

Downscaling climate simulations using a fully coupled global/regional model

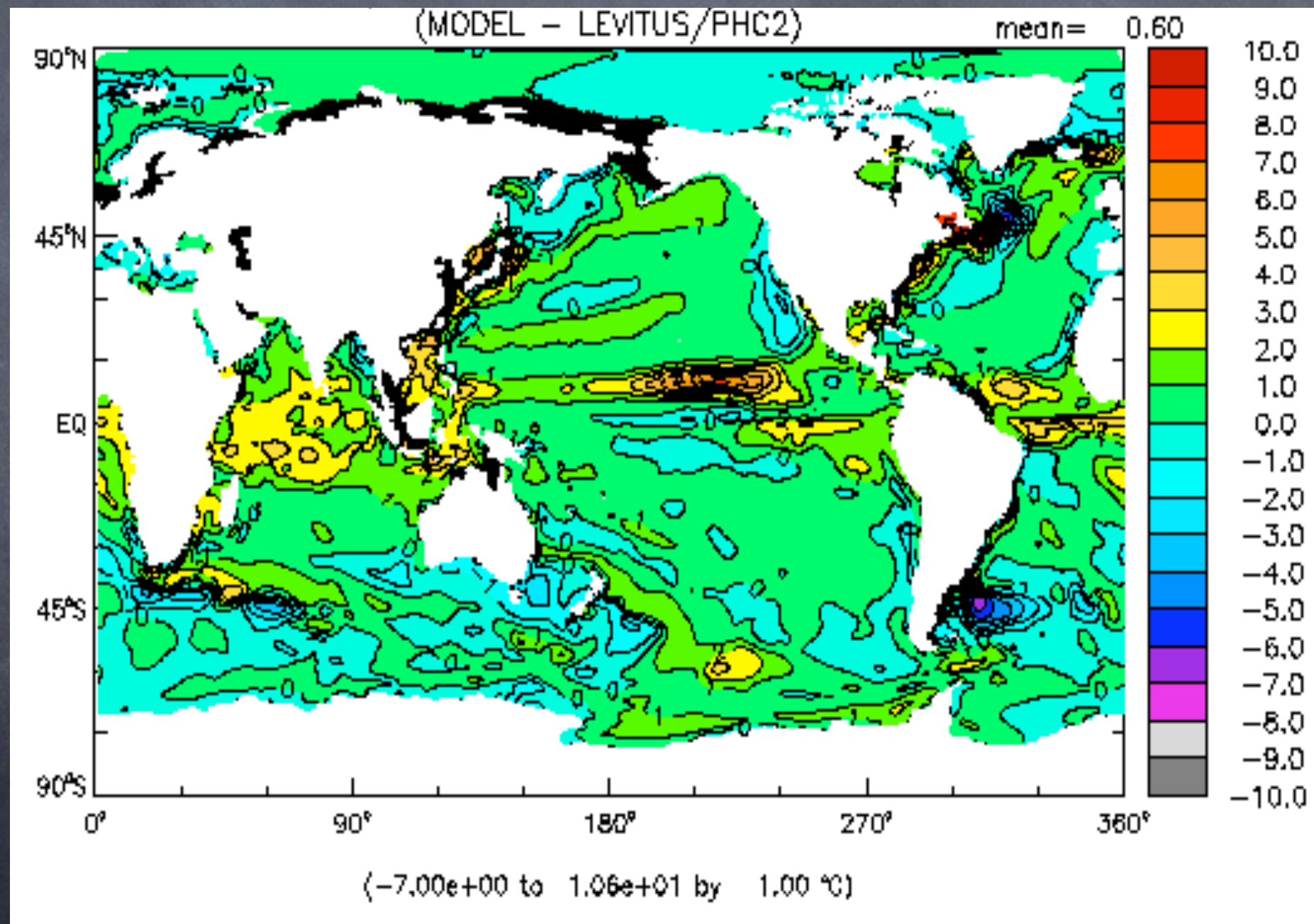
Enrique Curchitser

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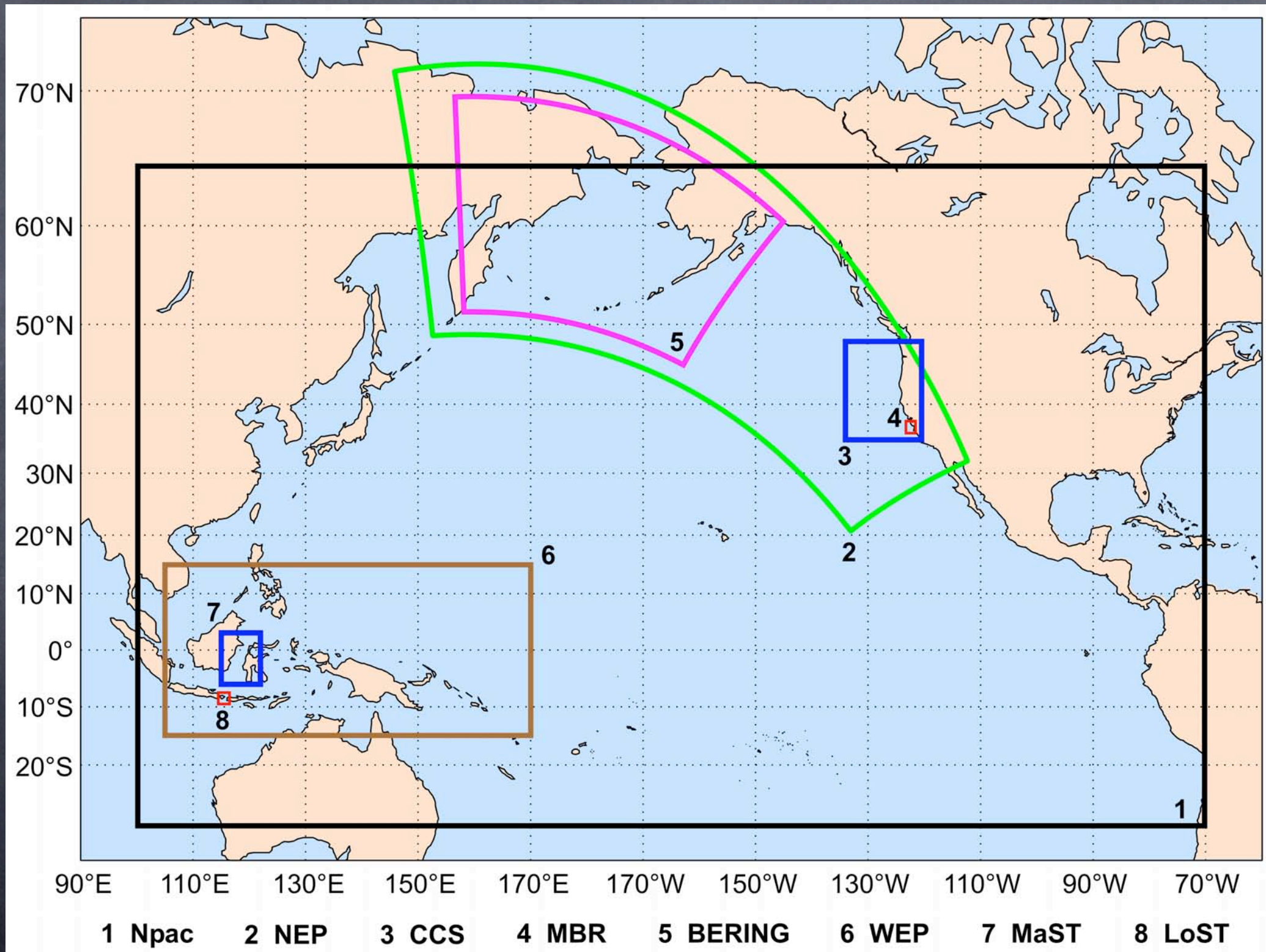
with

Bill Large (NCAR), Jon Wolfe (NCAR), Kate Hedstrom (ARSC)

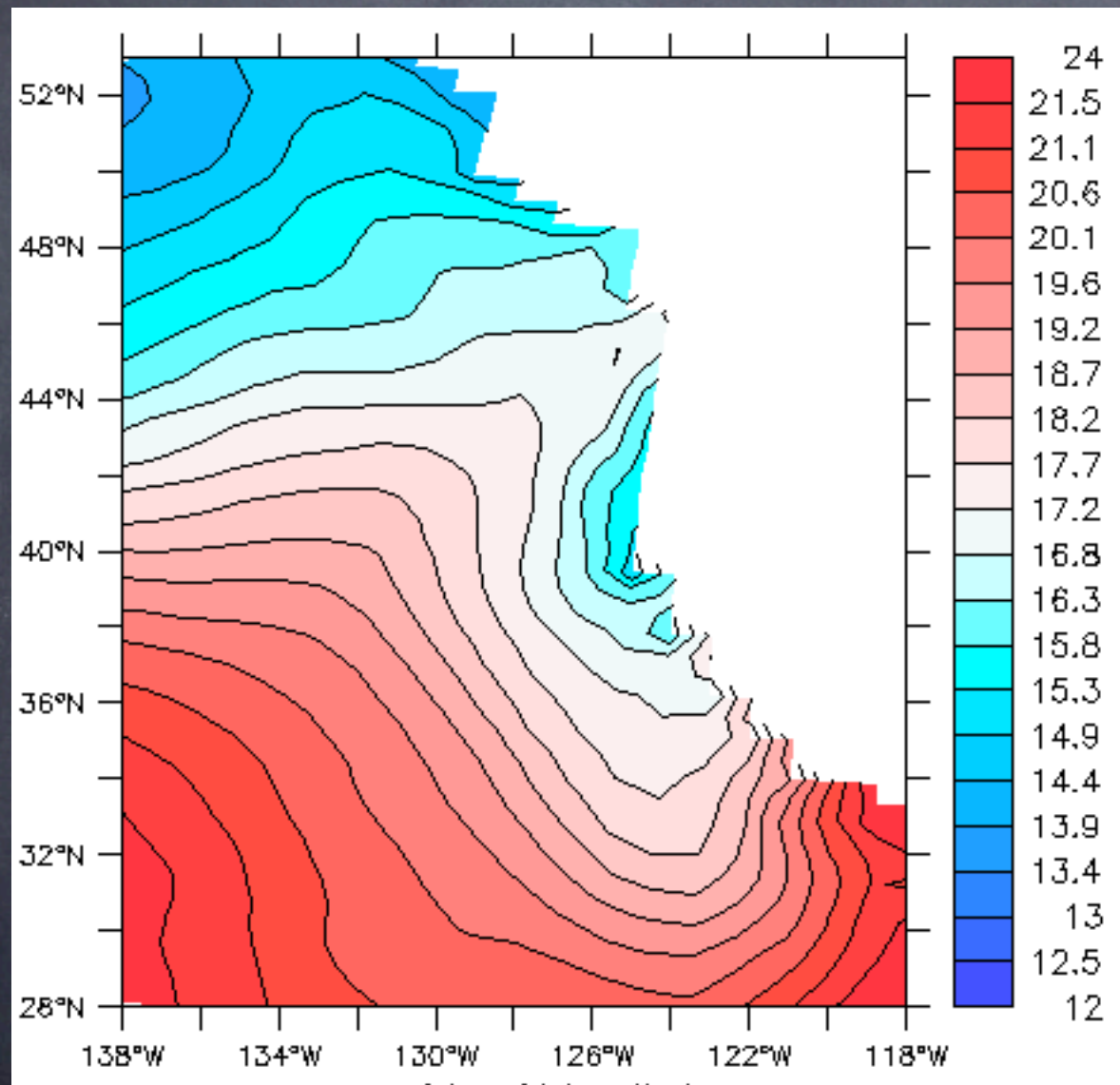
Climate model biases (CCSM)



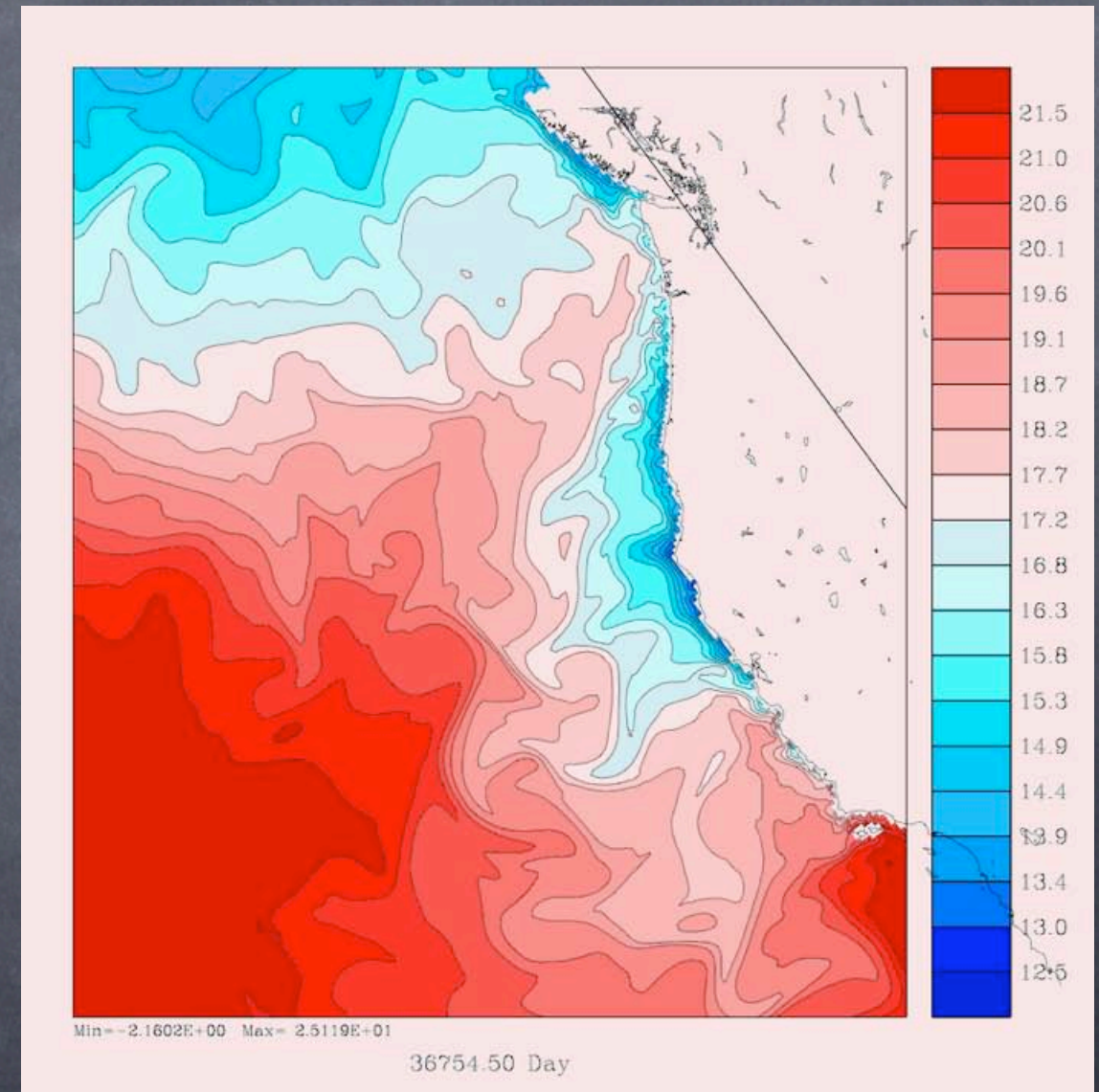
Can regional models help?



SST from a hindcast simulation

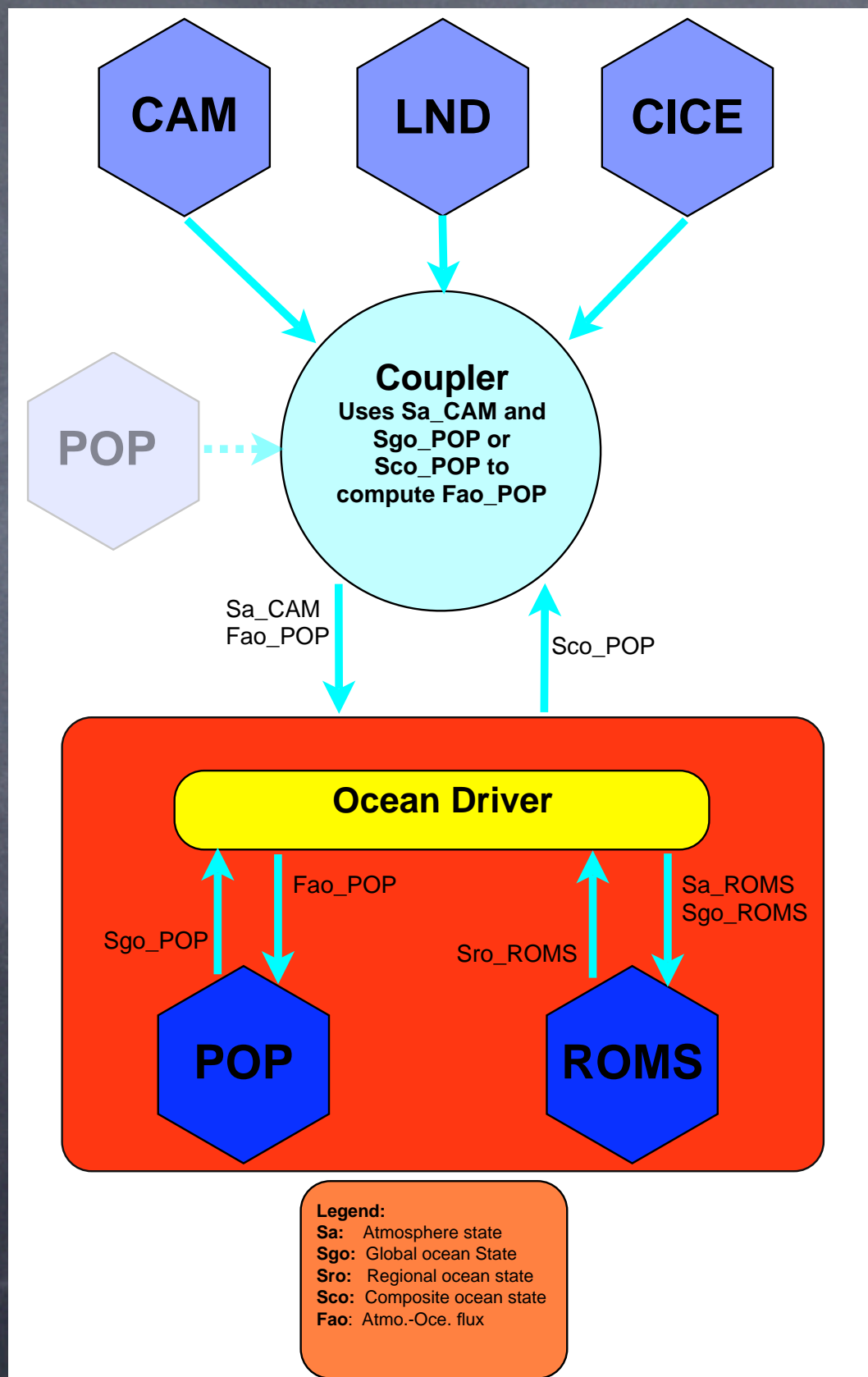


POP



ROMS

Re-designing CCSM

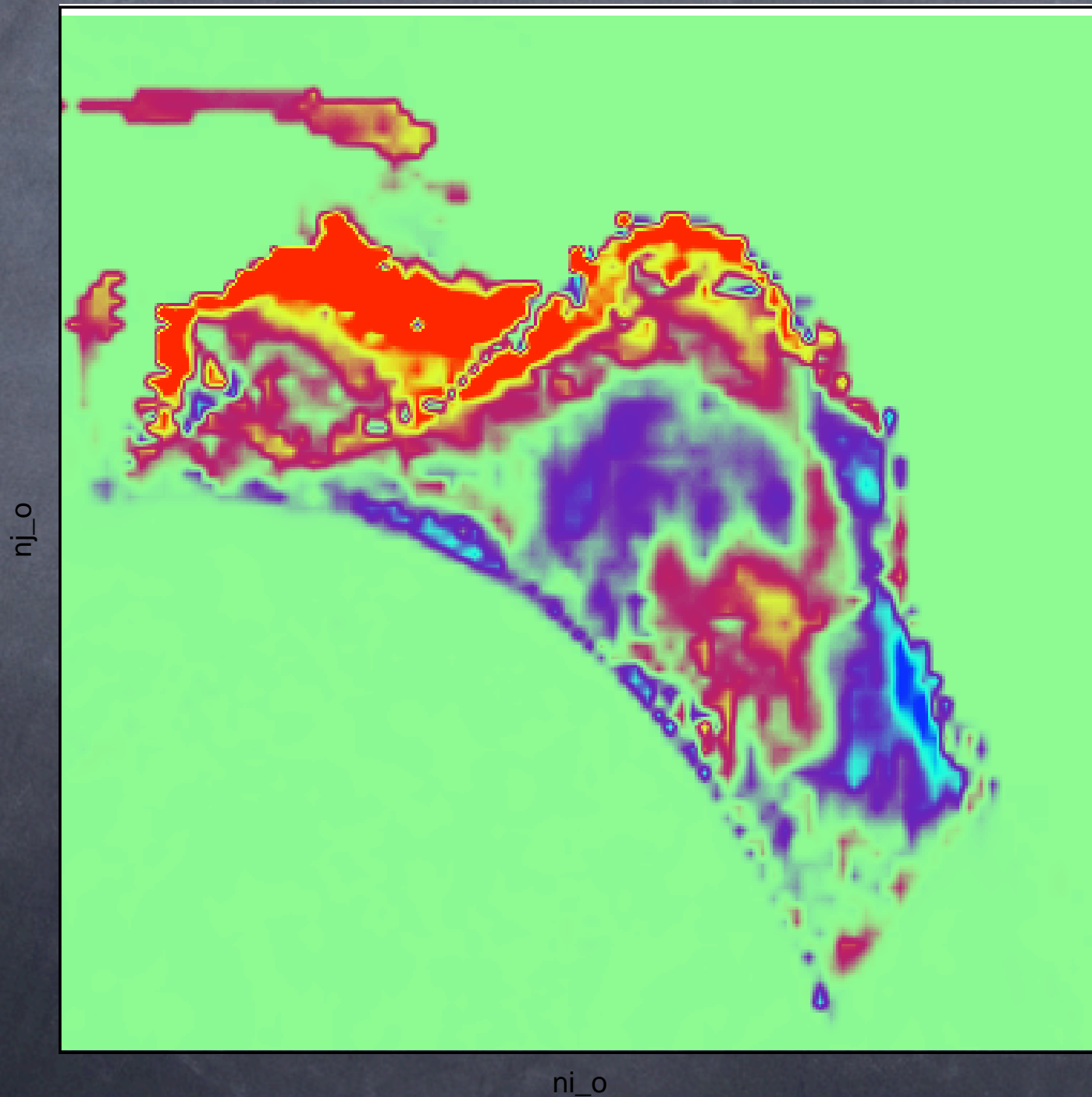


The first simulations:

POP	Active Ocean Data everything else (ATM., ICE., Land).	Active Ocean Active everything else.
POP + ROMS	Active Composite Ocean Data everything else (ATM., ICE., Land).	Active Composite Ocean Active everything else.

We have upwelling

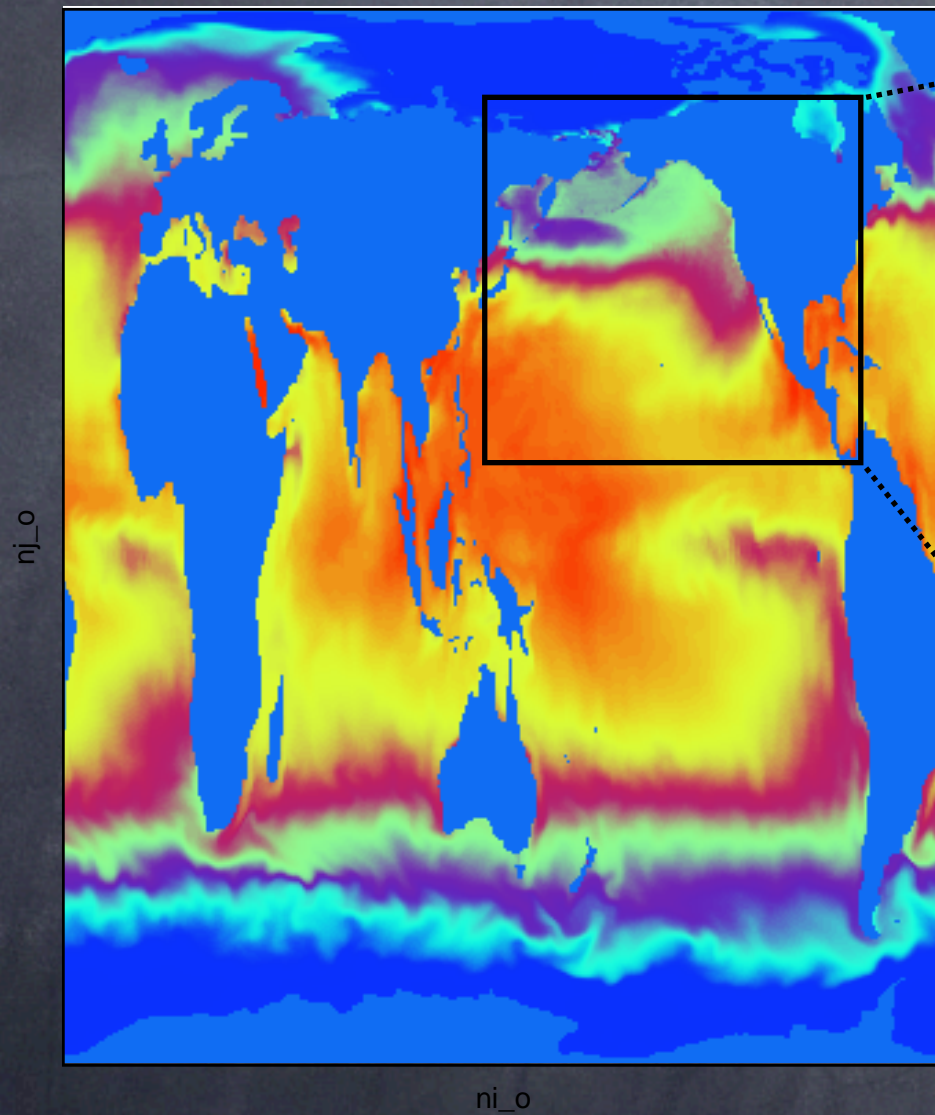
SST



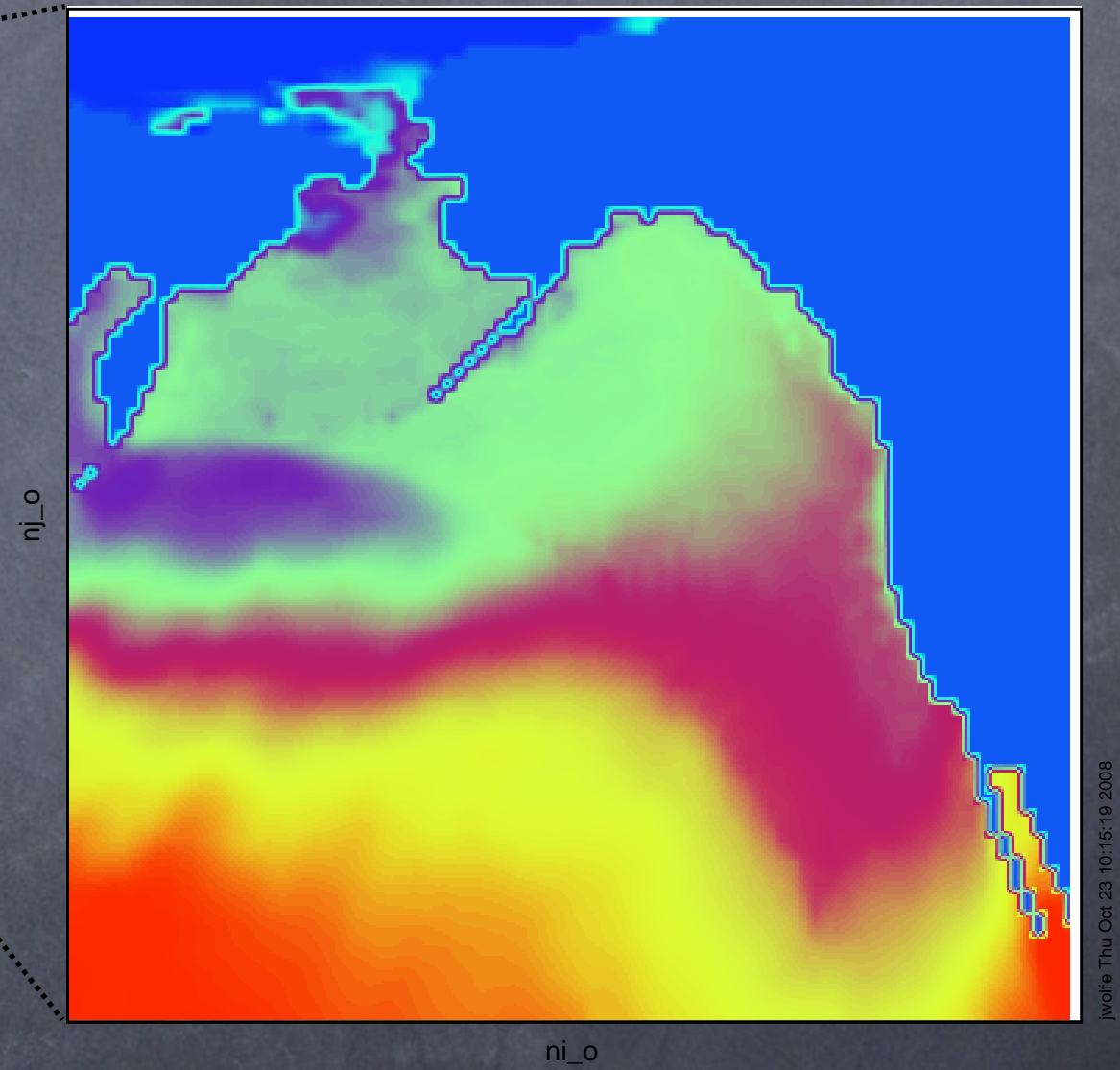
jwolfe Mon Aug 4 13:44:23 2008

The new global SST

temperature (kelvin)



SST

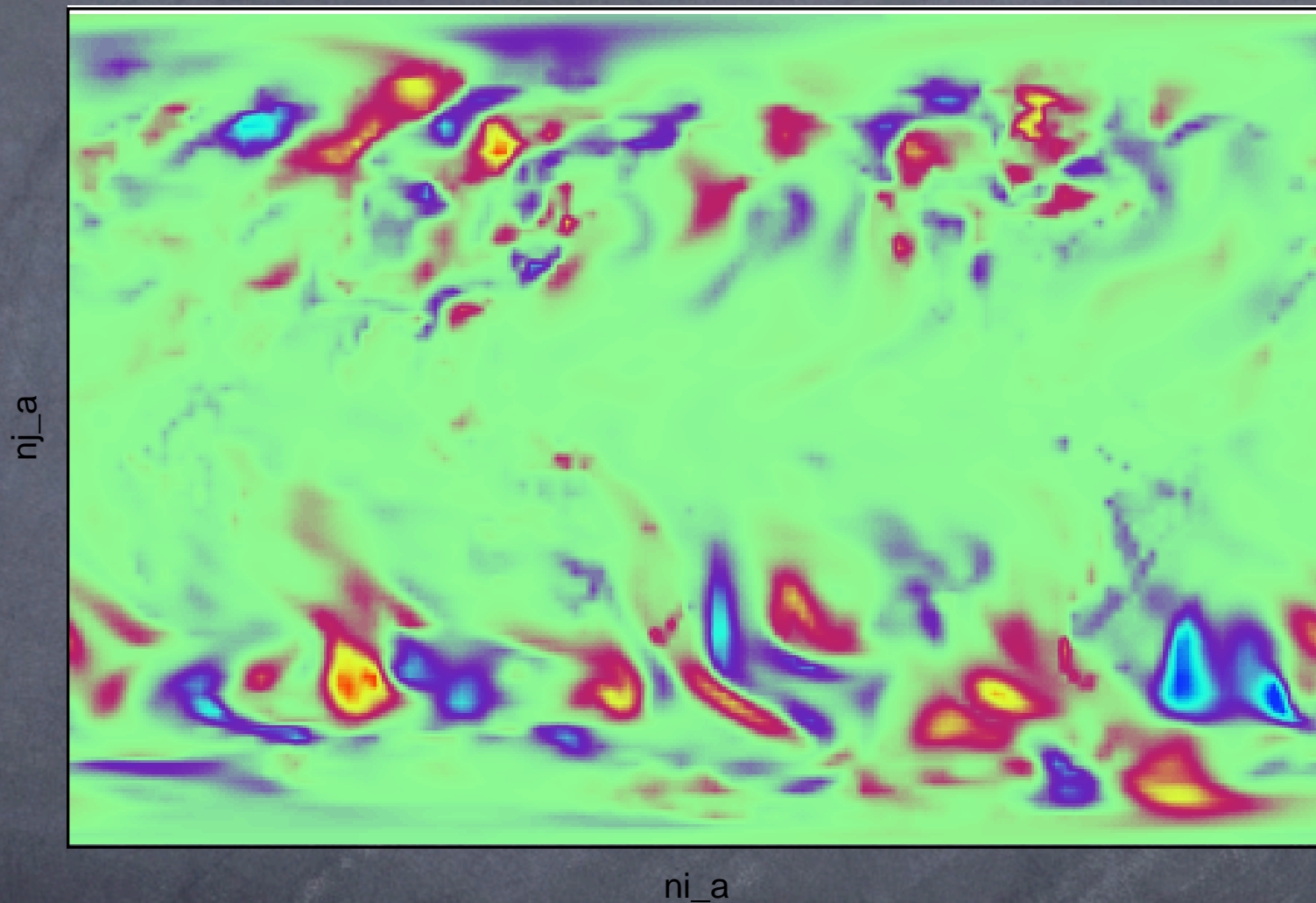


cpl6 output netCDF data file
Range of temperature: 270.857 to 304.046 kelvin
Range of ni_o: 0 to 319
Range of nj_o: 0 to 383
Current time: 577 days since 0000-01-01 00:00:00
Frame 1 in File PR.T62_g14.C2.bluefire.composite.cpl6.hi.0001-08-01-00000.nc

Range of SST: 271.382 to 302.068 (null)
Range of ni_o: 0 to 90
Range of nj_o: 0 to 90
Frame 90 in File SST.T62_g14.C2.bluefire.composite.cpl6.hi.0001-08-01-00000.nc

The atmosphere feels it!

Bottom_Atmospheric_Temperature_Difference



jwolfe Fri Sep 12 15:20:46 2008

Range of Bottom_Atmospheric_Temperature_Difference: -1 to 1 (null)

Range of ni_a: 0 to 143

Range of nj_a: 0 to 95

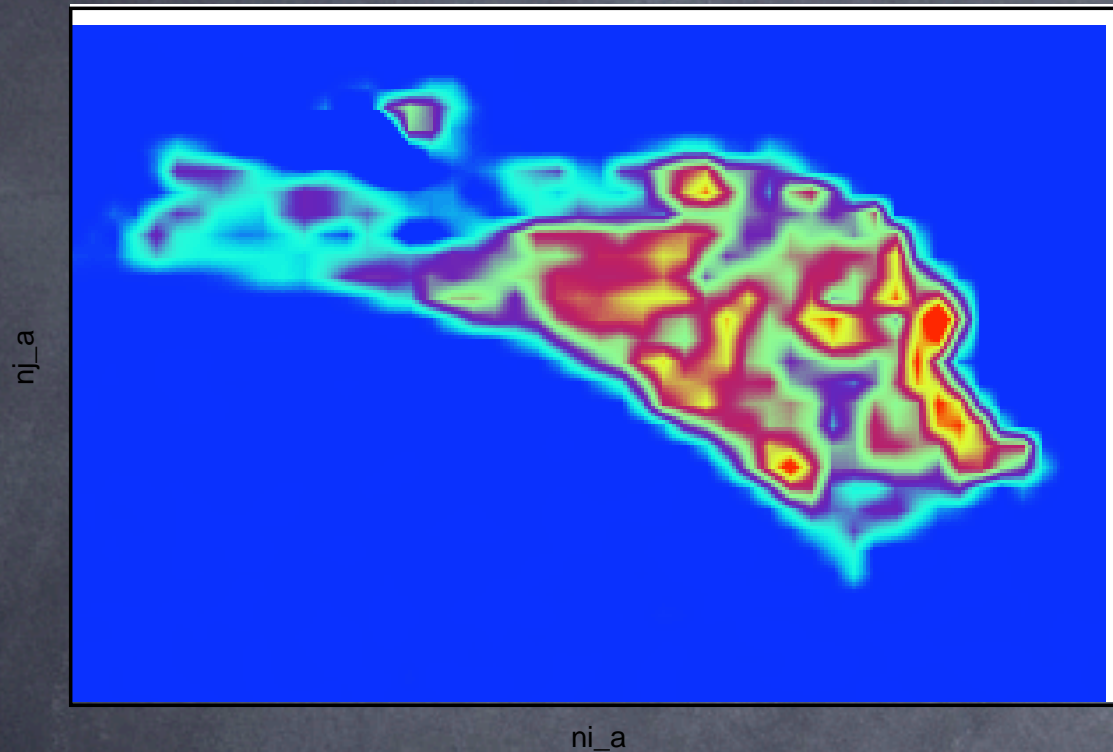
Frame 90 in File TBOT.f19_g14.B2.bluefire.diff.cpl6.hi.0001-06-01-00000.nc

Final remarks

- We designed and implemented a new regional/global ocean within a climate model.
- Early results point towards a non-trivial response in the atmosphere.
- We see this as a step towards an Earth System Model; Climate with ecosystems and social models.
- We are waiting for a high-resolution atmosphere to join the effort.

The new flux computation

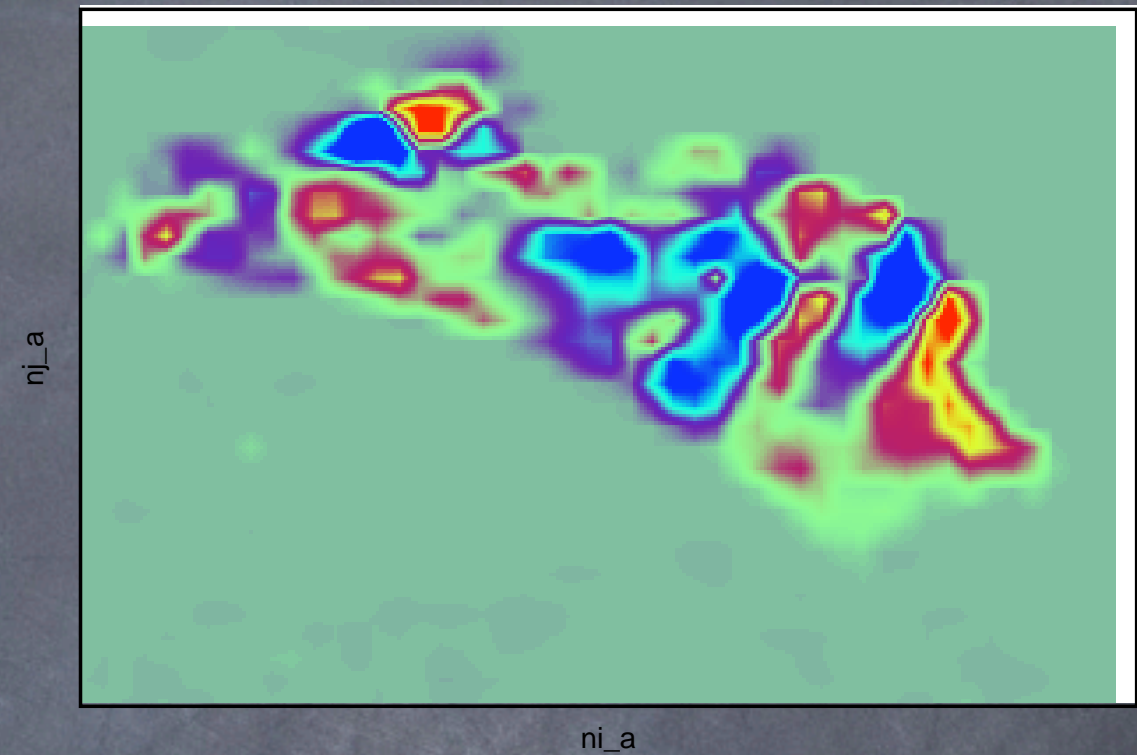
Latent_Heat_Flux



Range of Latent_Heat_Flux: -0.311737 to 29.8932 (null)
Range of ni_a: 0 to 49
Range of nj_a: 0 to 32
Frame 90 in File LAT.T62_g14.C2.bluefire.diff.cpl6.hi.0001-06-01-00000.nc

jwofe Fri Sep 12 14:45:09 2008

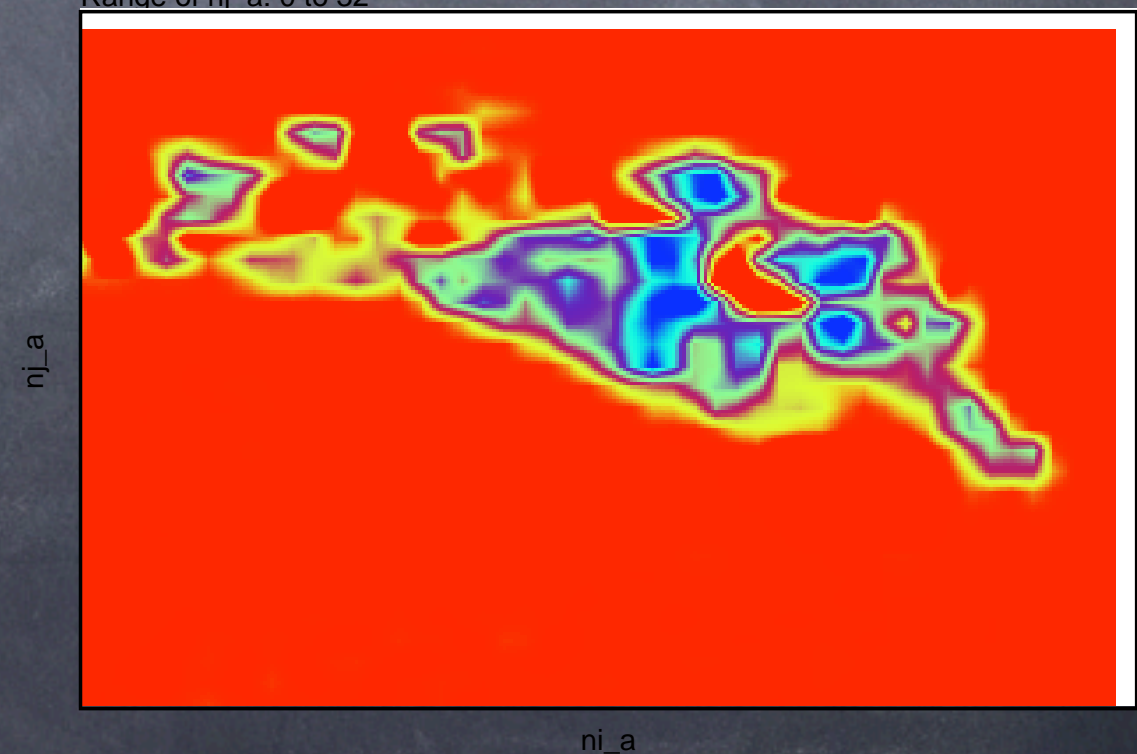
Meridional_Stress



Range of Meridional_Stress: -0.00395685 to 0.00501943 (null)
Range of ni_a: 0 to 49
Range of nj_a: 0 to 32

jwofe Fri Sep 12 14:48:03 2008

Zonal_Stress



Range of Zonal_Stress: -0.00550419 to 6.66678e-05 (null)
Range of ni_a: 0 to 49

jwofe Fri Sep 12 14:48:44 2008