Our options to validate fluxes

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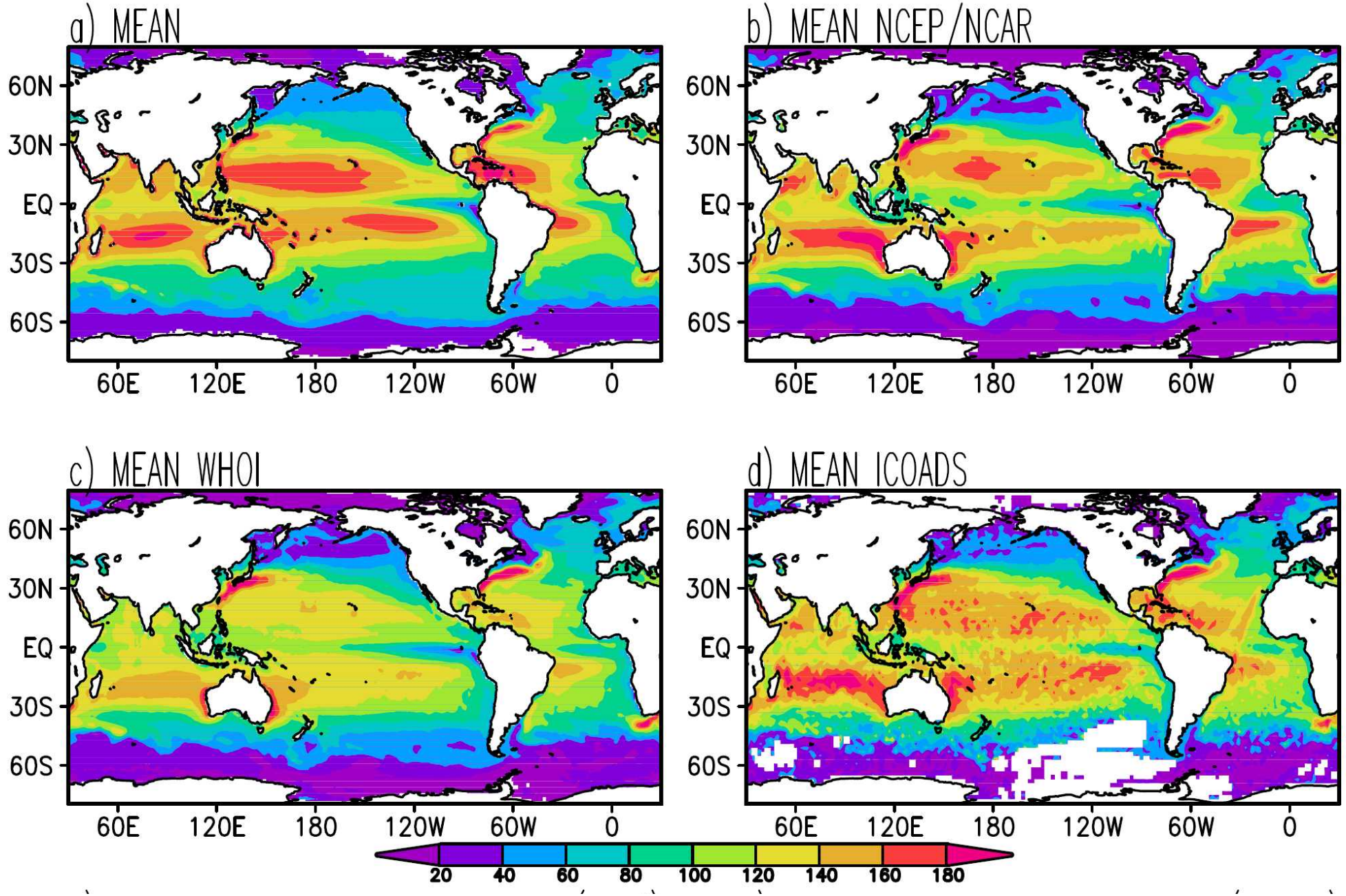
Difference between LHTFL products is significant

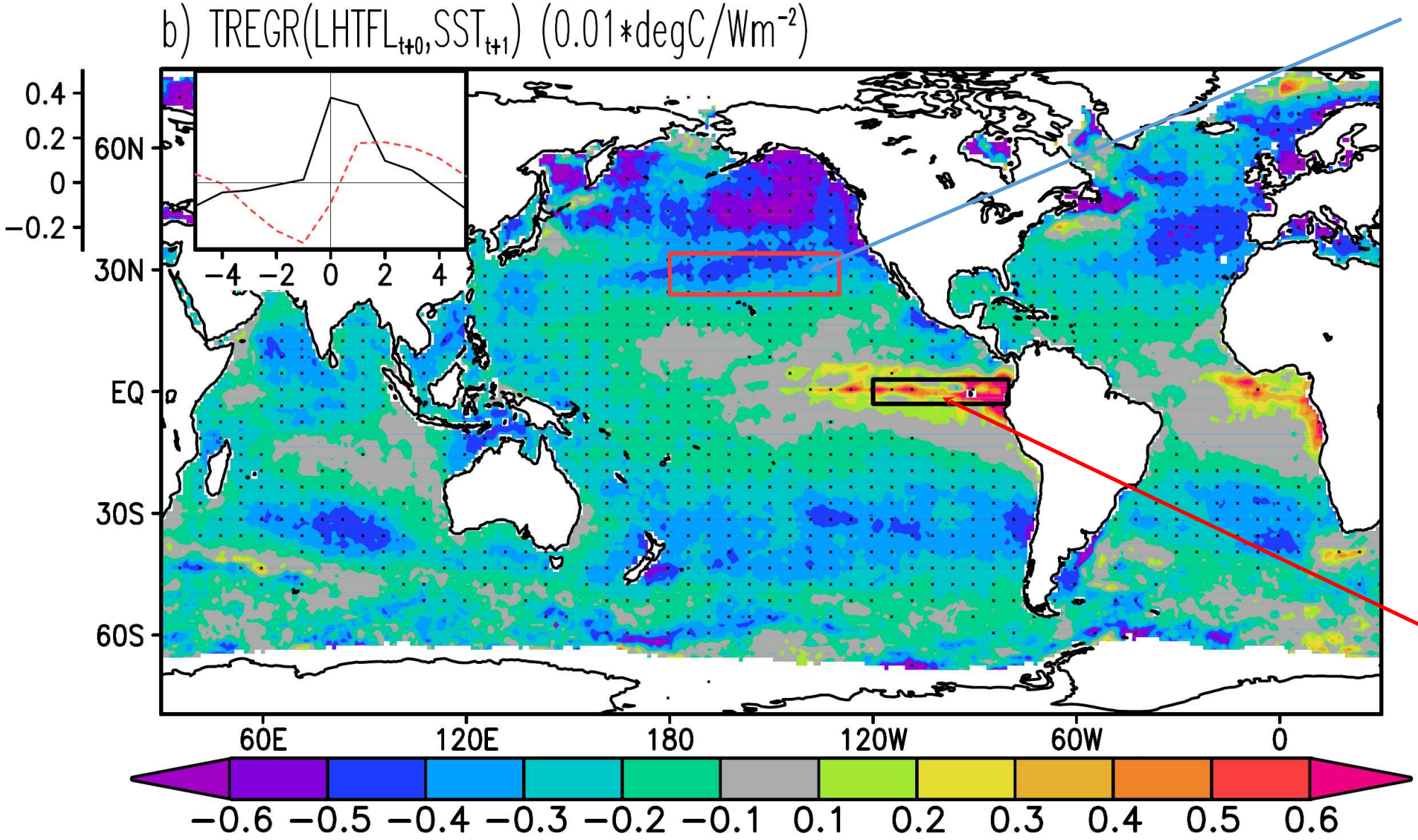


Sources of errors

- Qa, Ta
- Radiative fluxes are significantly better if observed cloud cover (e.g. MODIS) is used instead of ISCCP (Rachel Pinker)
- Is there any way to validate fluxes globally? Unfortunately, deducting the net surface flux from the heat budget of ocean assimilation models is a dead end. This deducted flux is mostly dominated by the component needed to correct for ocean model biases.

- We need a global flux observing system from voluntary ships.
- Currently, validation is limited to buoy network.
- We also could explore the physical consistency between the ocean surface flux components.

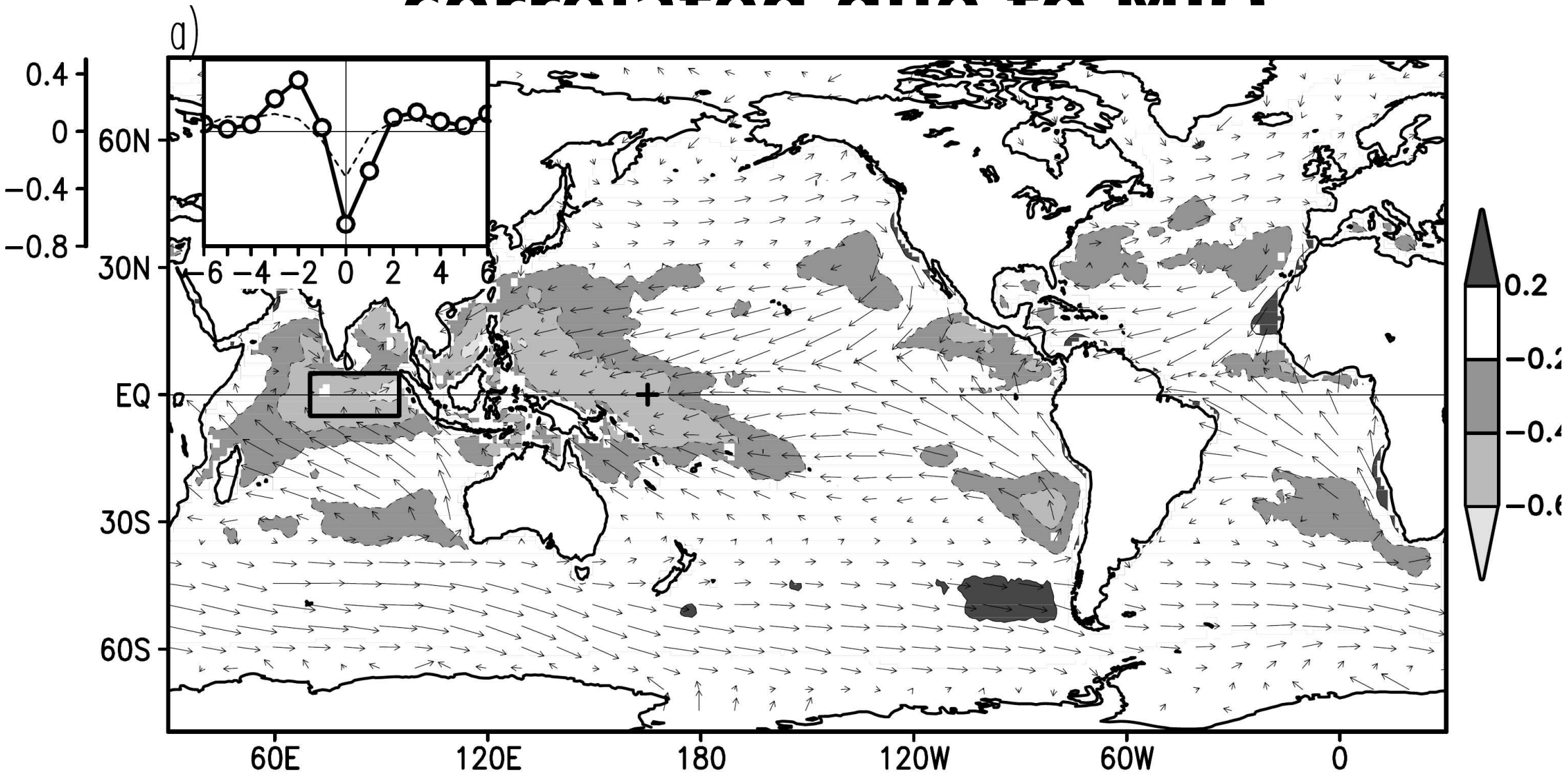
LHTFL vs SST

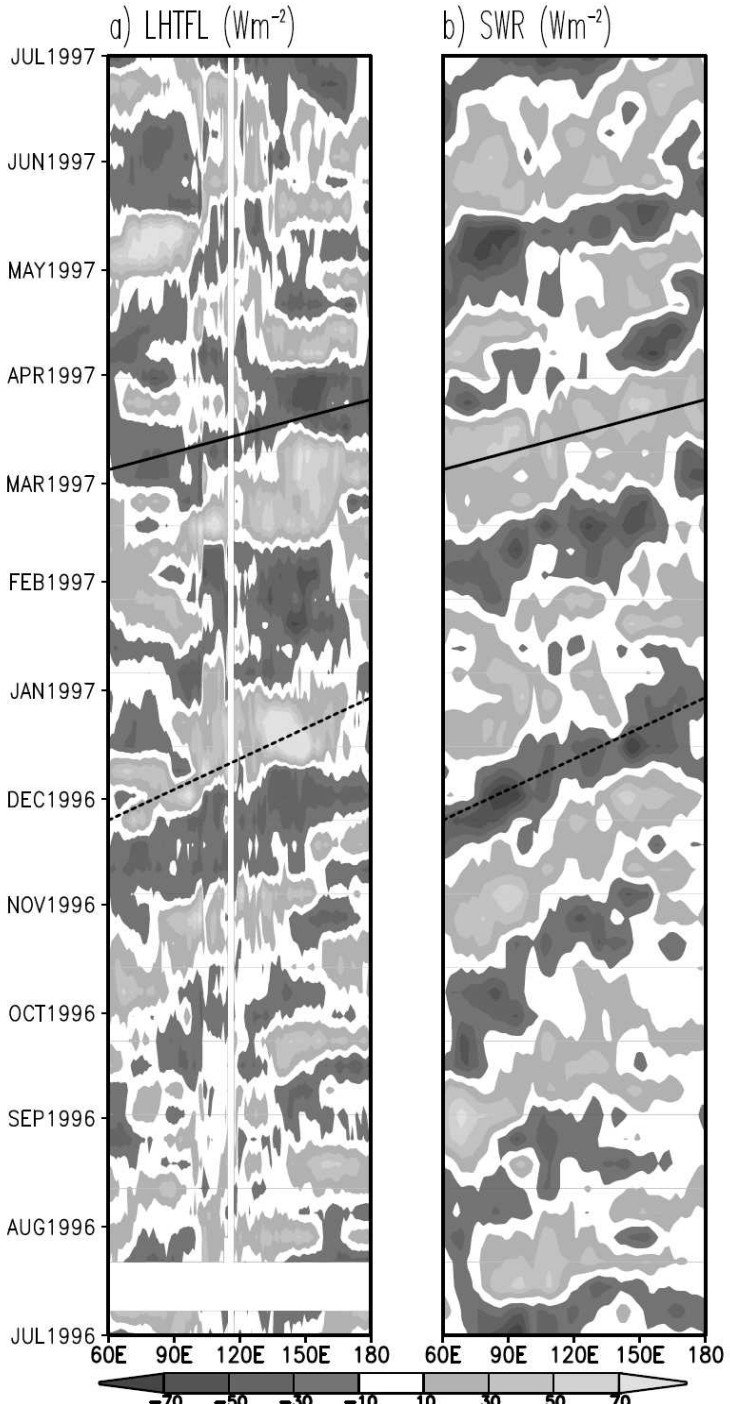


Surface flux drives the upper ocean heat budget: stronger LHTFL leads to lower temperature

Heat balance in the eastern equatorial cold tongues is driven by upwelling. Here LHTFL responds to SST rather than drives SST

LHTFL vs SWR is negatively correlated due to MJO





MJO produces coherent eastward propagation of LHTFL and SWR due to cloud clustering and its effect on SWR and convergent winds.

Buoy validation for intraseasonal LHTFL fluctuations: good correspondence but missing extreme events