

SST-surface fluxes Coupling and Local Impact of mesoscale SST on ABL in the Southeast Pacific

Dian Putrasahan¹, Art Miller¹, Hyodae Seo²

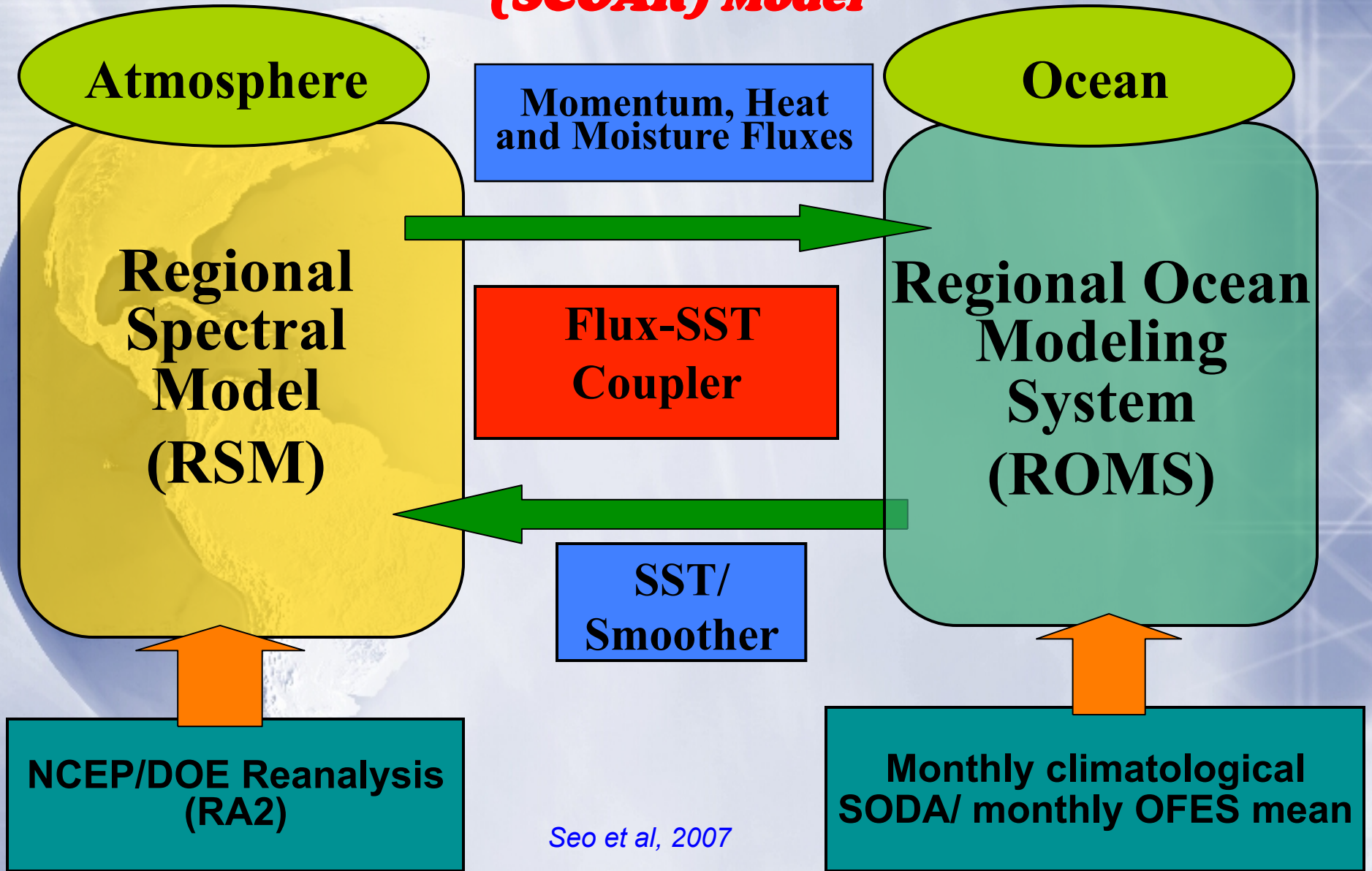
¹ Scripps Institution of Oceanography

² Woods-Hole Oceanographic Institution

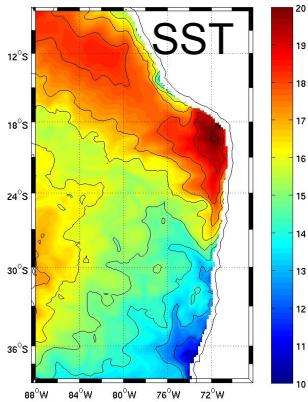
*3rd VOCALS Meeting
University of Miami
March 22nd, 2011*



Scripps Coupled Ocean-Atmosphere Regional (SCOAR) Model



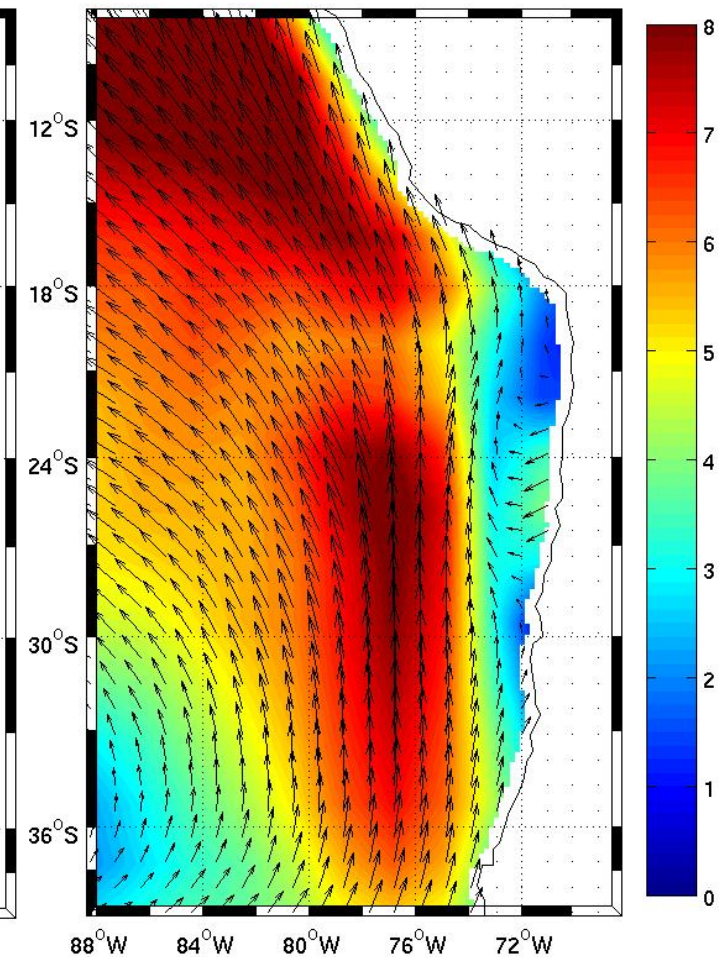
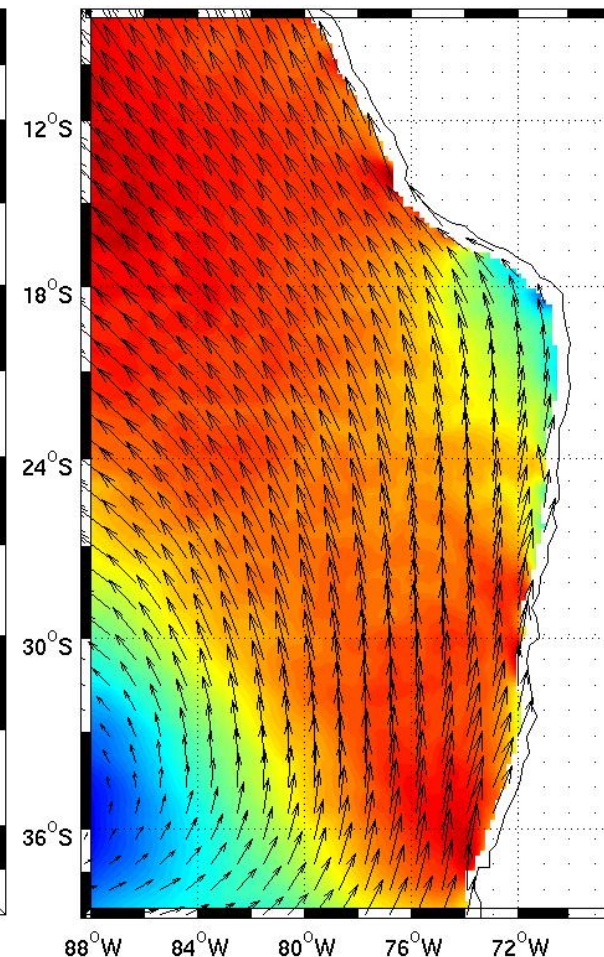
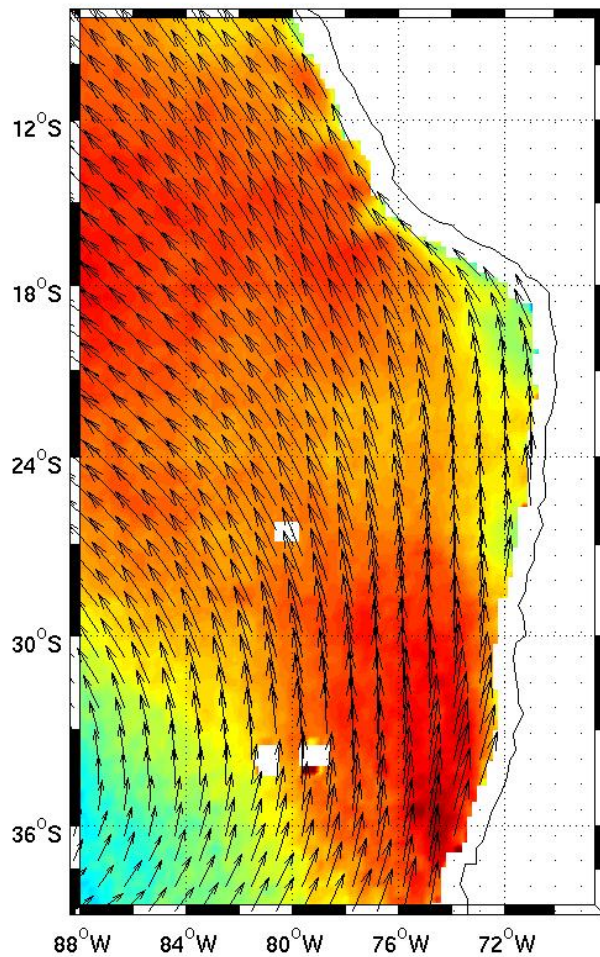
Mean surface winds (m/s) (Summer of 2007)



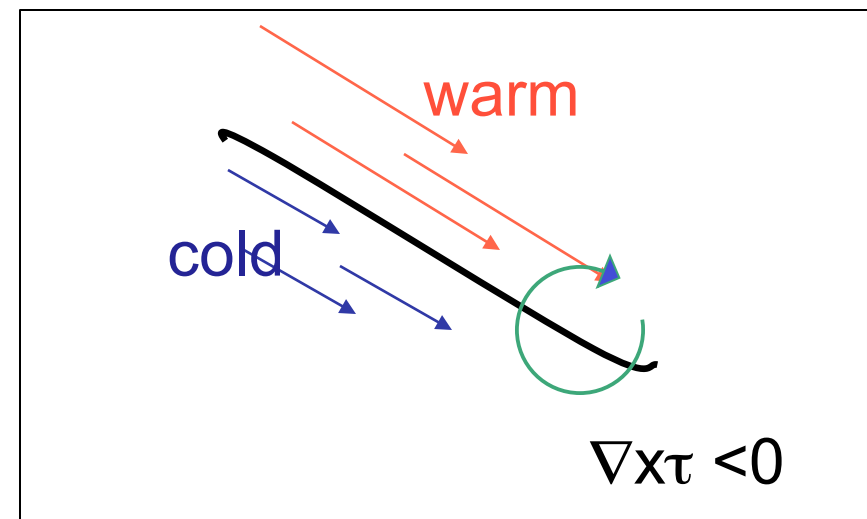
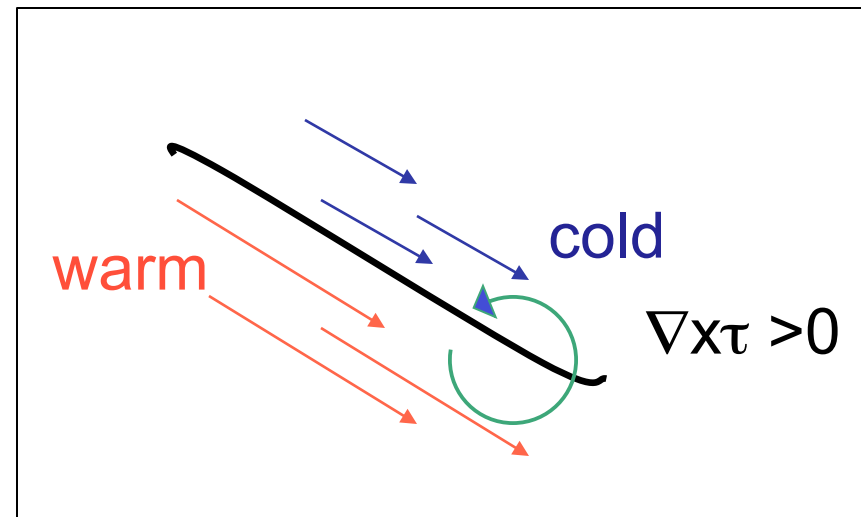
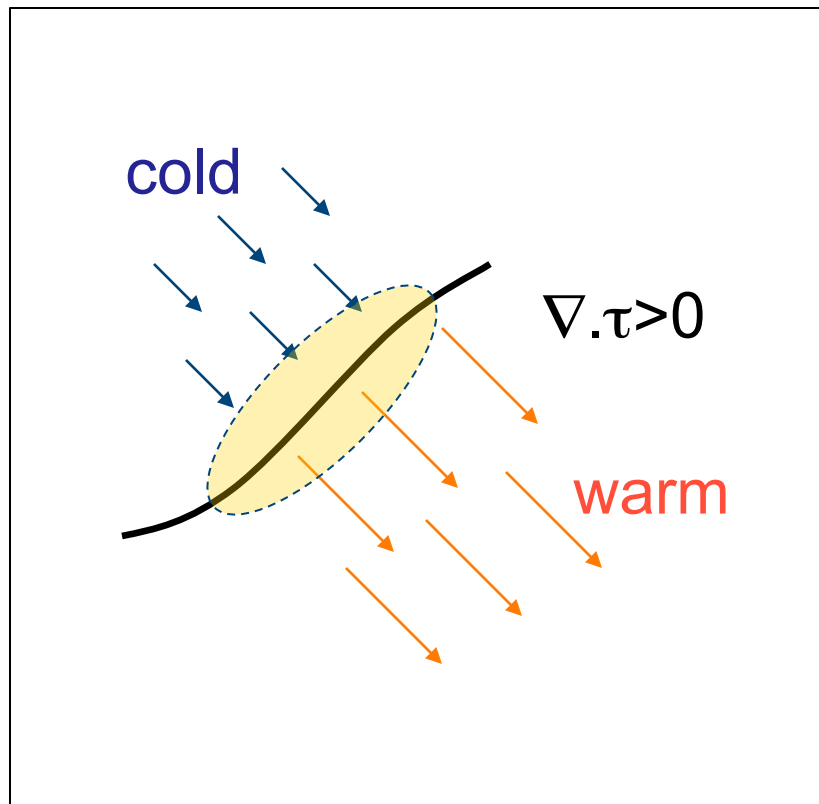
QuikSCAT winds

SCOAR

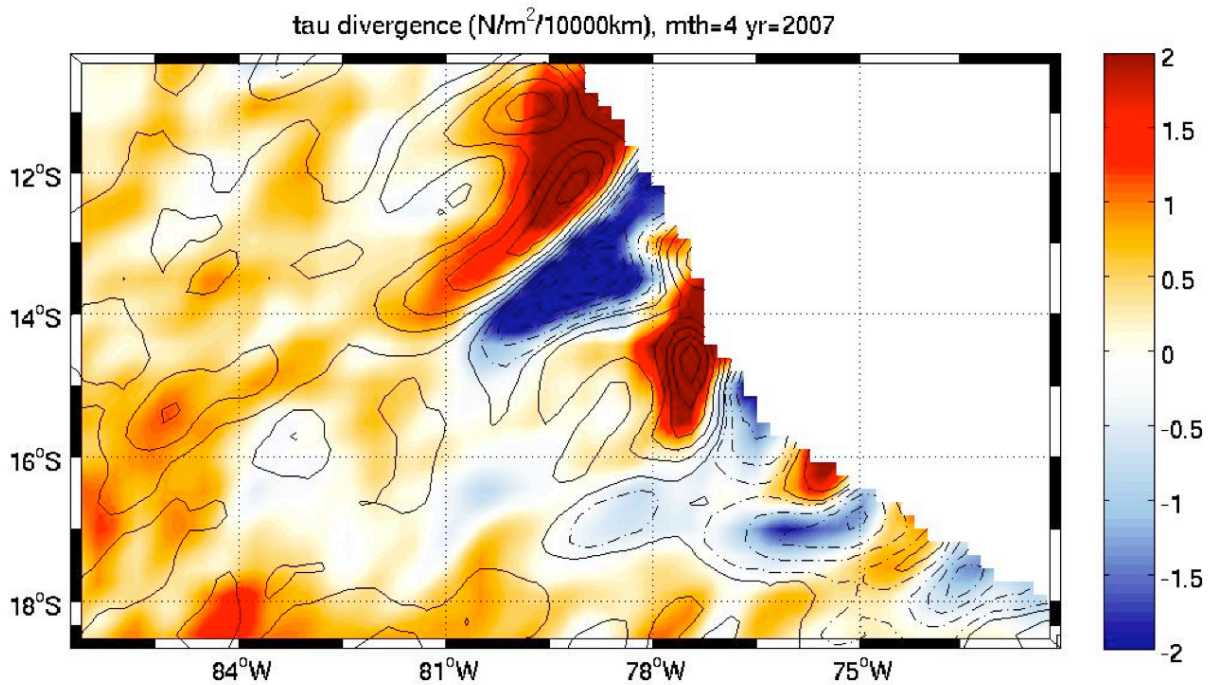
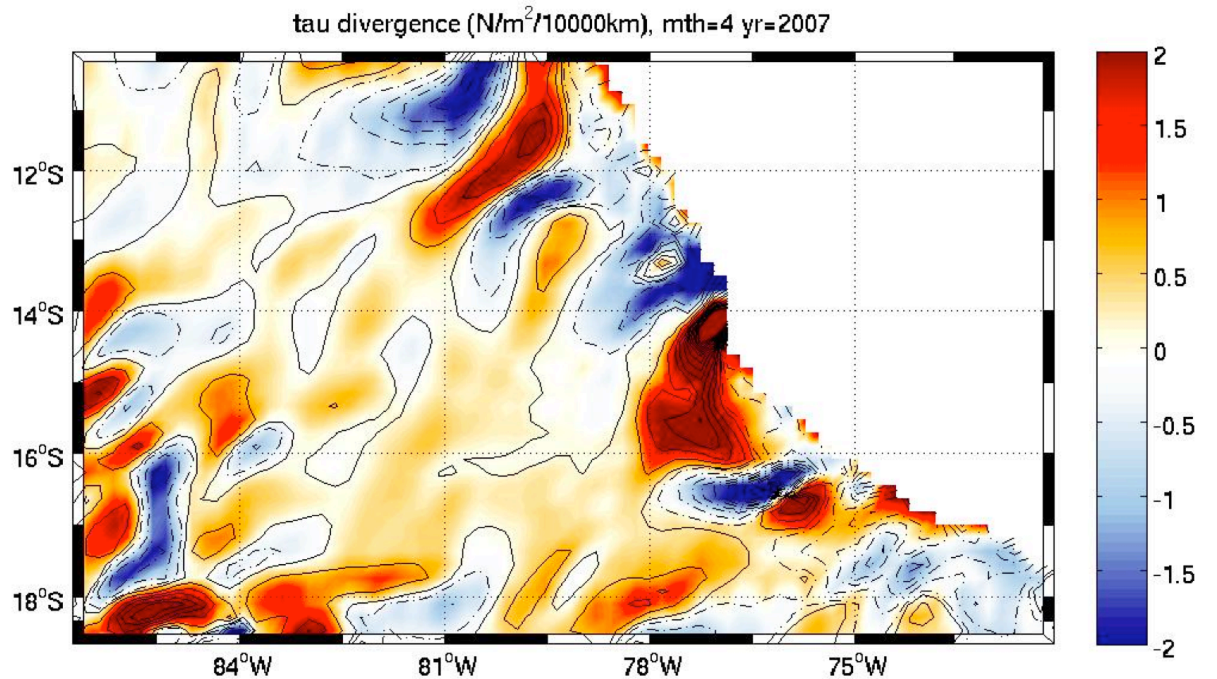
NCEP R2



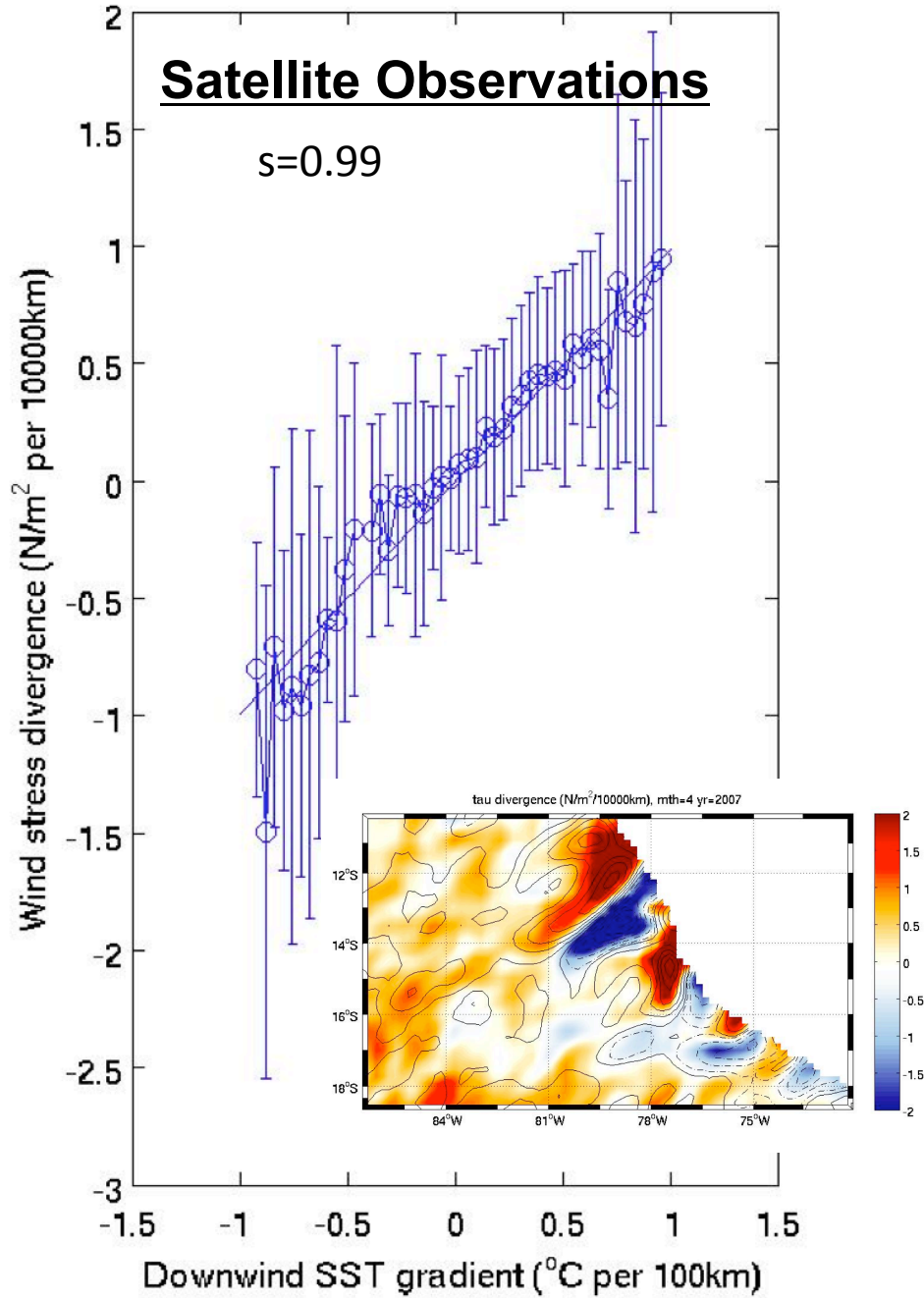
SST gradient impact on wind stress curl and divergence



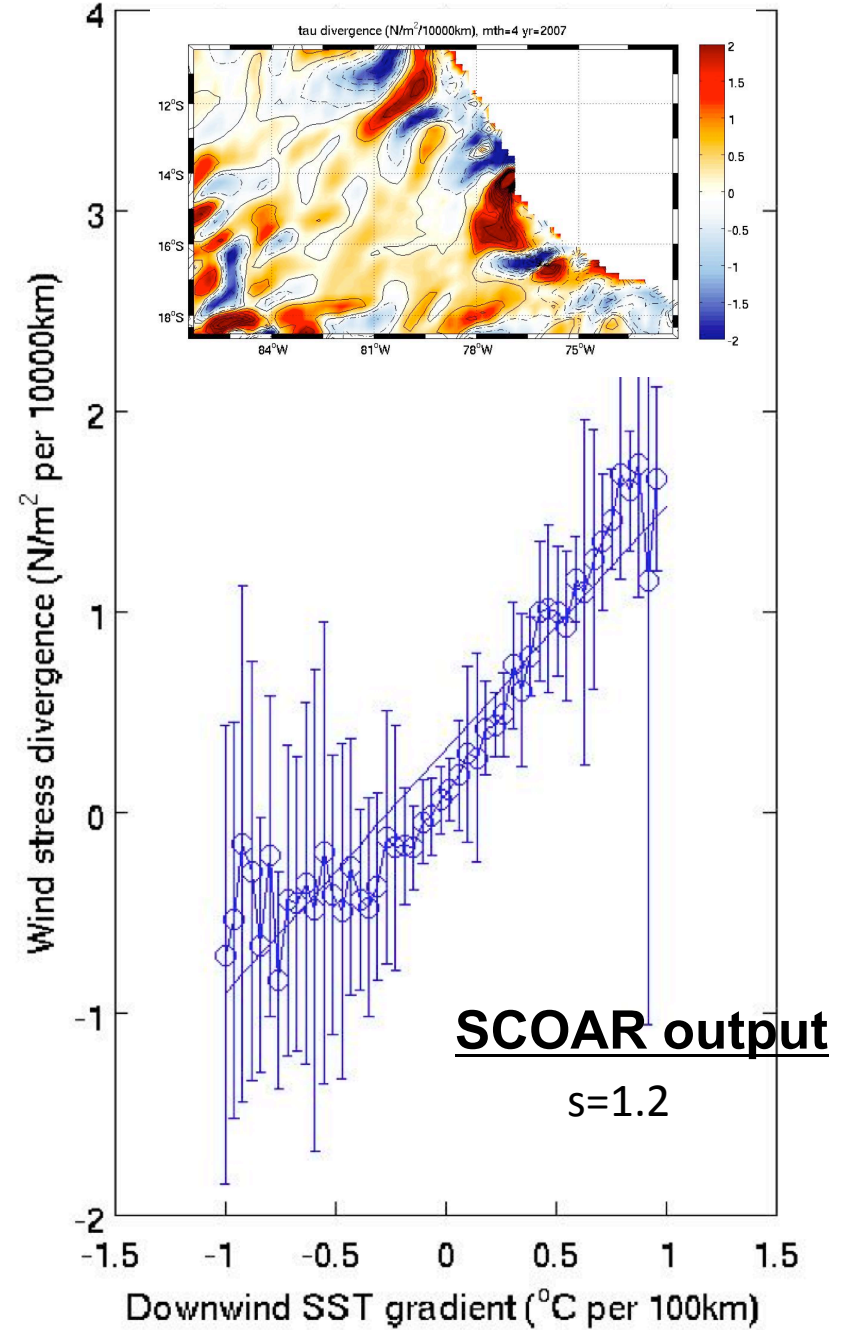
**Color maps of
wind stress
divergence overlaid
with contours of
downwind SST
gradients (April
2007)**



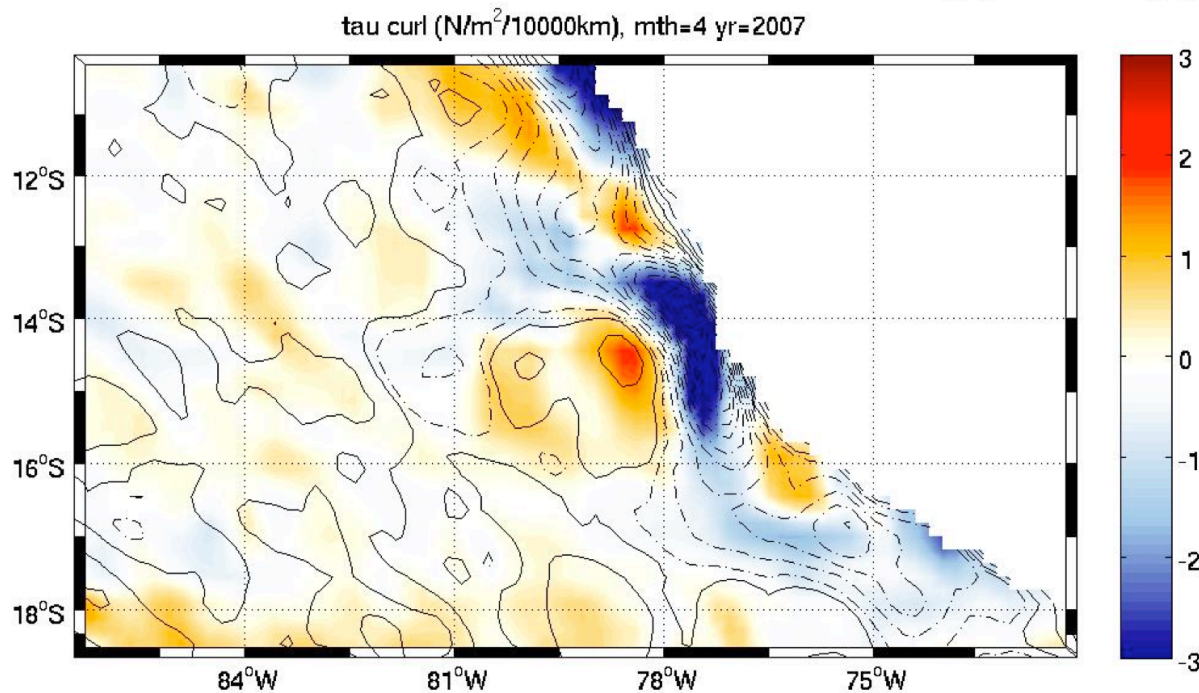
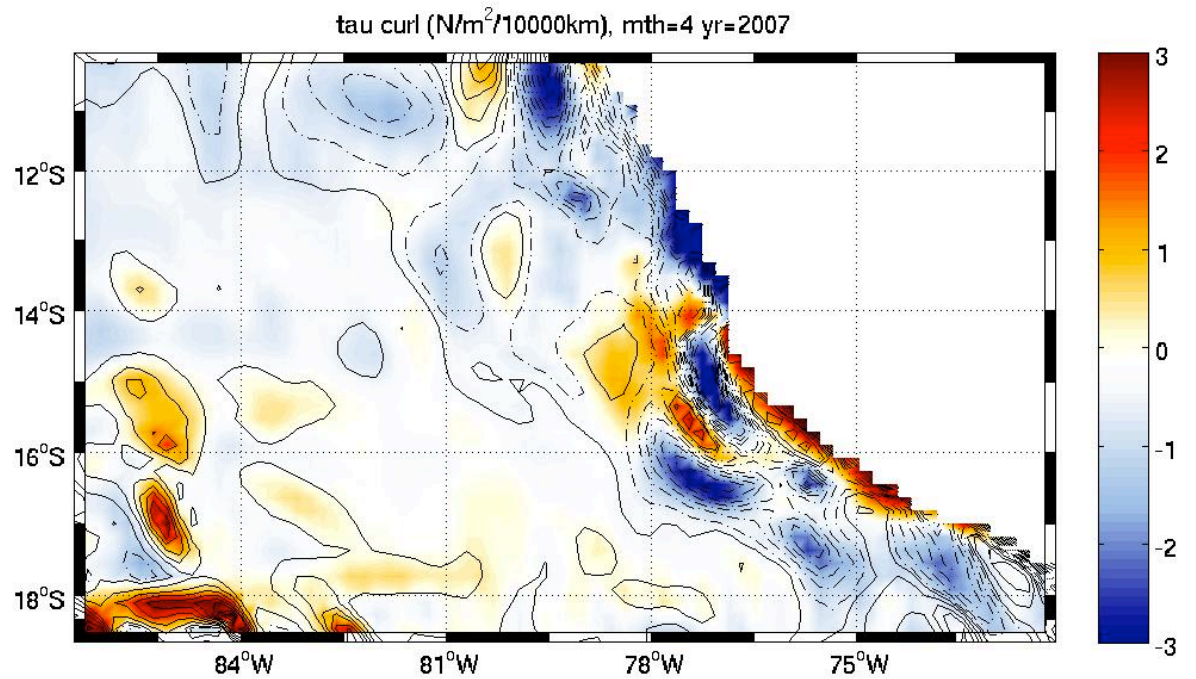
TauDiv and DownT



TauDiv and DownT



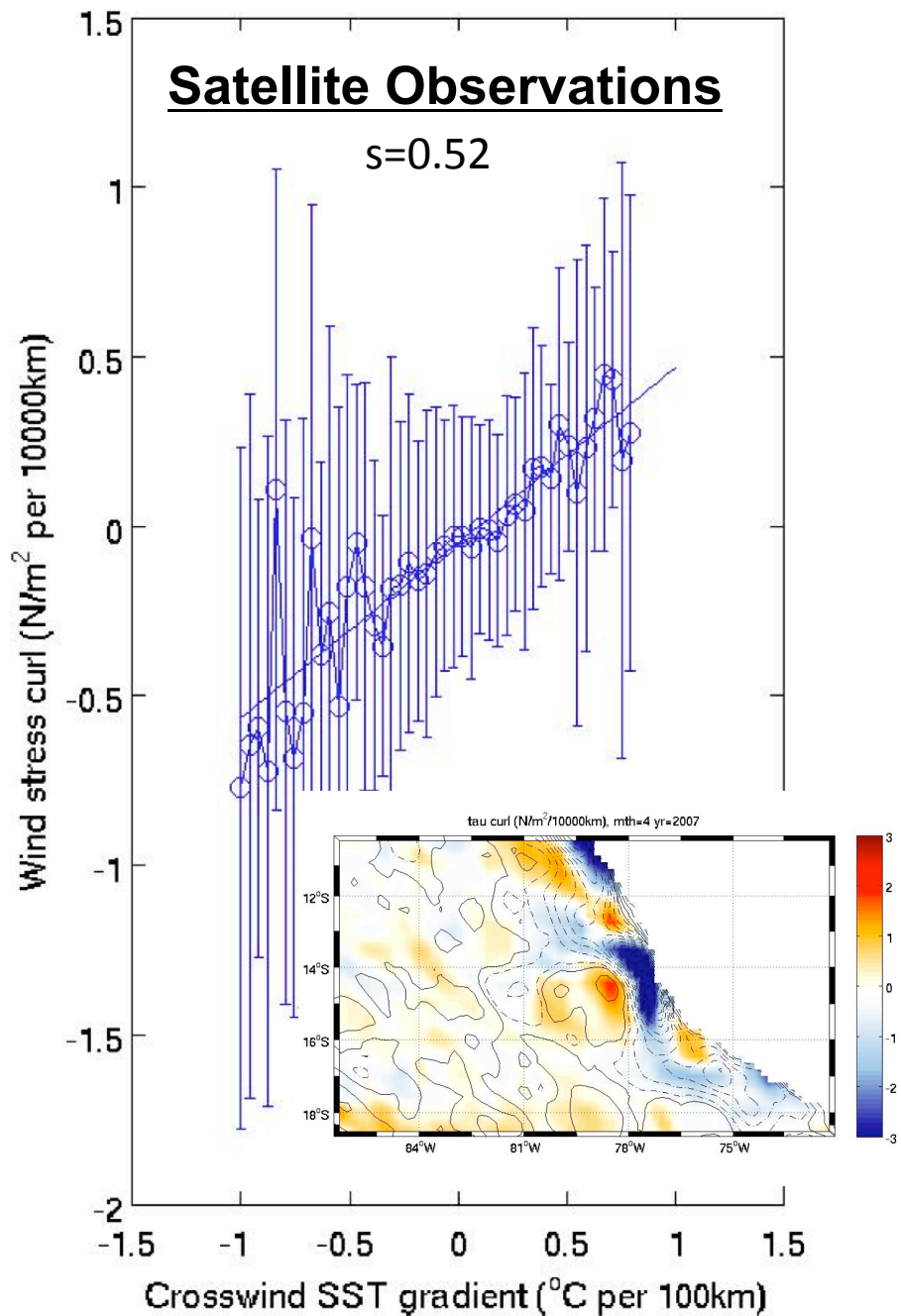
**Color maps of
wind stress curl
overlaid with
contours of
crosswind SST
gradients (April
2007)**



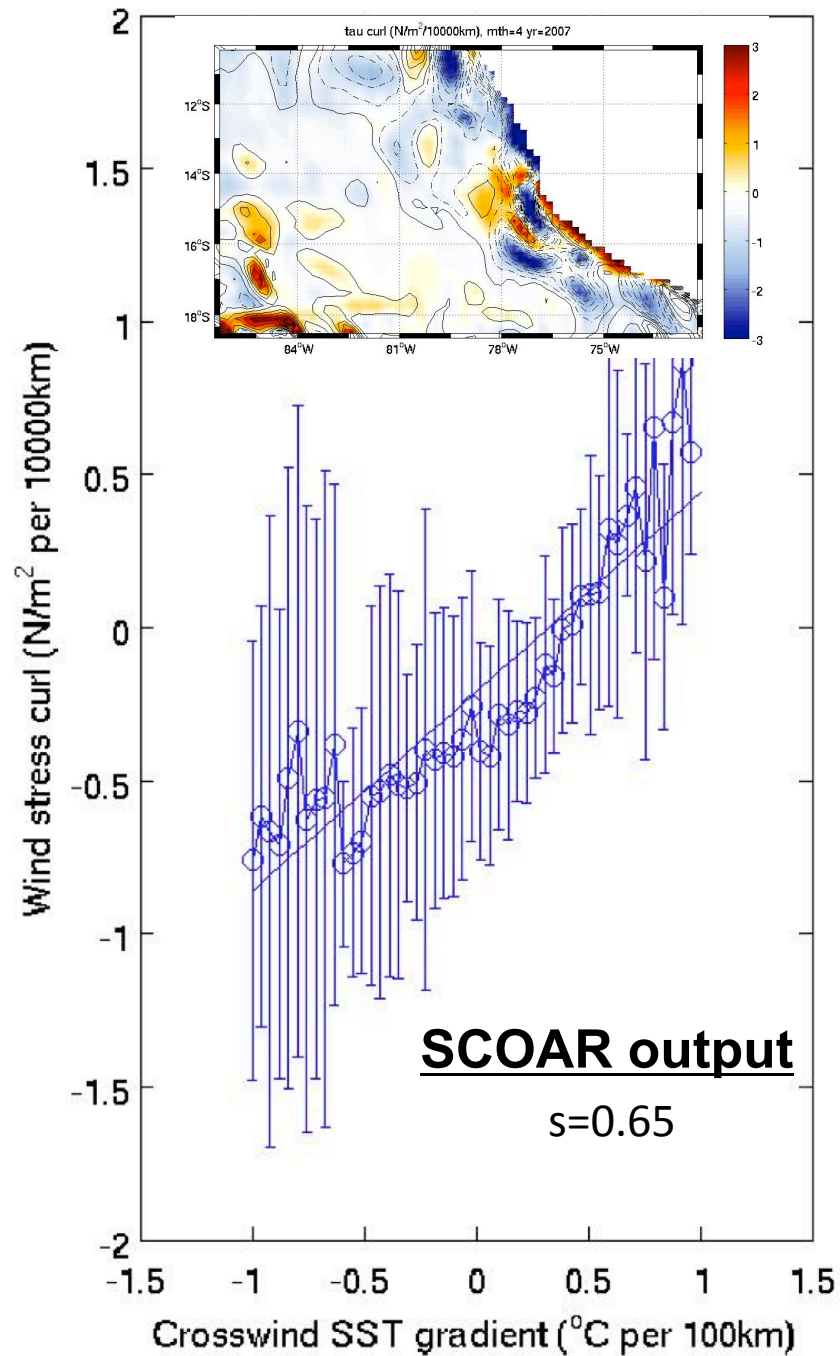
SCOAR output

Satellite Observations

TauCurl and CrossT

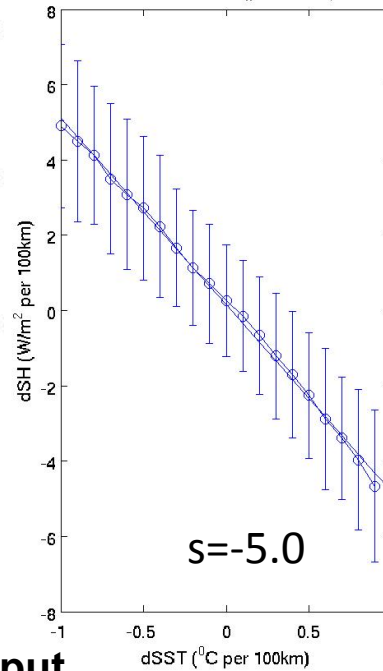
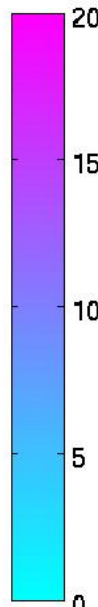
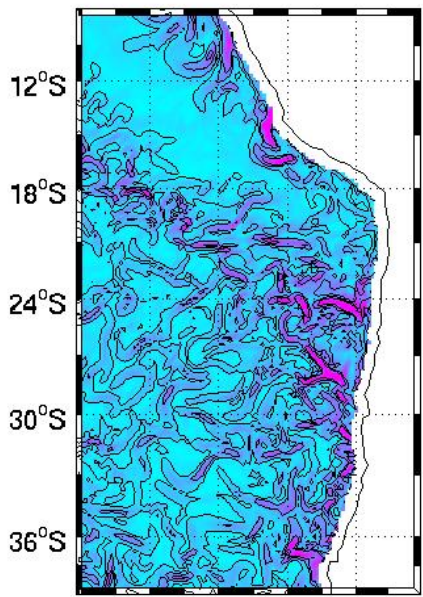


TauCurl and CrossT

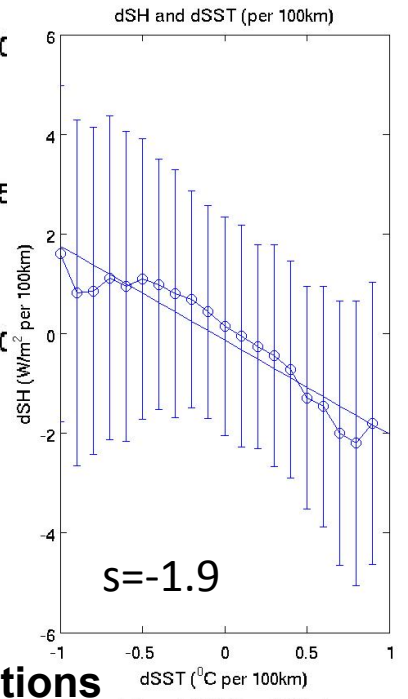
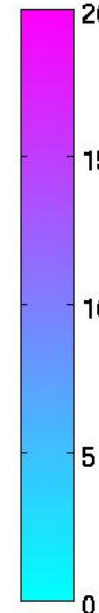
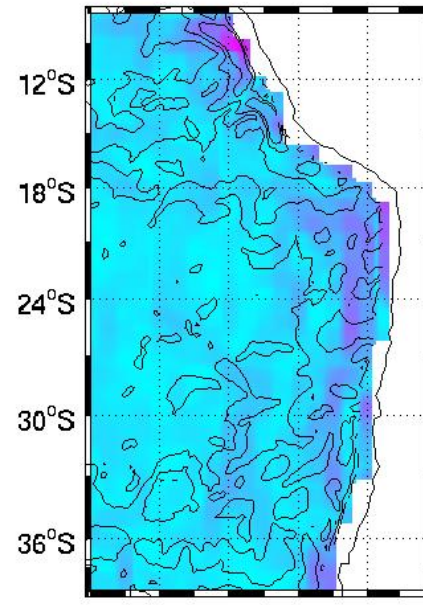


Surface Heat Fluxes vs SST gradient

|dSH| and |dSST| (per 100km)



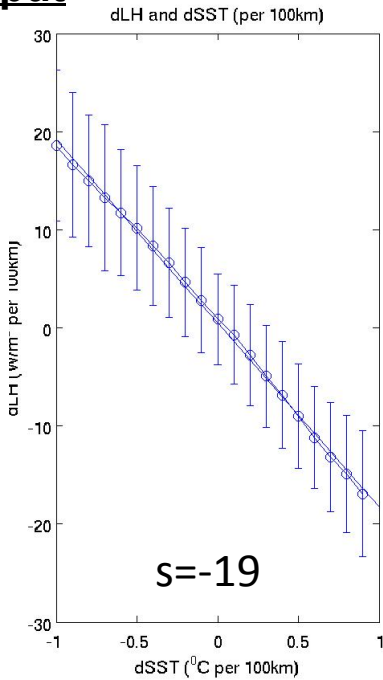
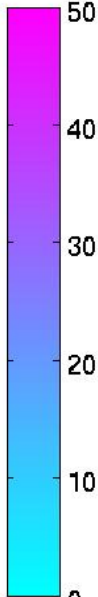
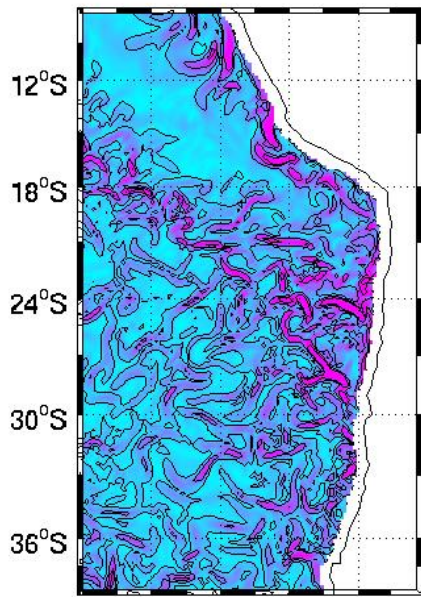
|dSH| and |dSST| (per 100km)



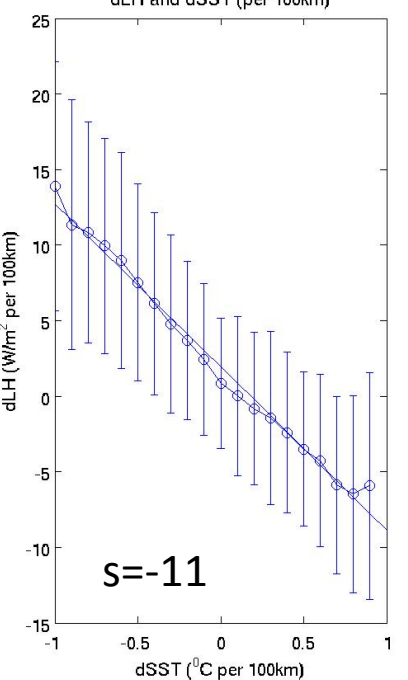
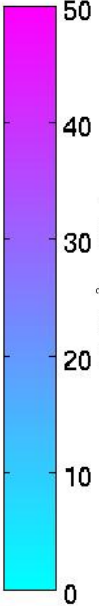
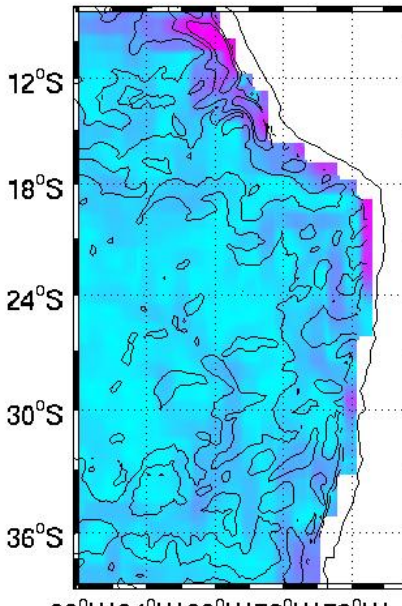
SCOAR output

Satellite Observations

|dLH| and |dSST| (per 100km)

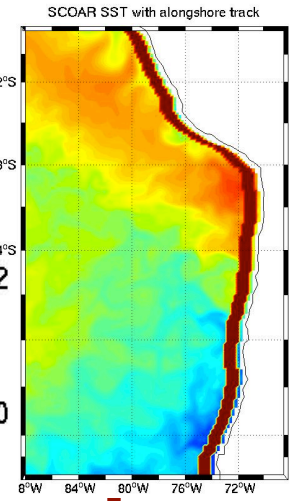
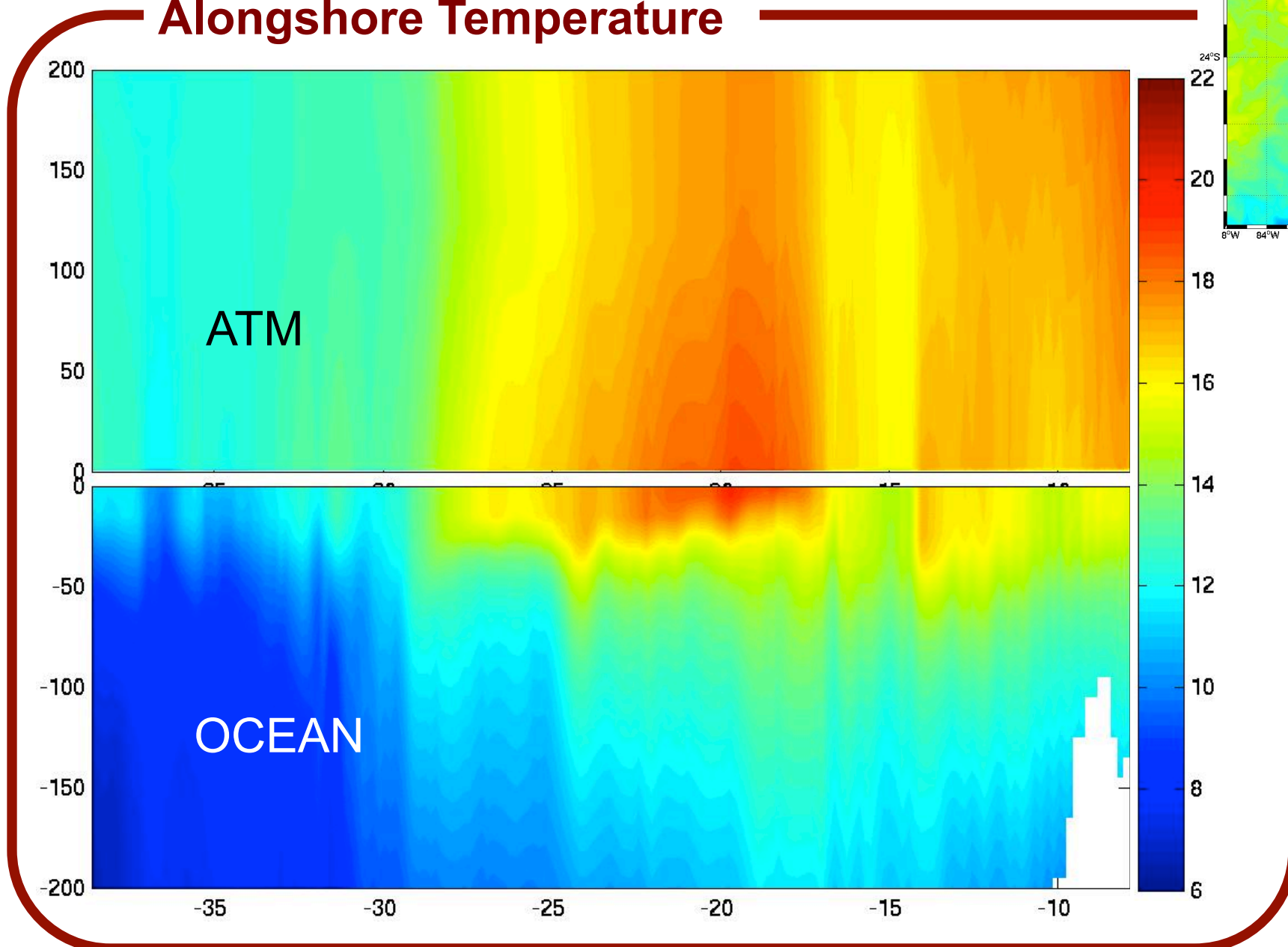


|dLH| and |dSST| (per 100km)

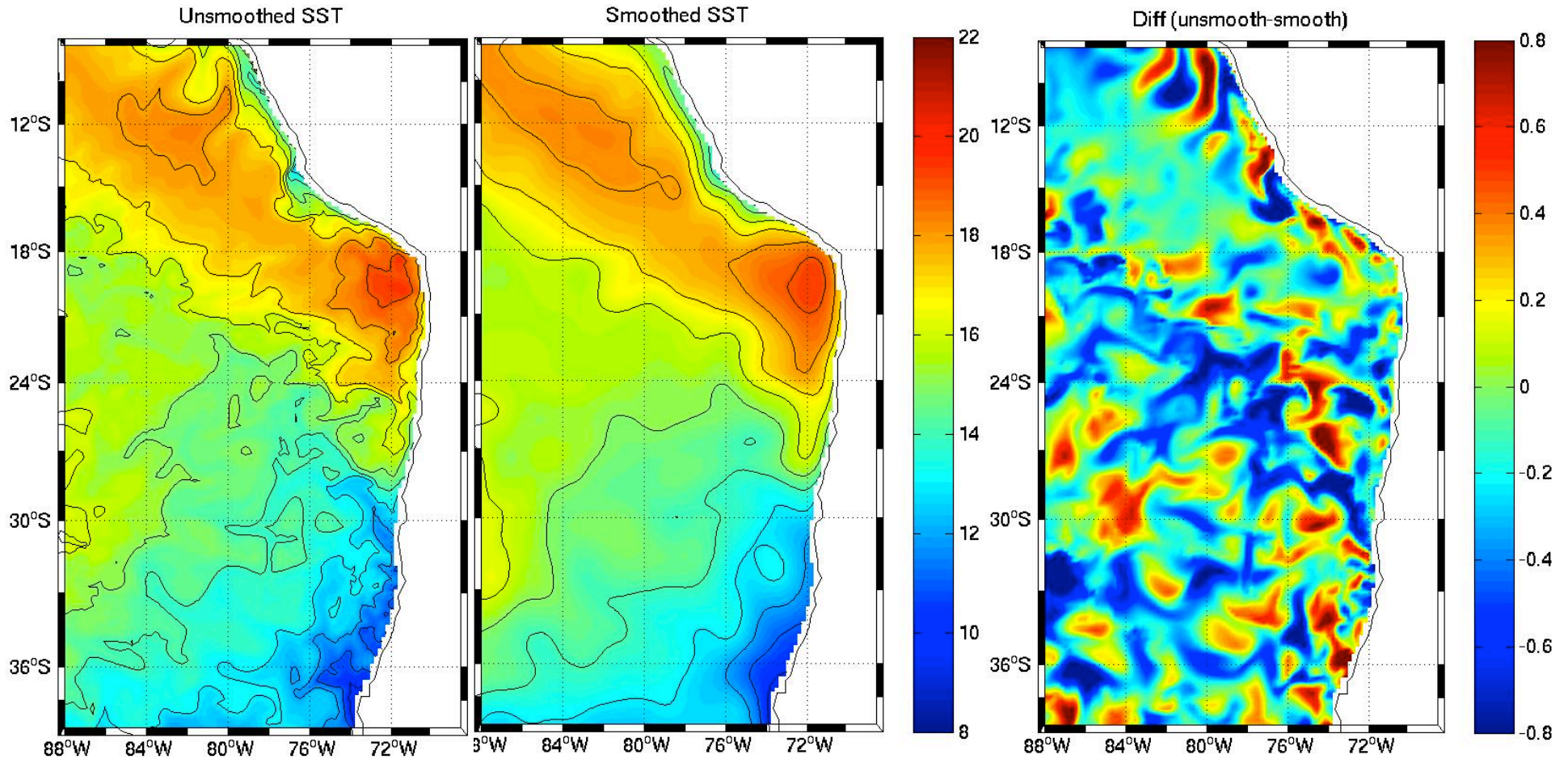


Mesoscale SST impact

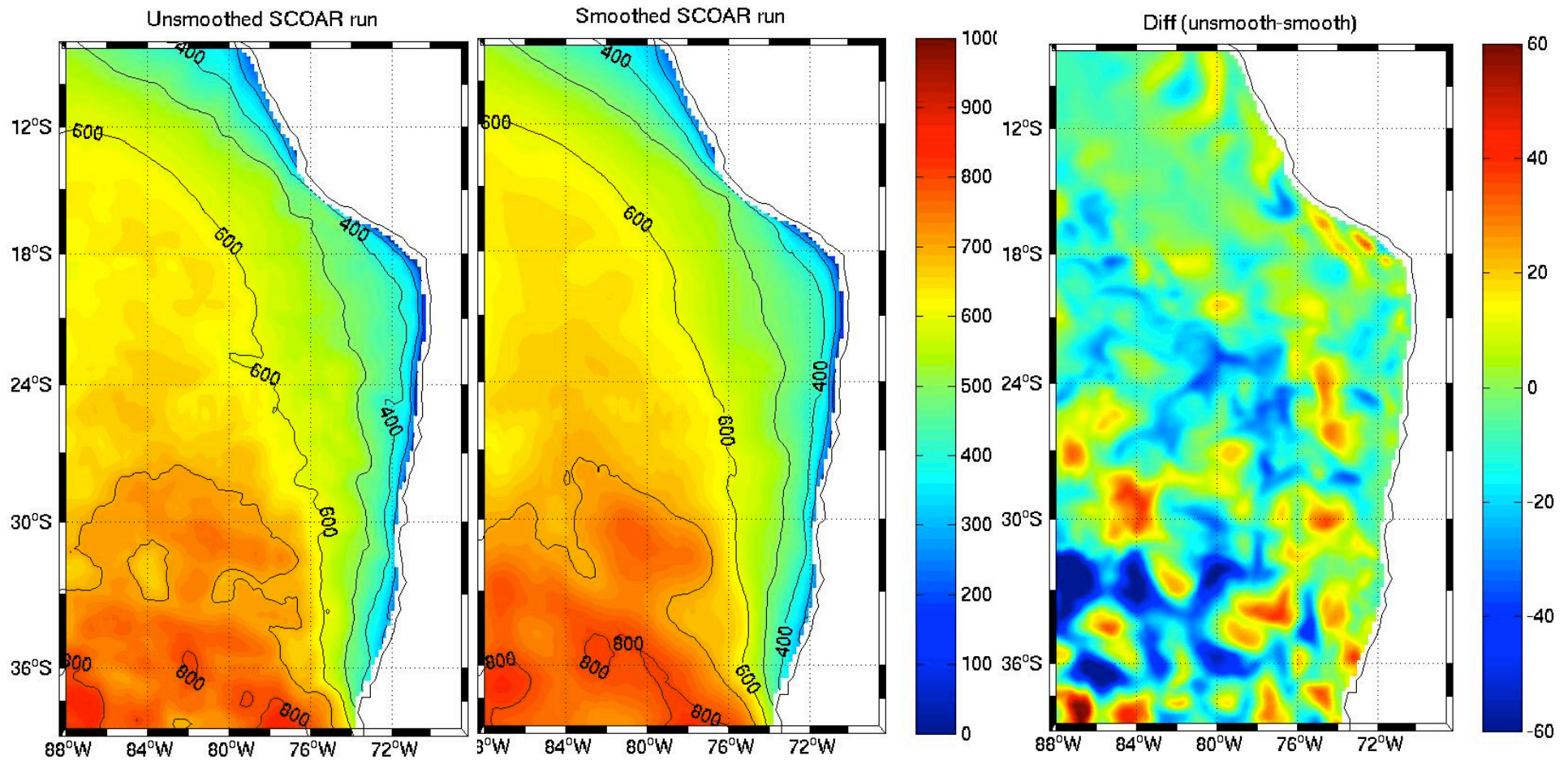
Alongshore Temperature



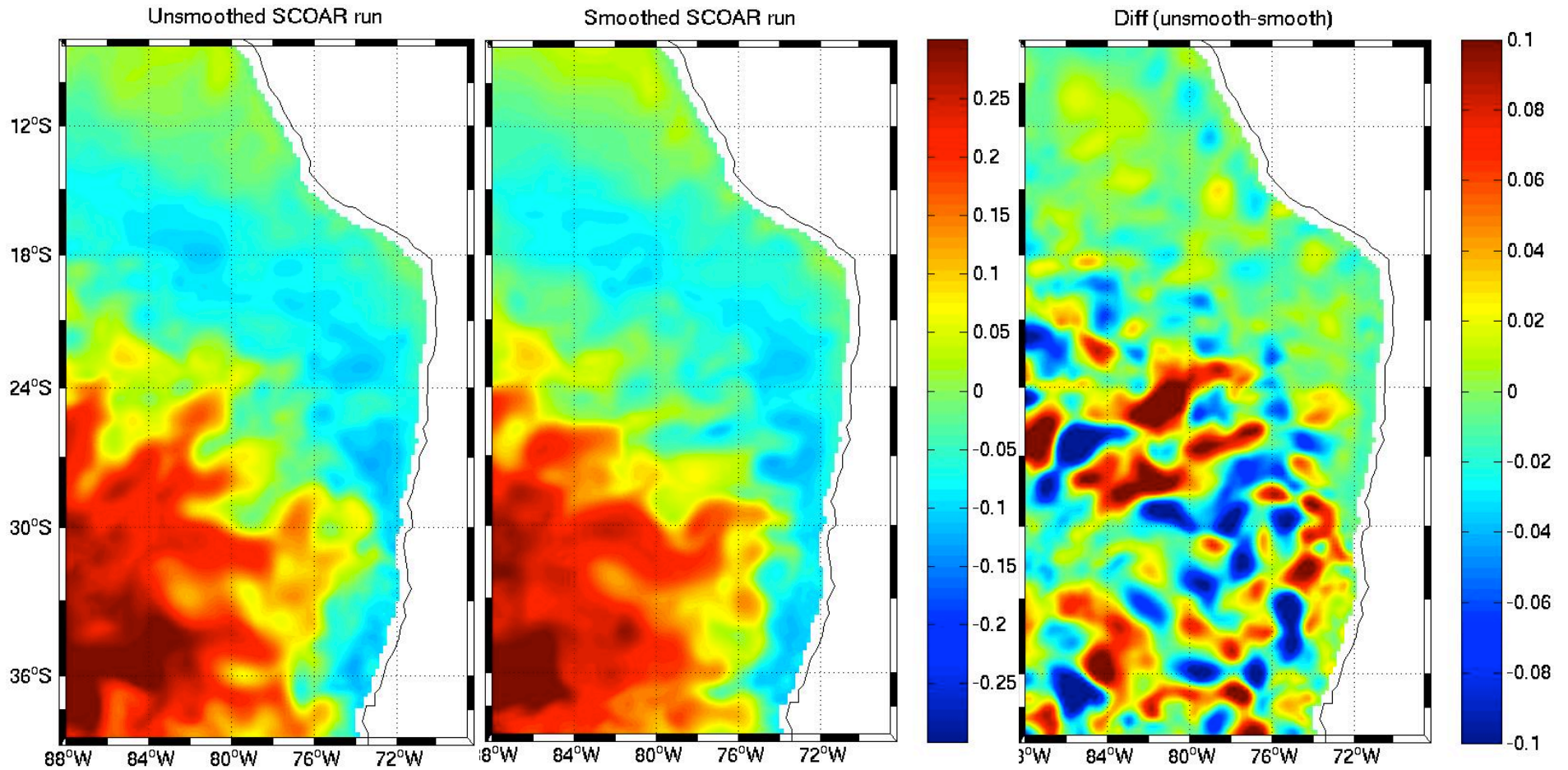
SCOAR SST (April 2007)



Model PBL height (April 2007)



Model SSH (April 2007)



Mesoscale SST impact on ABL?

(Comparative experiments)

- ✧ *Case 1: Control run composed of a fully-coupled SCOAR run for 1999-2007*
- ✧ *Case 2: Coupled SCOAR run with daily, 3 degrees smoothing of SST for the same duration*
- ✧ *Case 3: Coupled SCOAR run with daily, 5 degrees smoothing of SST for the same duration*
- ✧ *Case 4: Uncoupled RSM forced with daily, 5 degrees smoothed SST taken from SCOAR run*

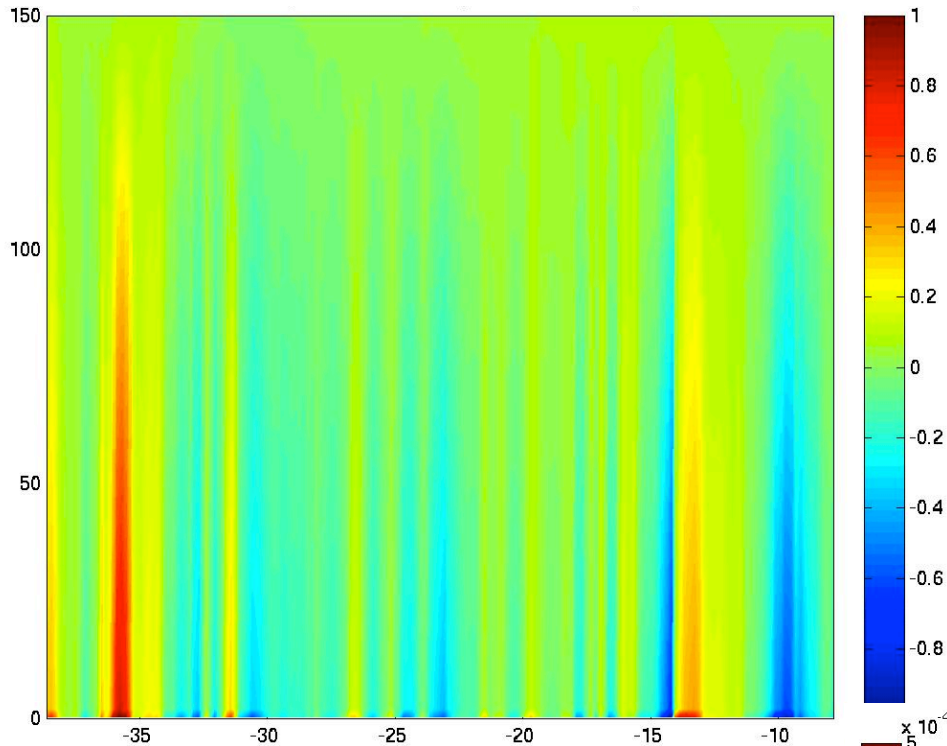
A blue-tinted image of Earth from space, showing the Americas. The text "THANK YOU" is overlaid in a stylized font, flanked by decorative wavy lines.

~ ~ ~ THANK YOU ~ ~ ~



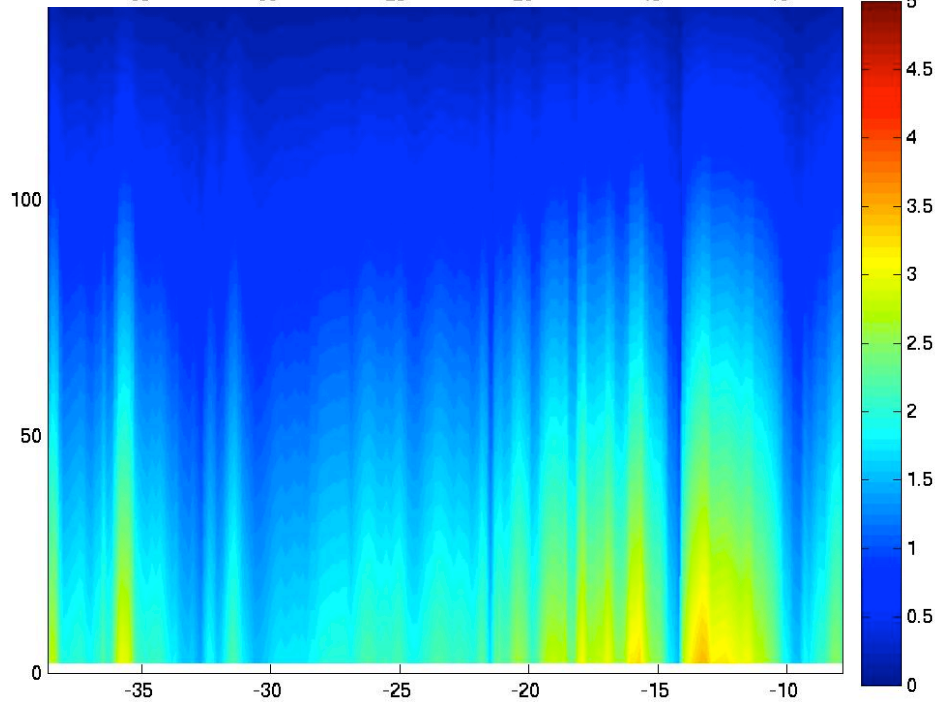
Summary

- ✧ SCOAR produces more realistic surface winds than NCEP R2 reanalysis.
- ✧ Correlation between crosswind SST gradient and wind stress curl was seen, along with correlation between downwind SST gradient and wind stress divergence.
- ✧ Changes in latent heat loss and sensible heat loss out of the ocean linearly correlates with changes in SST.
- ✧ Mesoscale SST features has a local impact on the lower part of the overlying PBL, but the overall large-scale pattern remains very similar.



Alongshore Profile Difference (unsmooth-smooth)

Temperature difference in °C



Specific humidity difference in
kg/kg