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VOCALS Regional Modeling Activities at UCLA

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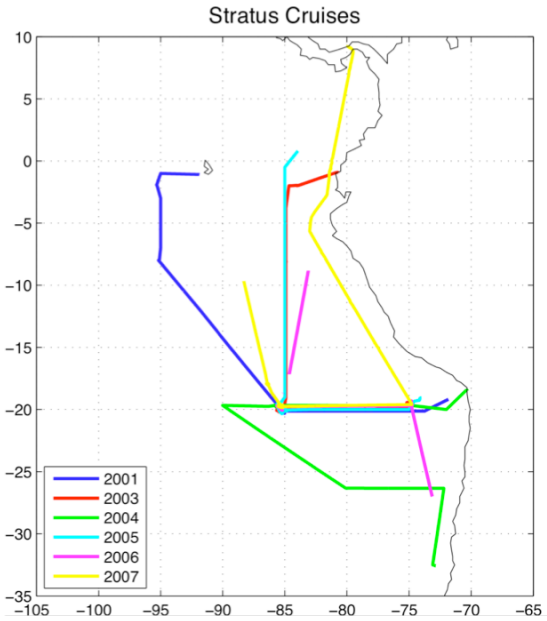
WRF-VOCALS region simulations

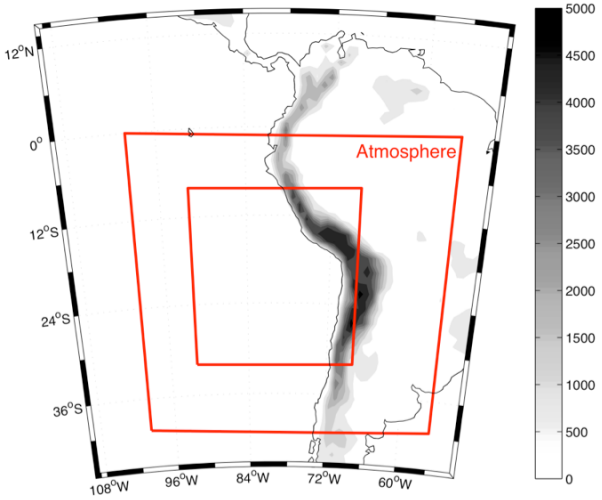
Year	Cruise time	Radiosonds	WRF model
2001	O/09-25	O/09-25	O/07-31
2003	N/11-24	N/14-24	N/09-30
2004	D/04-22	D/06-22	D/03-22
2005	O/05-20	O/04-18	O/03-22
2006	O/10-25	O/10-25	O/07-31
2007	O/16-N/03	O/18-N/03	O/15-N/03
2008	O-N	O-N	O/01-N/30

WRF-3.0.1.1
Two nested domains (45km and 15km) in VOCALS region
B.C. and I.C.: NNRP (NCEP-NCAR Reanalysis Product)
Both PBL schemes, non-local YSU and
Mellor-Yamada-Janjic TKE give similar results.
Model output hourly for diurnal analysis

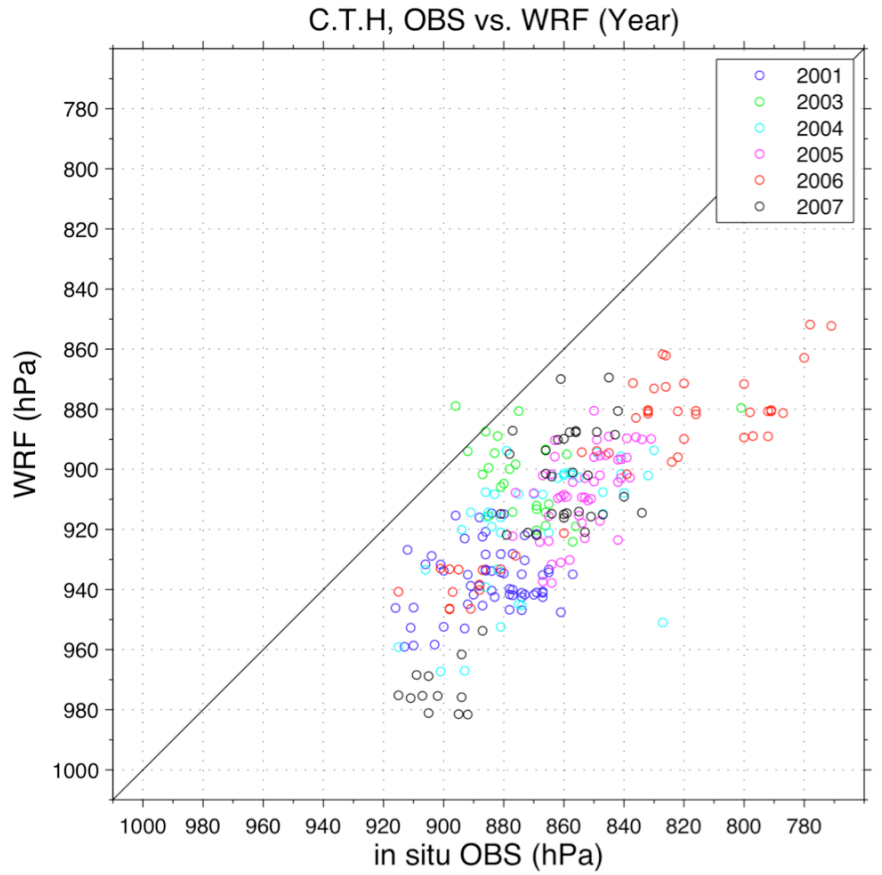
radiosonds



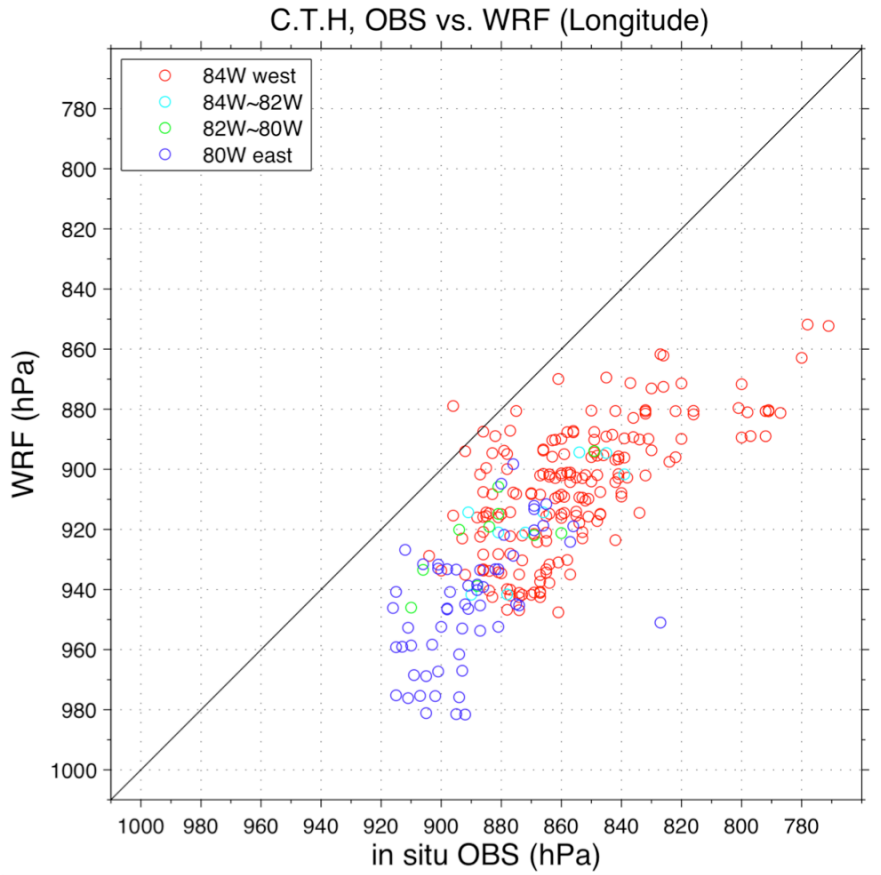
WRF domains



WRF vs. OBS (time grouped)

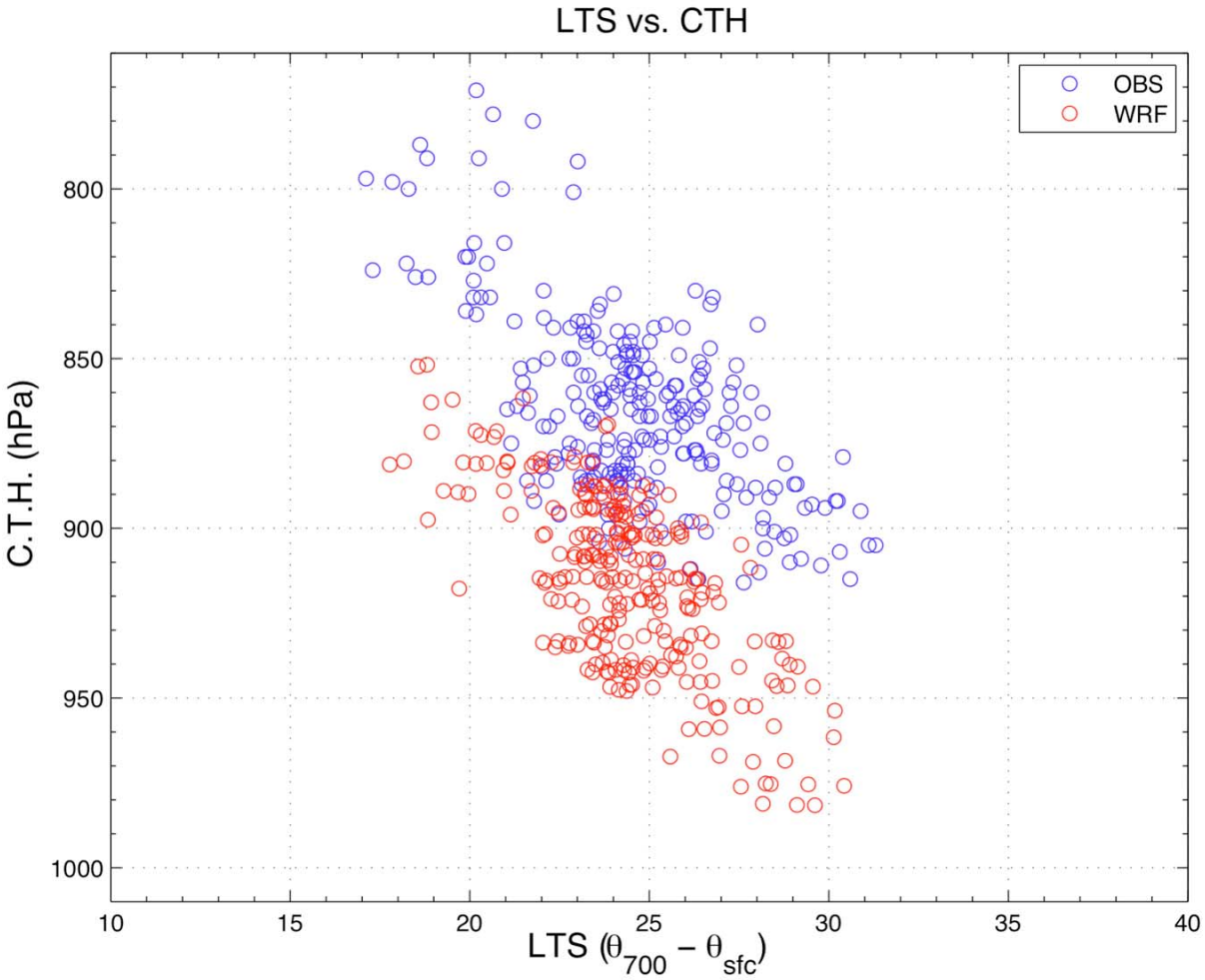


WRF vs. OBS (longitude grouped)



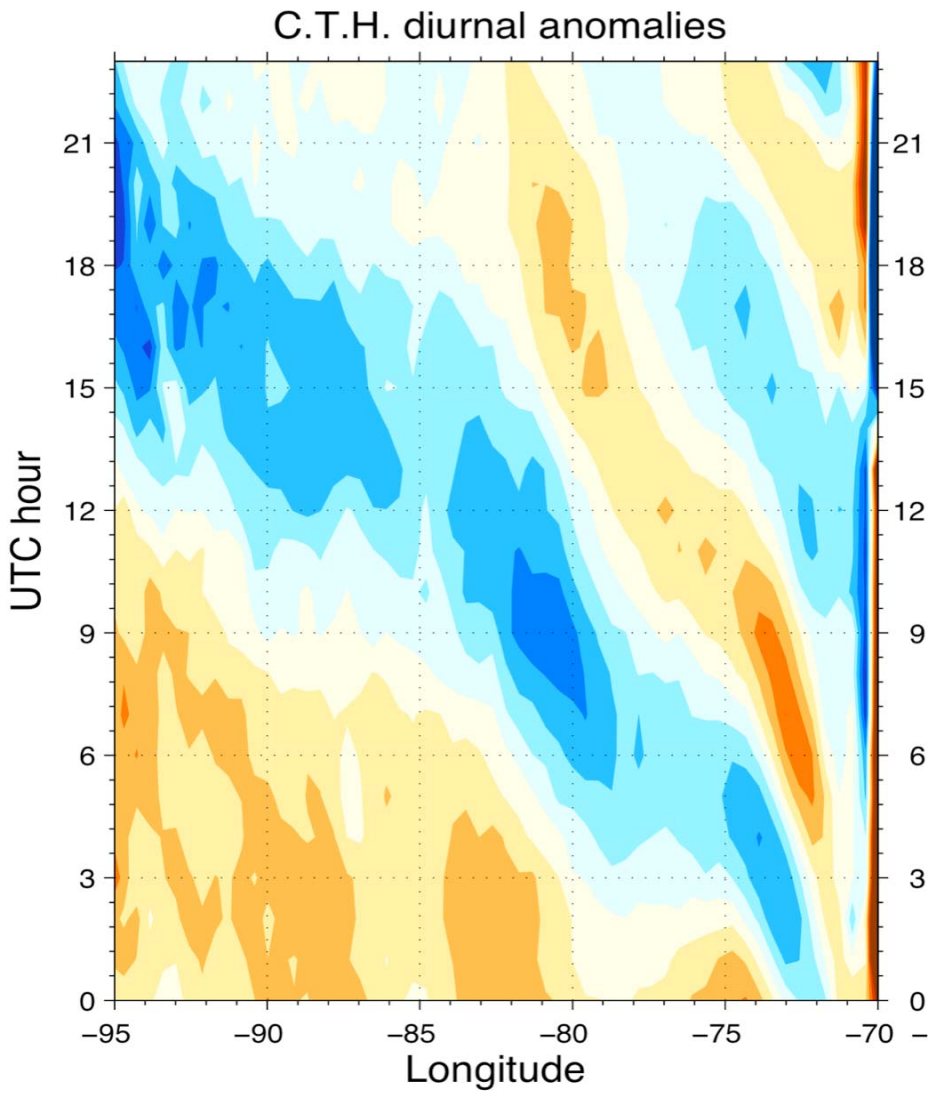
WRF has a systematic bias towards low cloud top height, but captures the interannual variability and zonal gradient reasonably well.

WRF simulated relationship btw CTH and LTS



WRF simulates the observed linear inverse relationship between cloud top height and lower tropospheric stability reasonably well.

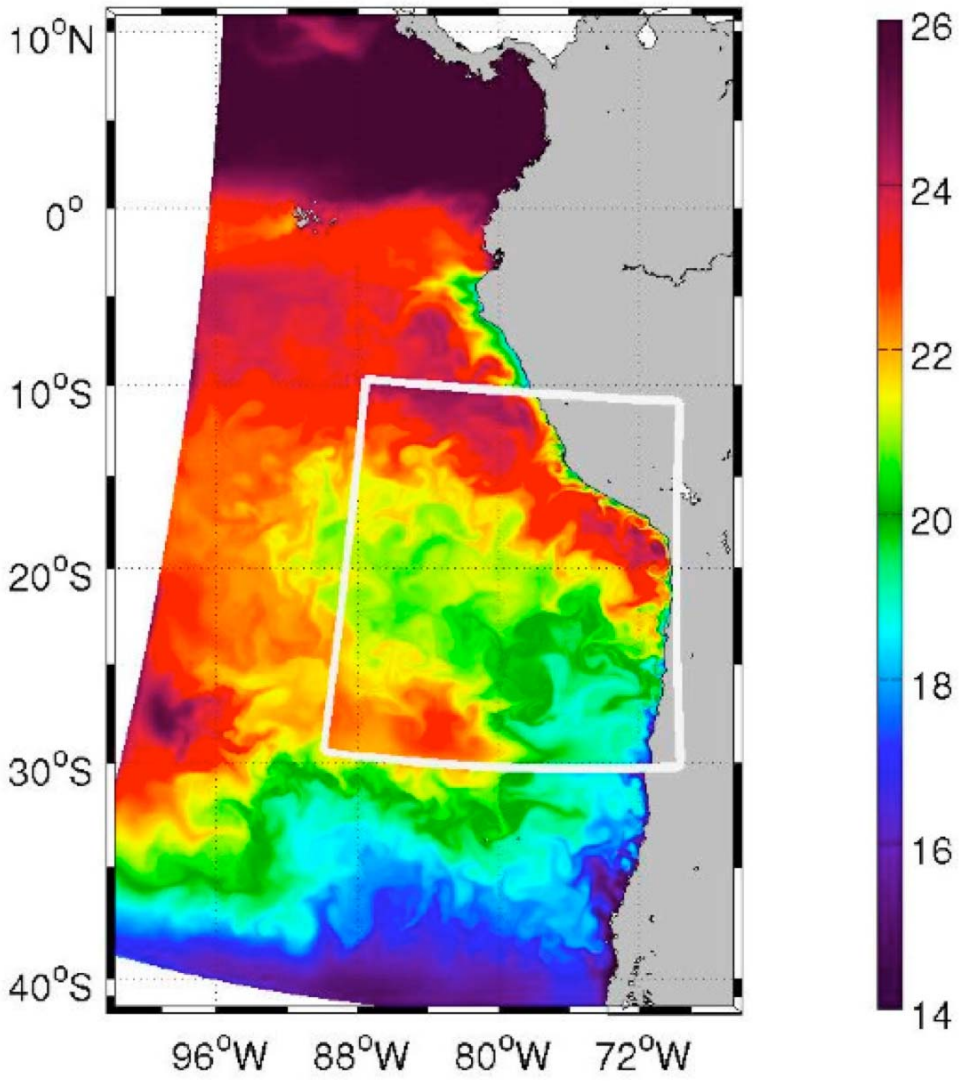
Diurnal cycle, westward propagation



WRF 6-year averaged diurnal mean of CTH

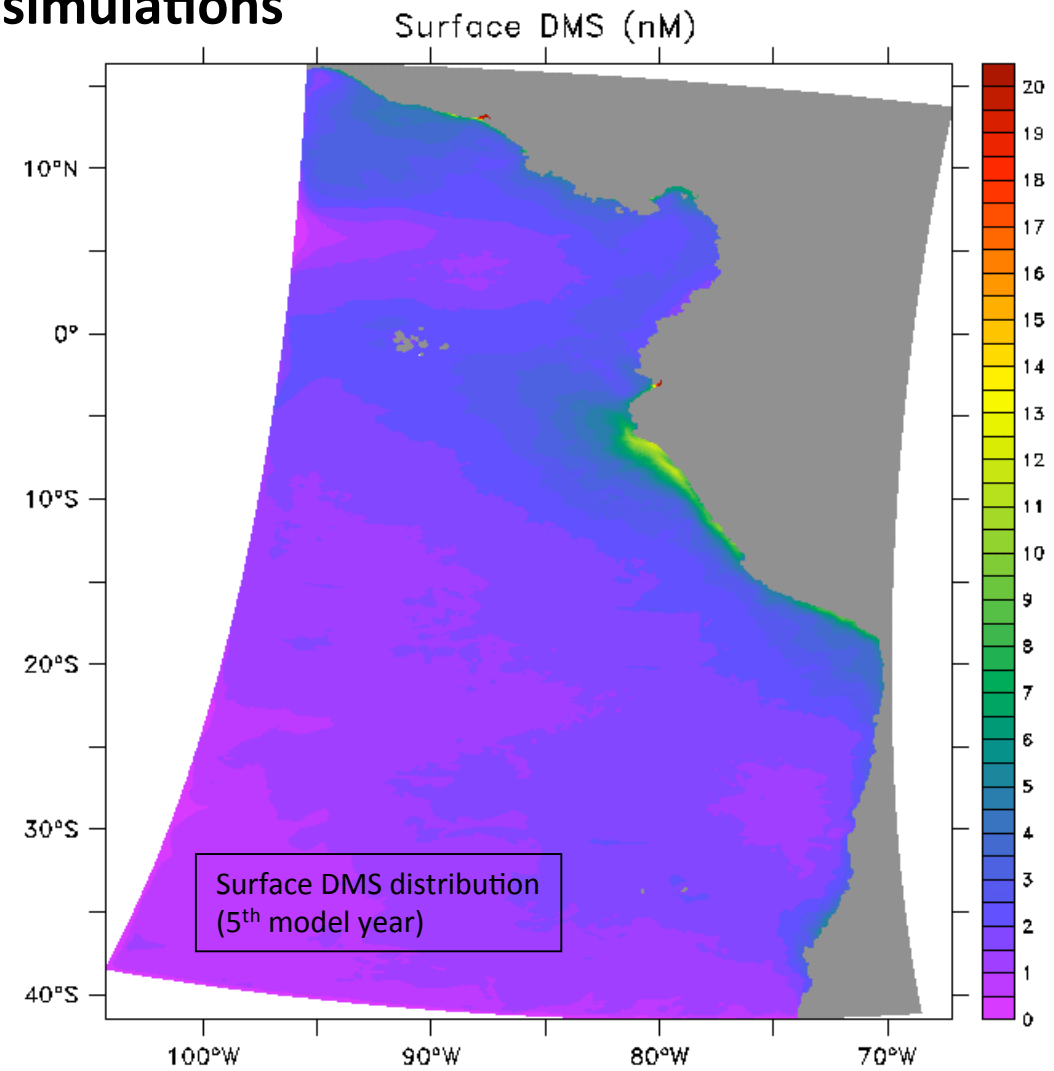
Oceanic simulations

Sea Surface Temperature snapshots from ROMS embedded grids at horizontal resolutions 7.5 and 4 km. To better understand the role of the mesoscale eddies in the region and to assess errors in the oceanic simulation, we generated climatological quasi-equilibrium solutions for the Peru-Chile System.



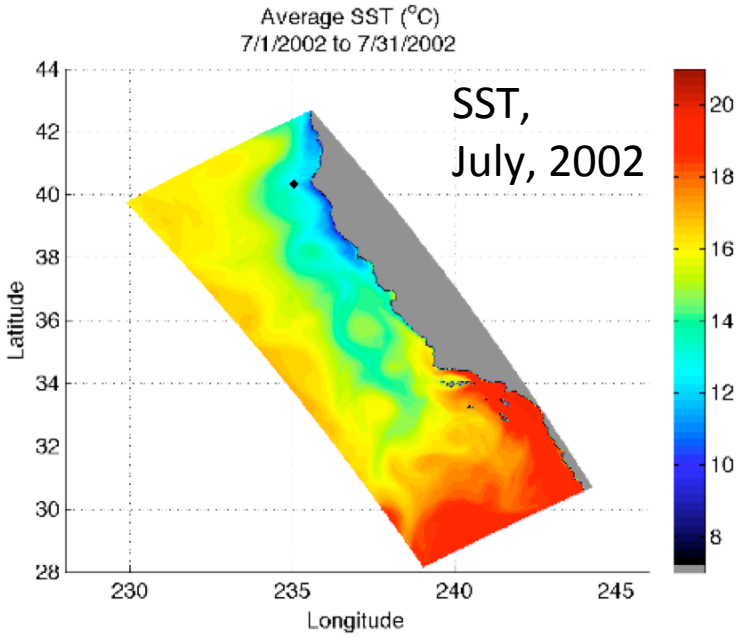
- Mesoscale eddies are well simulated in southeast Pacific coastal regions.
- Compared with available observations, the nested eddy-resolved ROMS solutions give a reasonable seasonal cycle, mean circulation patterns, and level of mesoscale activity.

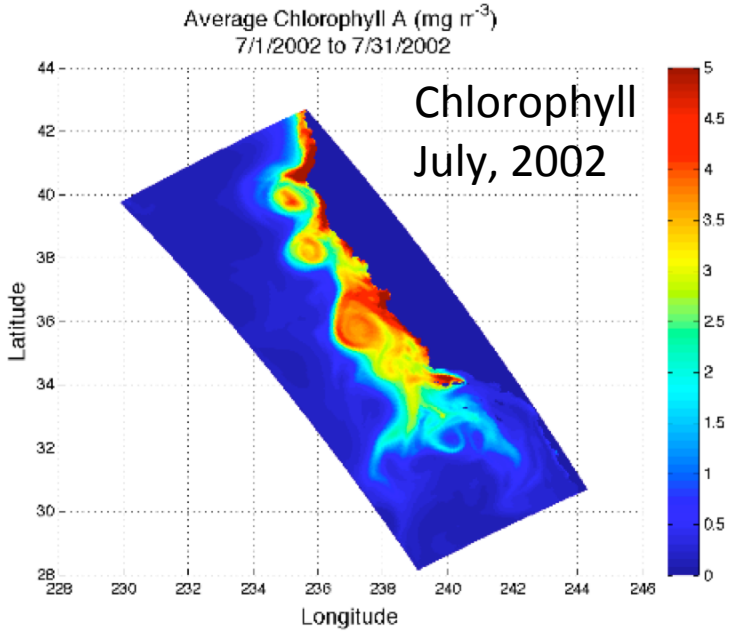
Biogeochemical simulations

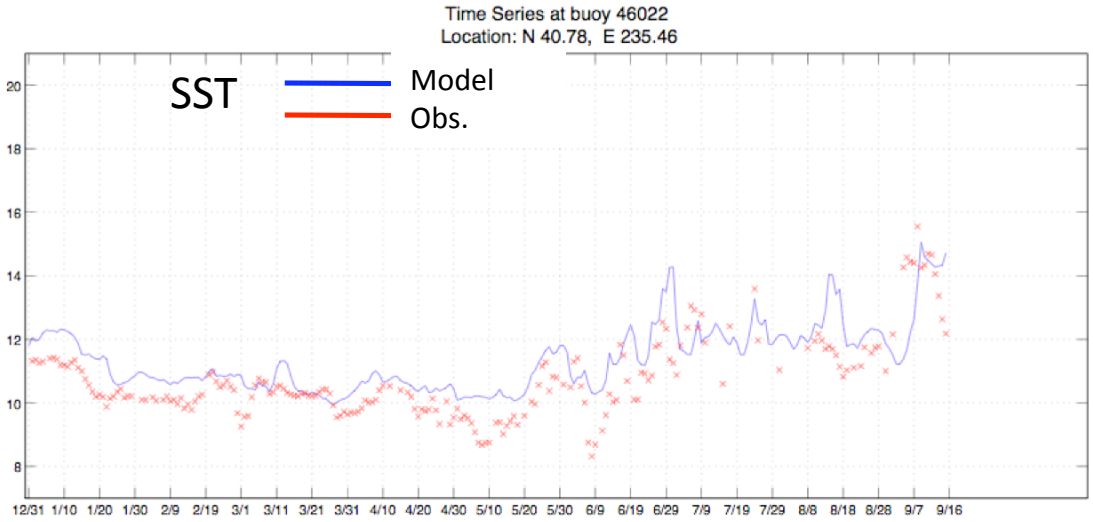


- Successfully implemented a simple description of the dimethyl sulfide (DMS) cycle in the biogeochemical module of ROMS (7.5km resolution).
- Surface DMS concentration spatial pattern shows some rough agreement with observations, to the extent they have been taken.
- Some adjustments to the parameters and better observations are needed to assess and improve the quantitative agreement.

Coupled WRF/ROMS testbed-California costal region







- Coupled WRF/ROMS with biogeochemistry module embedded
- Strong upwelling with enhanced biological activity
- Modeled SST variation generally consistent with in-situ buoy observed but with warm bias, probably with stratus underestimation