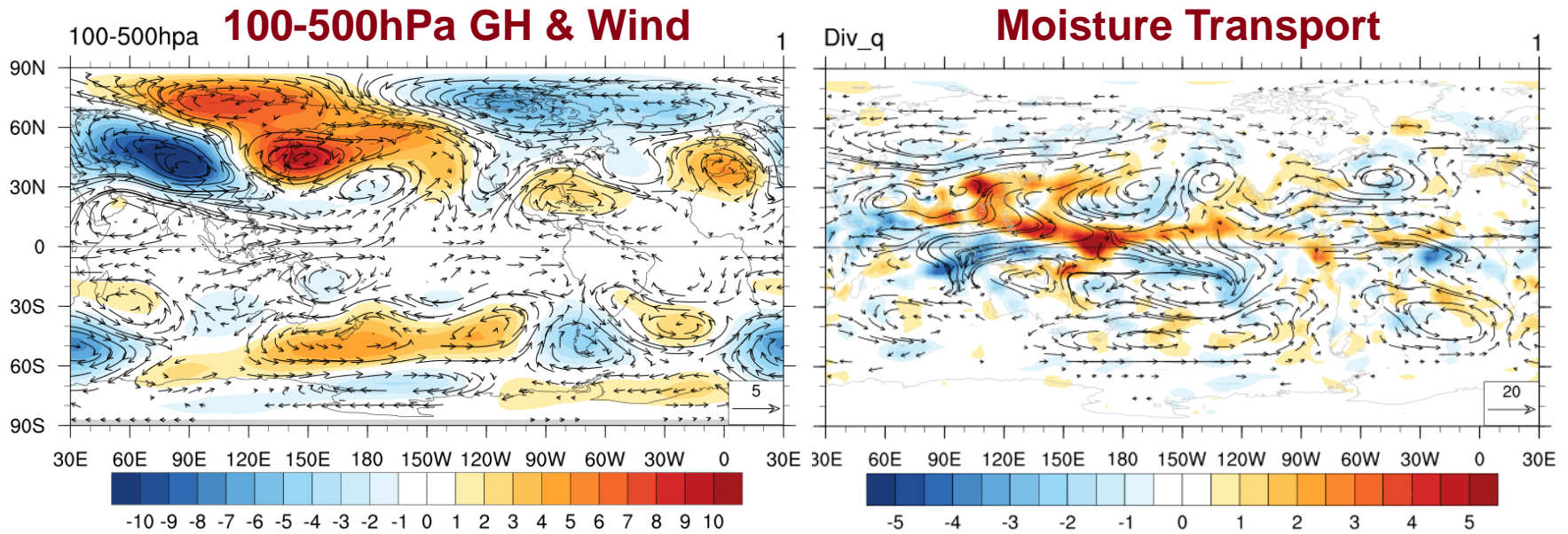
TP Forcing: *Thermal* and *Dynamical*



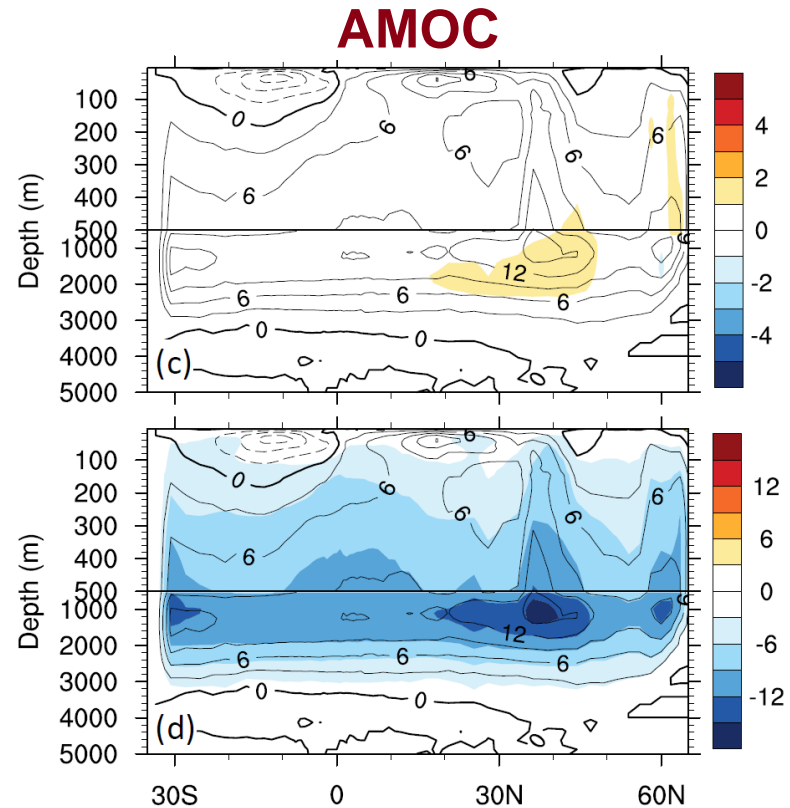
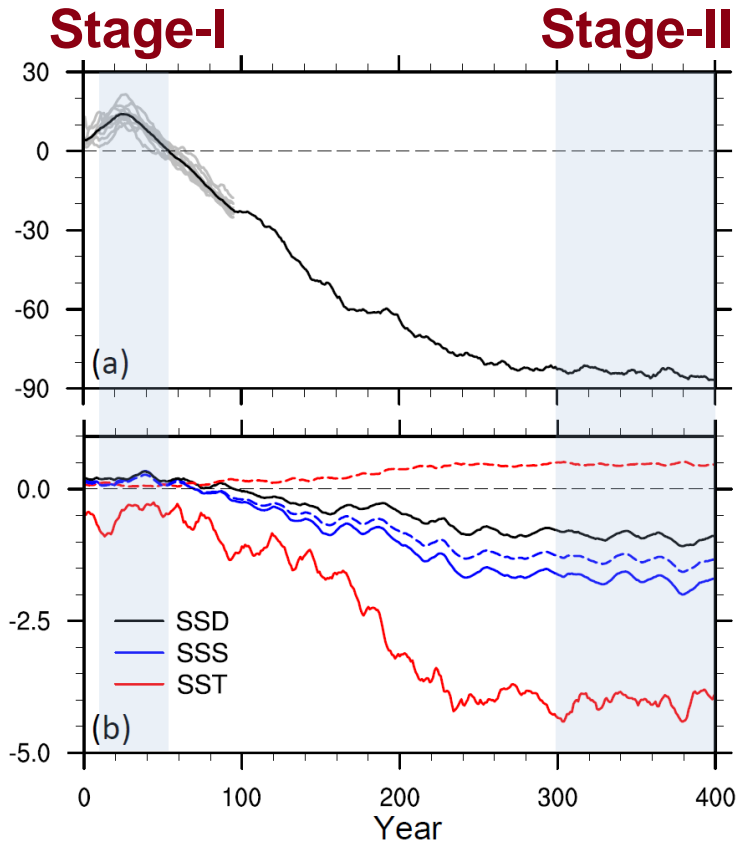
SAT Evolution w/o TP



Planetary Wave and Moisture Transport

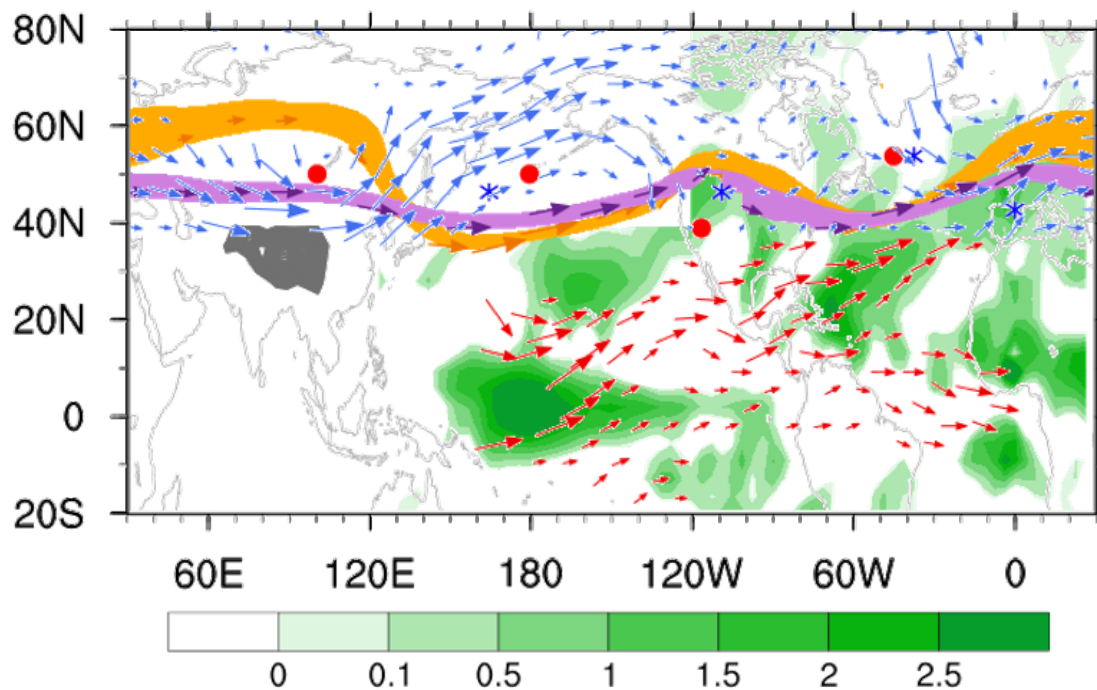


AMOC Evolution w/o TP

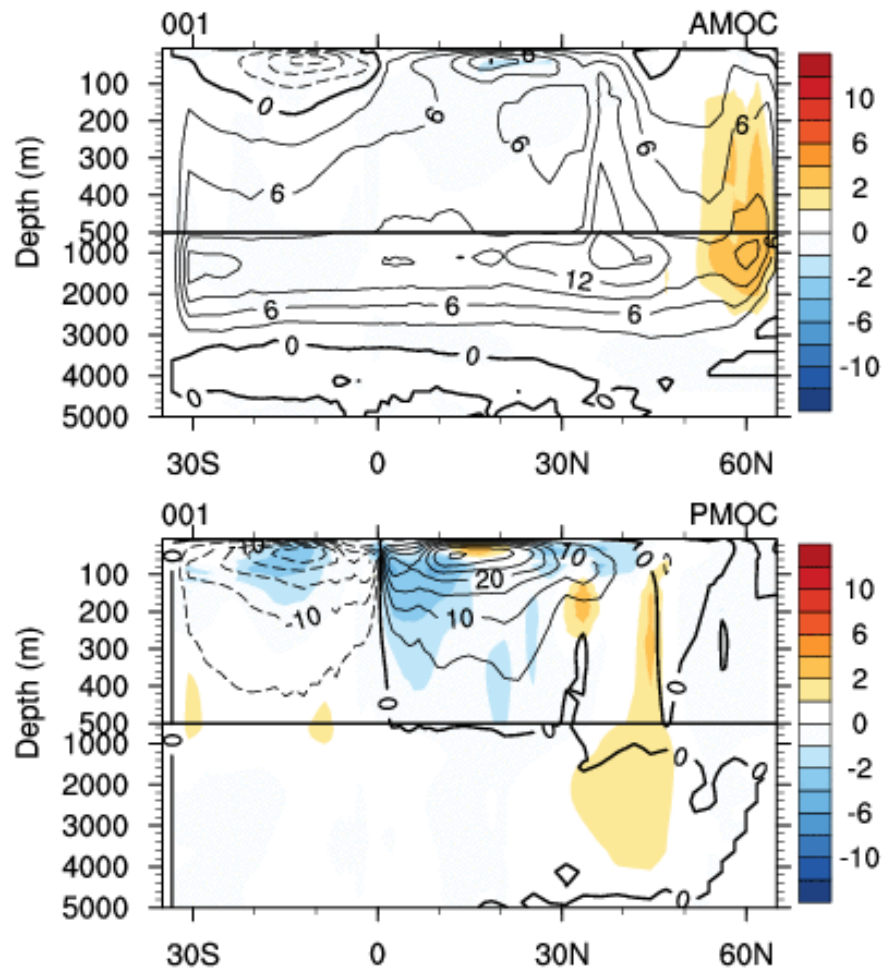


From *TP* to *AMOC*: Atmosphere Dynamics

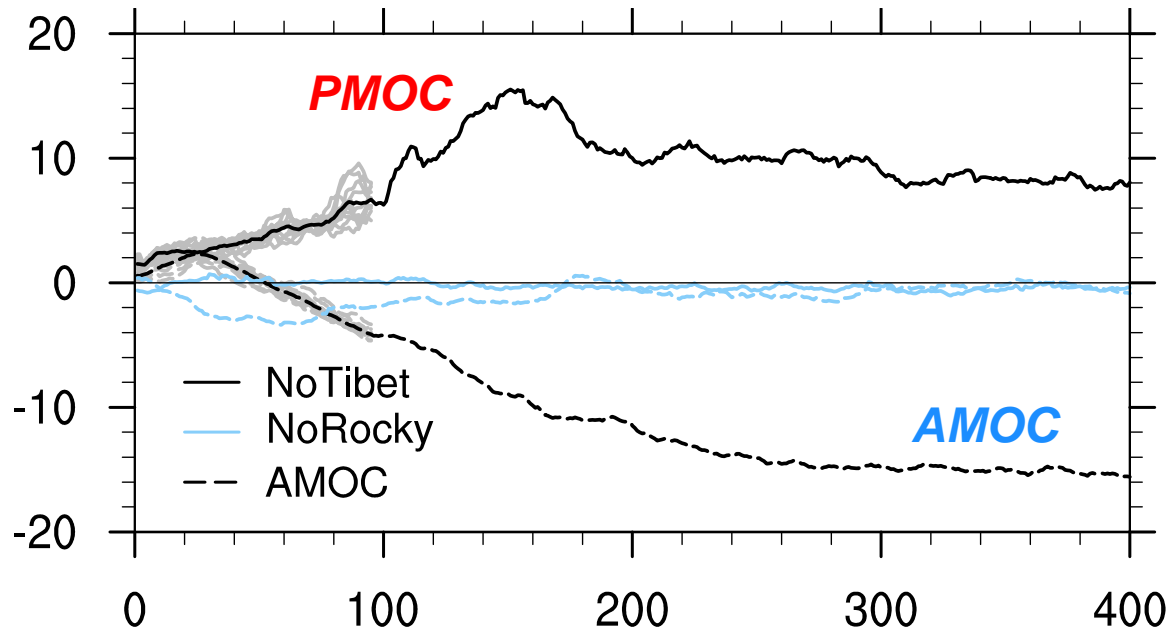
Stationary Waves with Tibetan Plateau



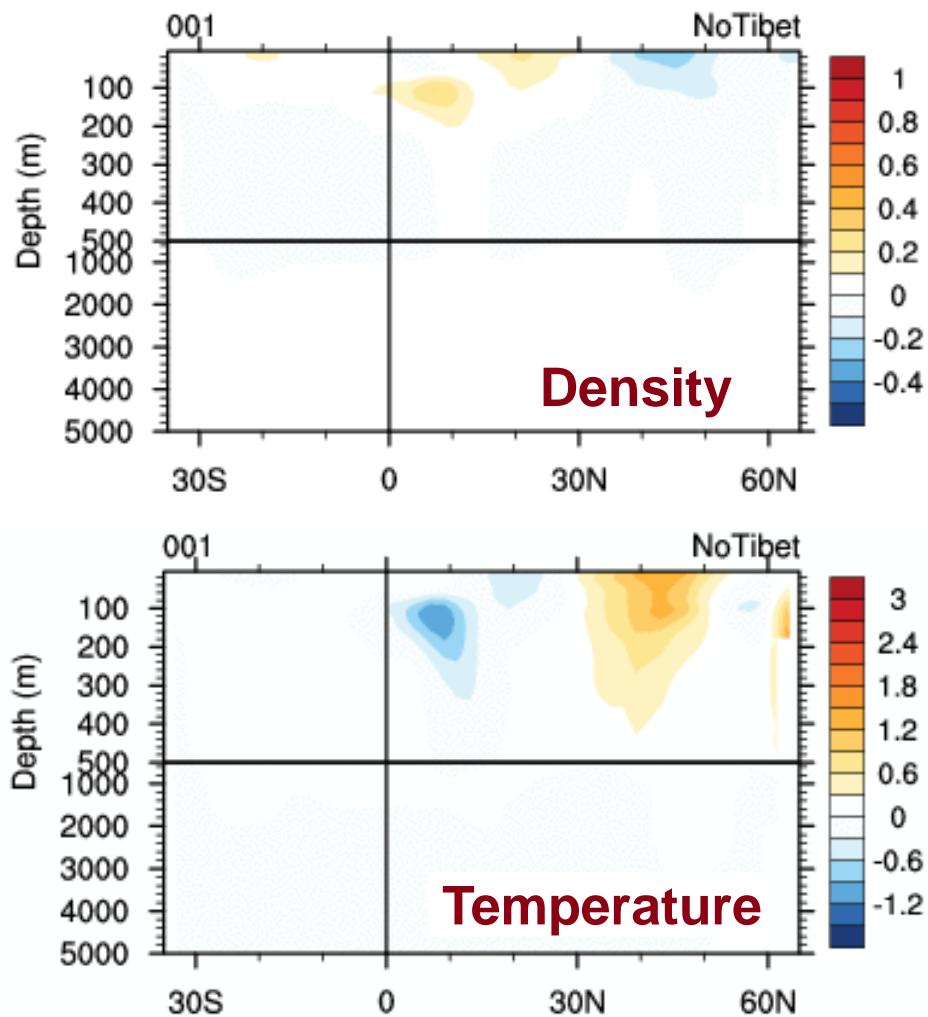
AMOC vs. PMOC: See-Saw?



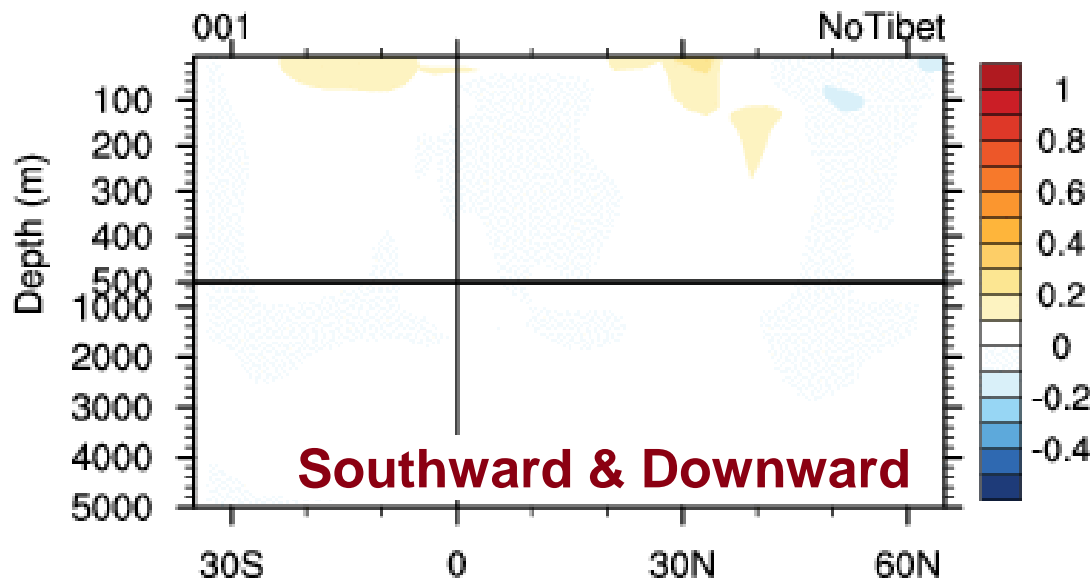
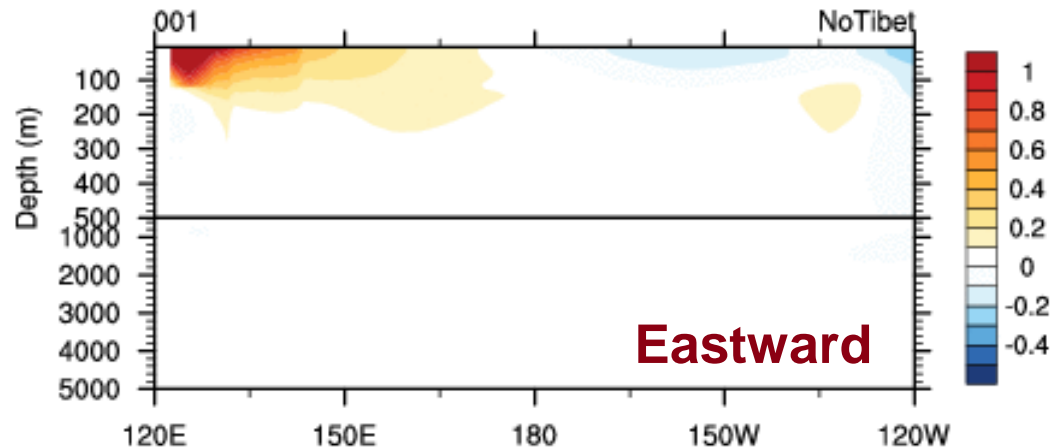
AMOC vs. PMOC



PMOC: Mechanism?

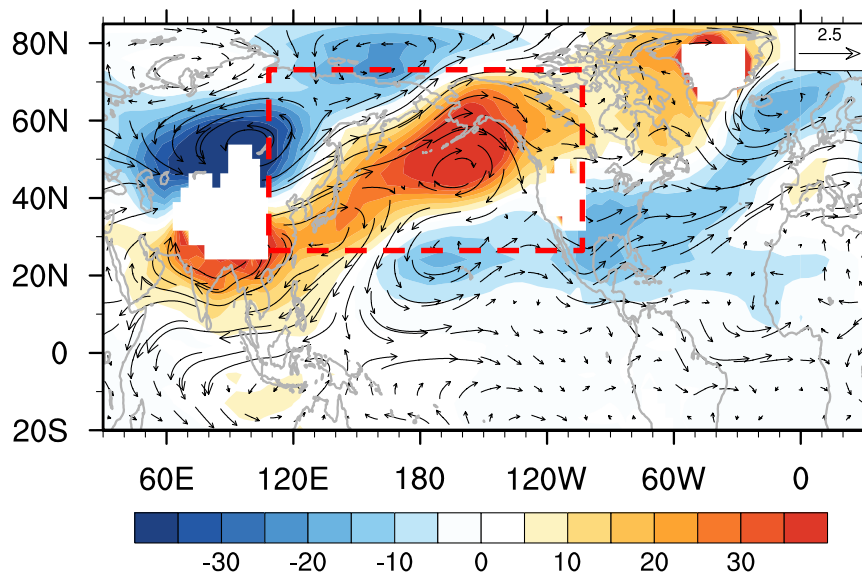


PMOC: *Salinity* Mechanism

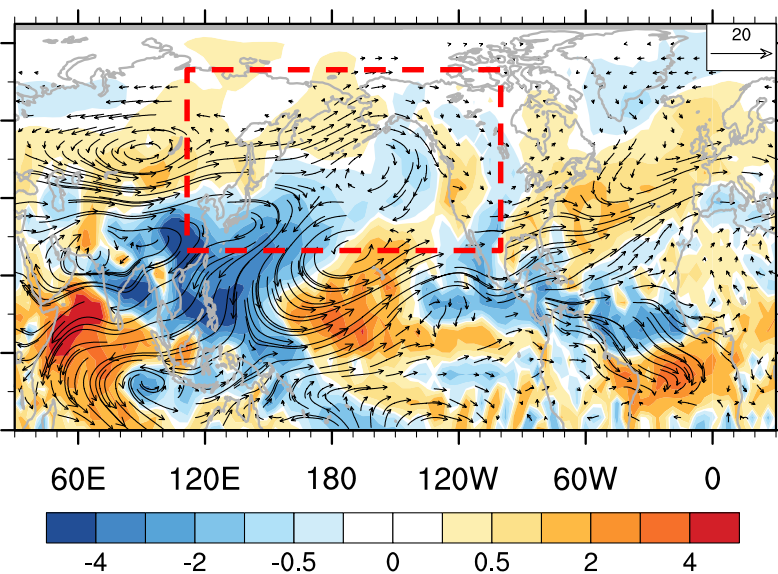


Atmospheric Changes

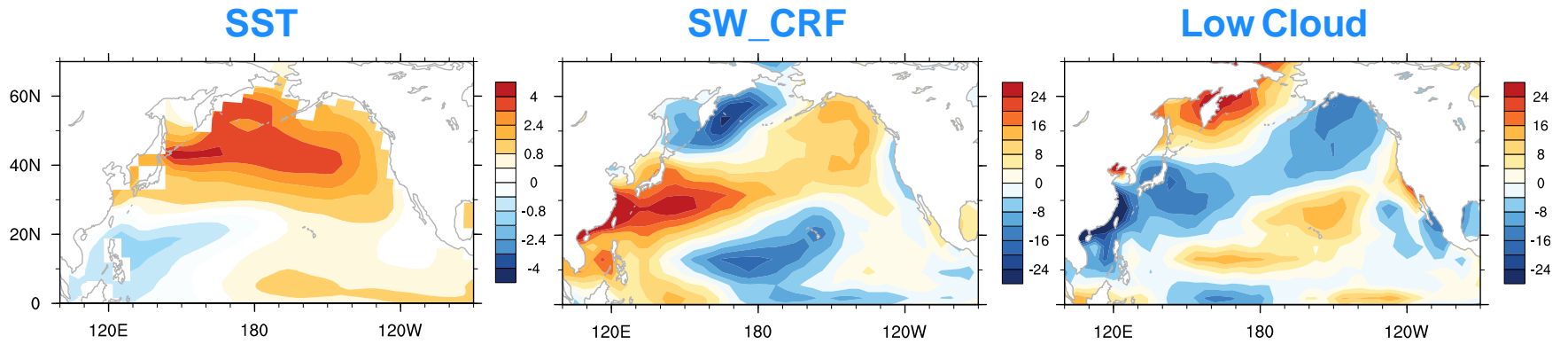
850 hPa GH and Winds



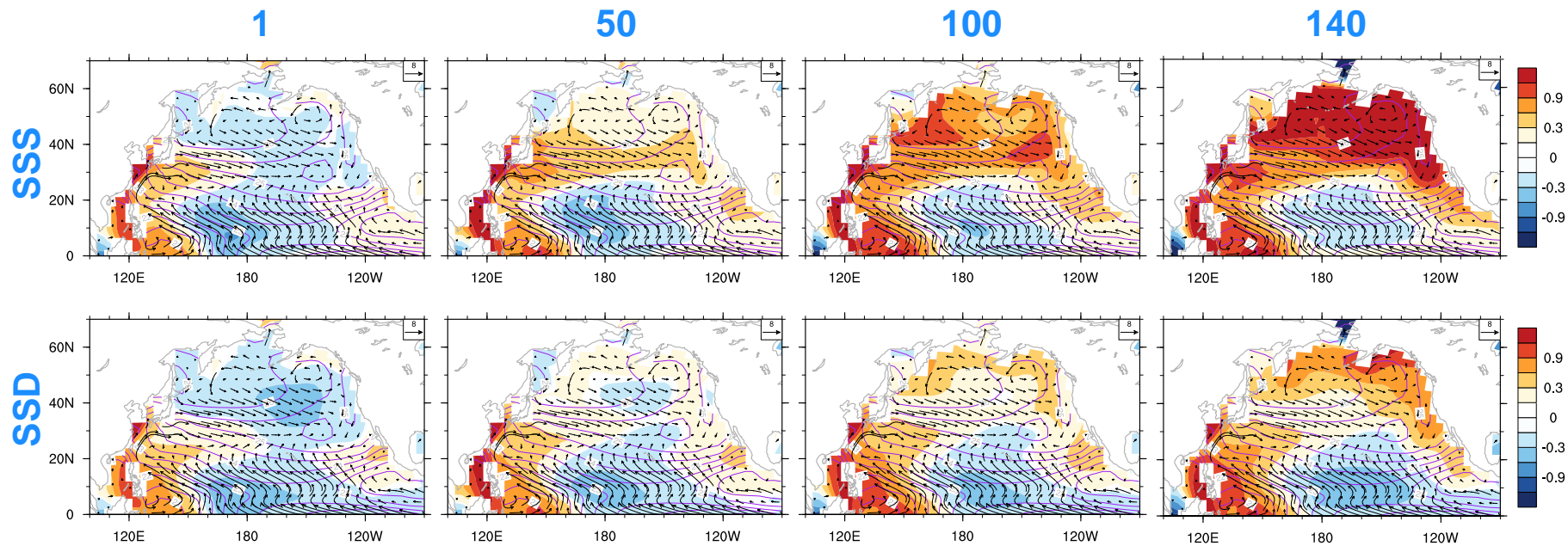
Moisture transport and divergence



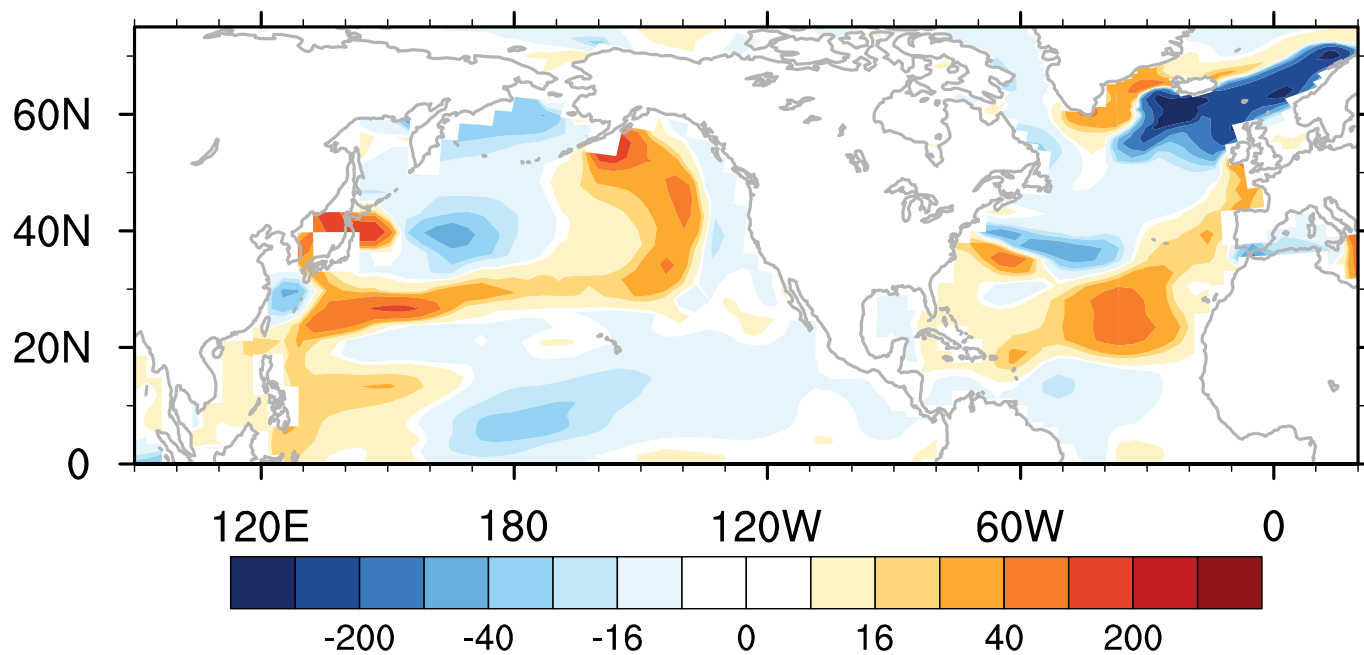
SST Change



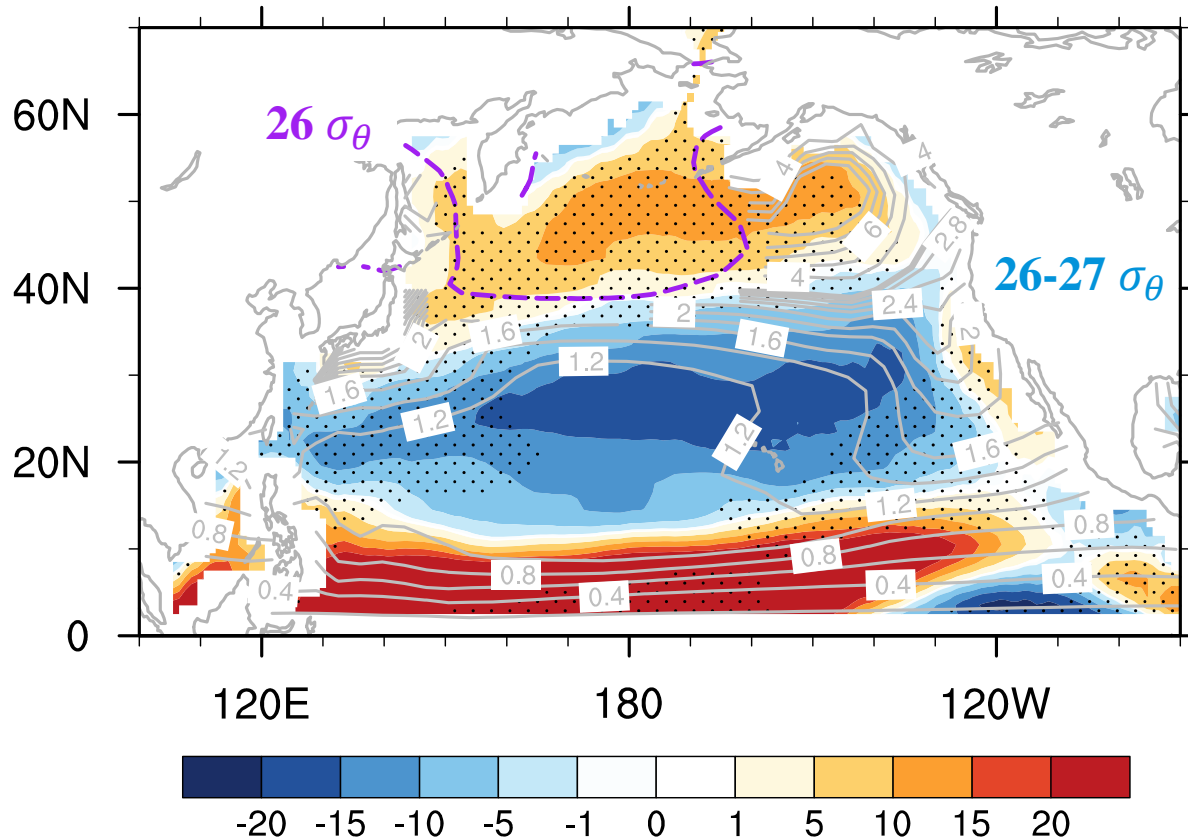
Surface Salinity and Density Changes



Mixed Layer Depth Change



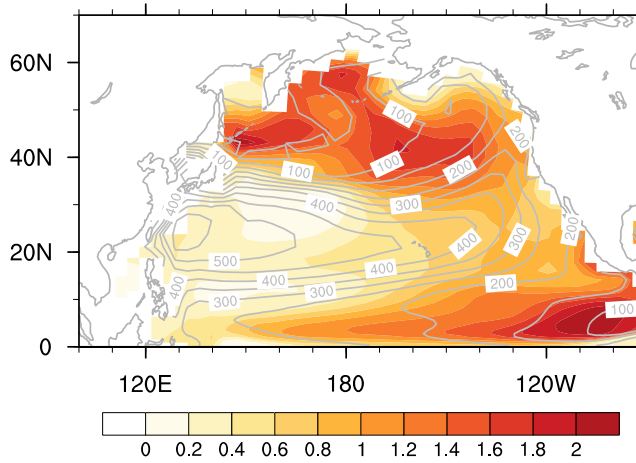
Ekman Pumping and PV



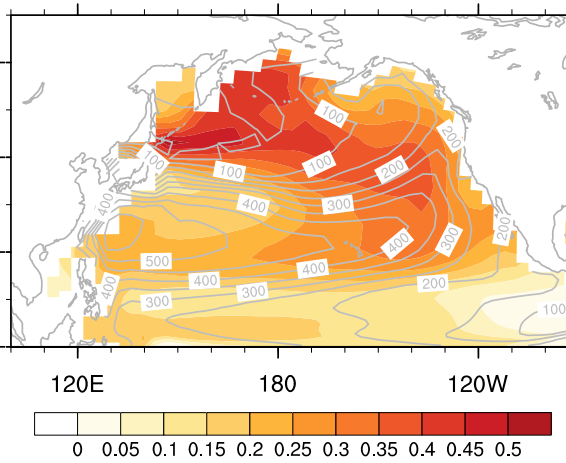
Black Dots: Enhanced Ekman Downwelling

RMS of *Temp*, *Salinity* and *Thickness*

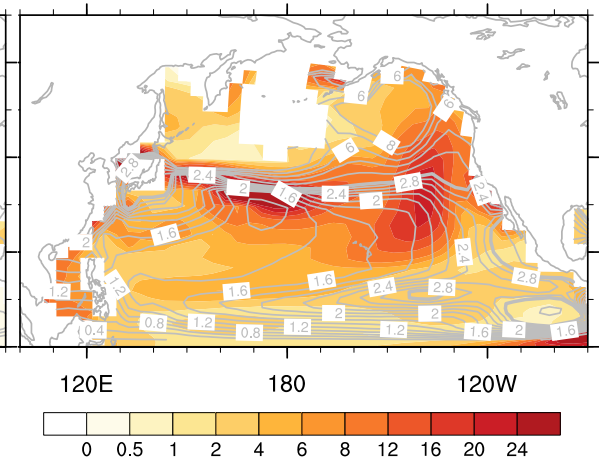
26.6 RMS(T)



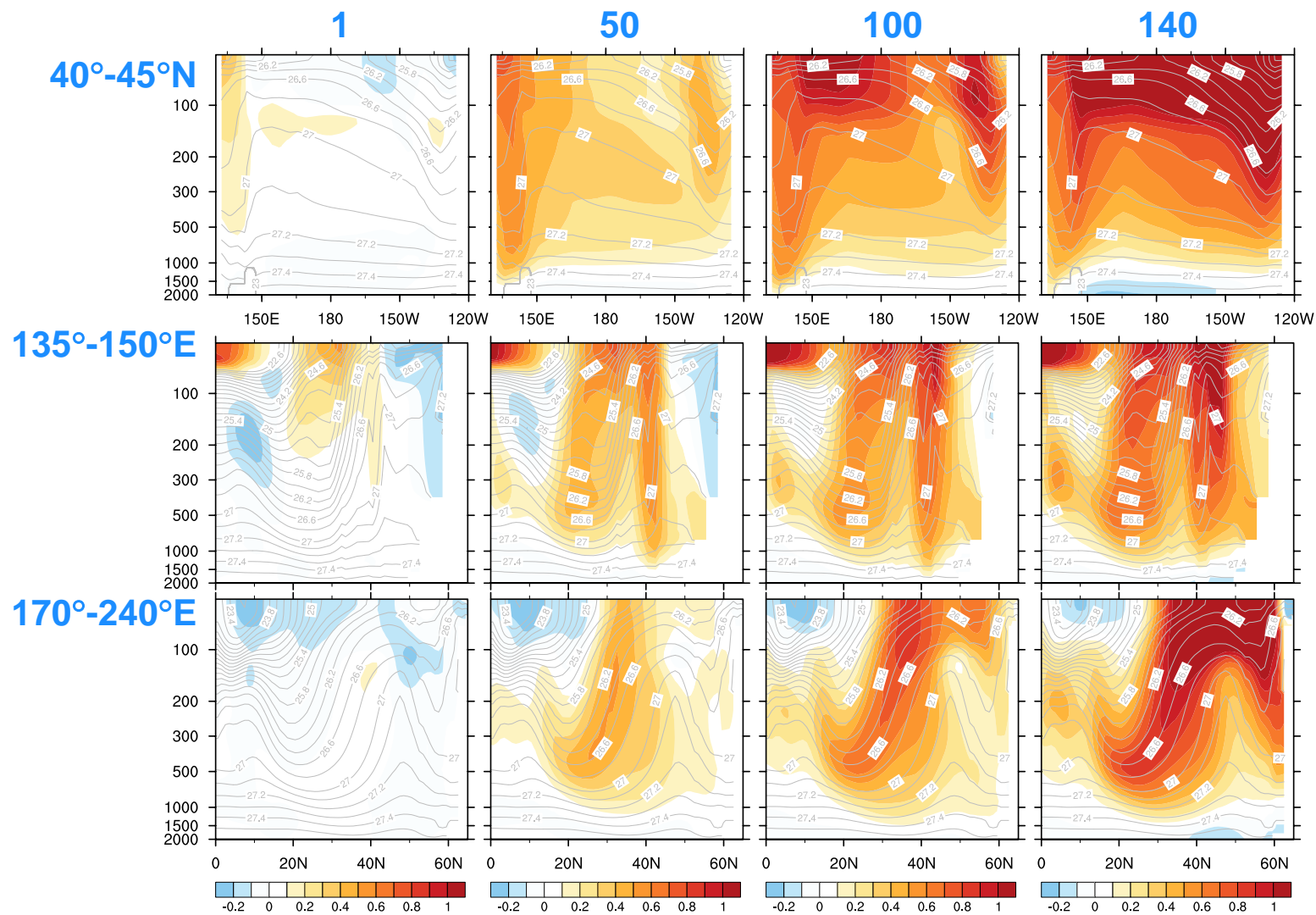
26.6 RMS(S)



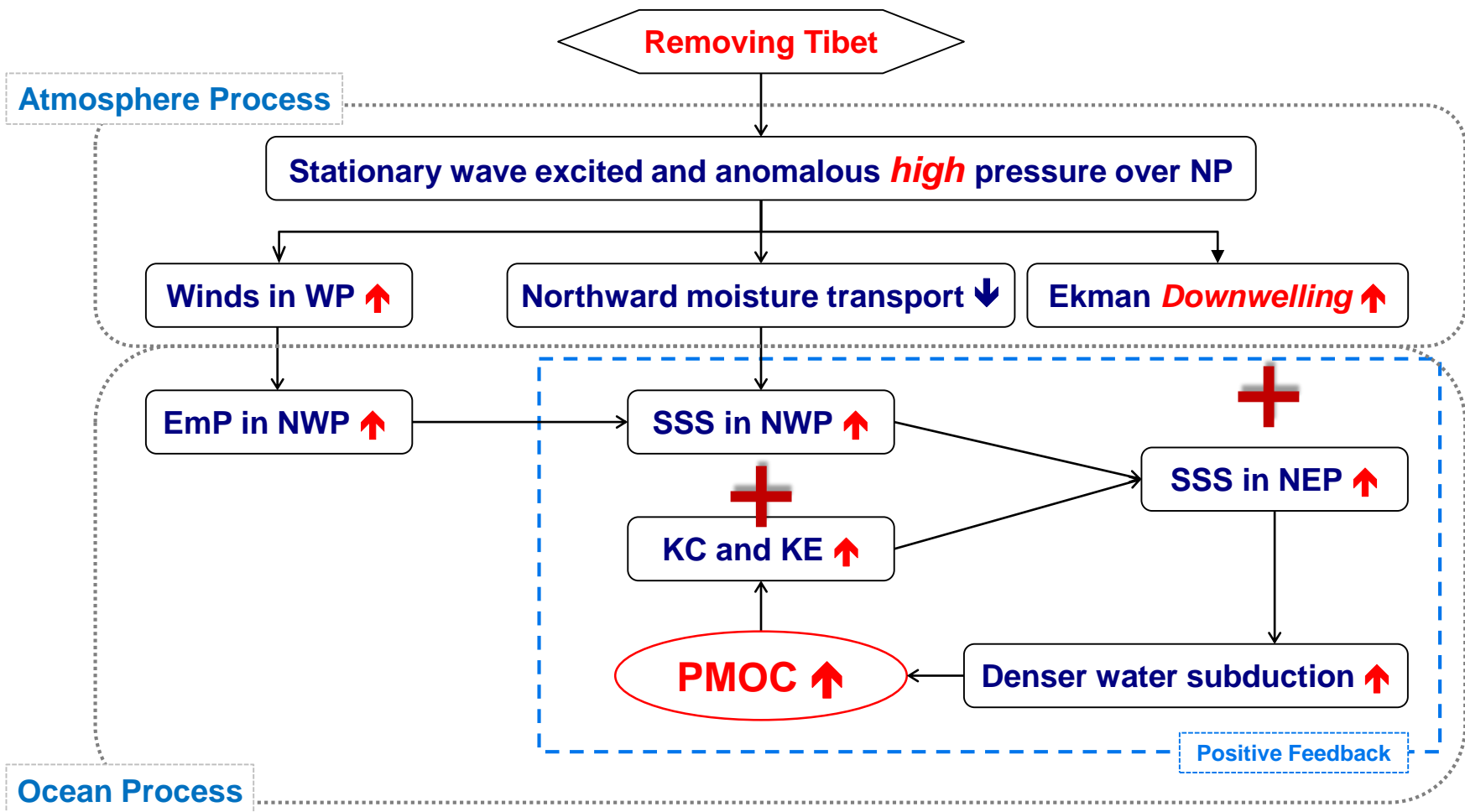
26.2-26.6 RMS(dH)



Salinity Subduction

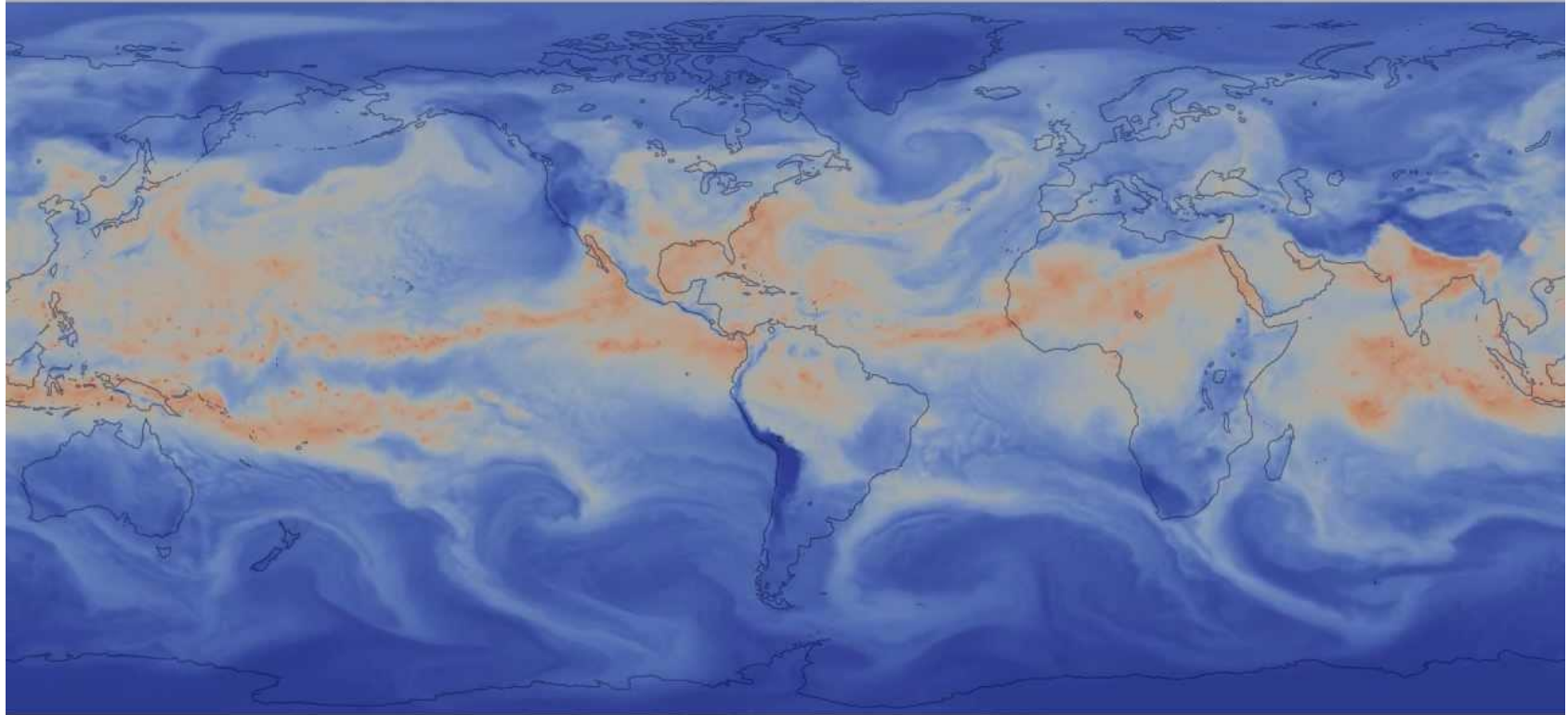


Mechanism



Atmosphere River

NSF/DOE Community Atmosphere Model (CAM5)



Aug 19 18:00

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Computing Facility

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Summary

0 → **1** : Critical to **AMOC**, **PMOC**,

Energy and moisture transport

in / between SH and NH

1 → **∞**



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谢谢