Near-Inertial Waves – the new Aspirin

A climate process team together with
SIO, UW, Univ. Mich. & Alaska, GFDL, FSU and WHOI

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Large, Bryan, Gent (NCAR)
&
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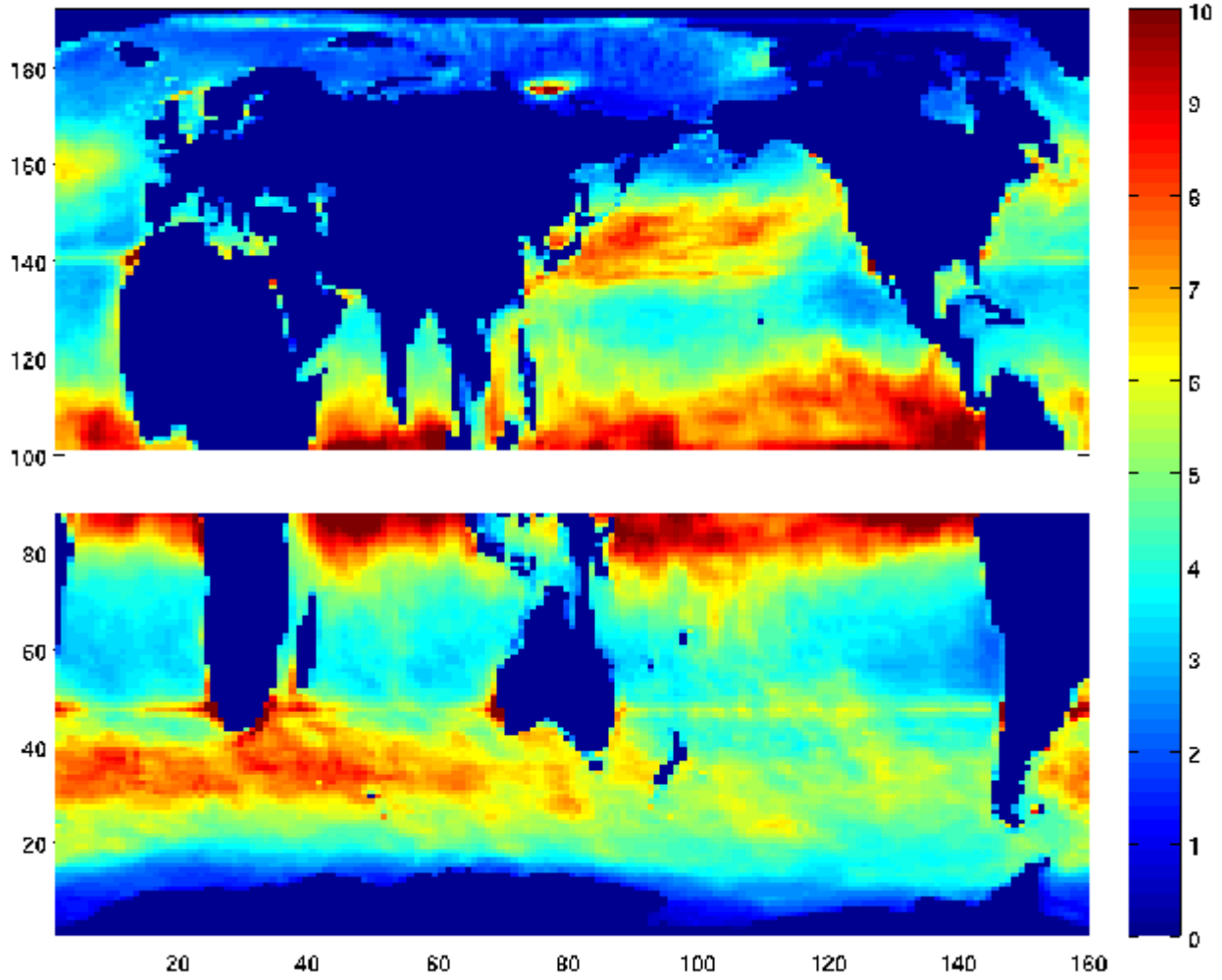
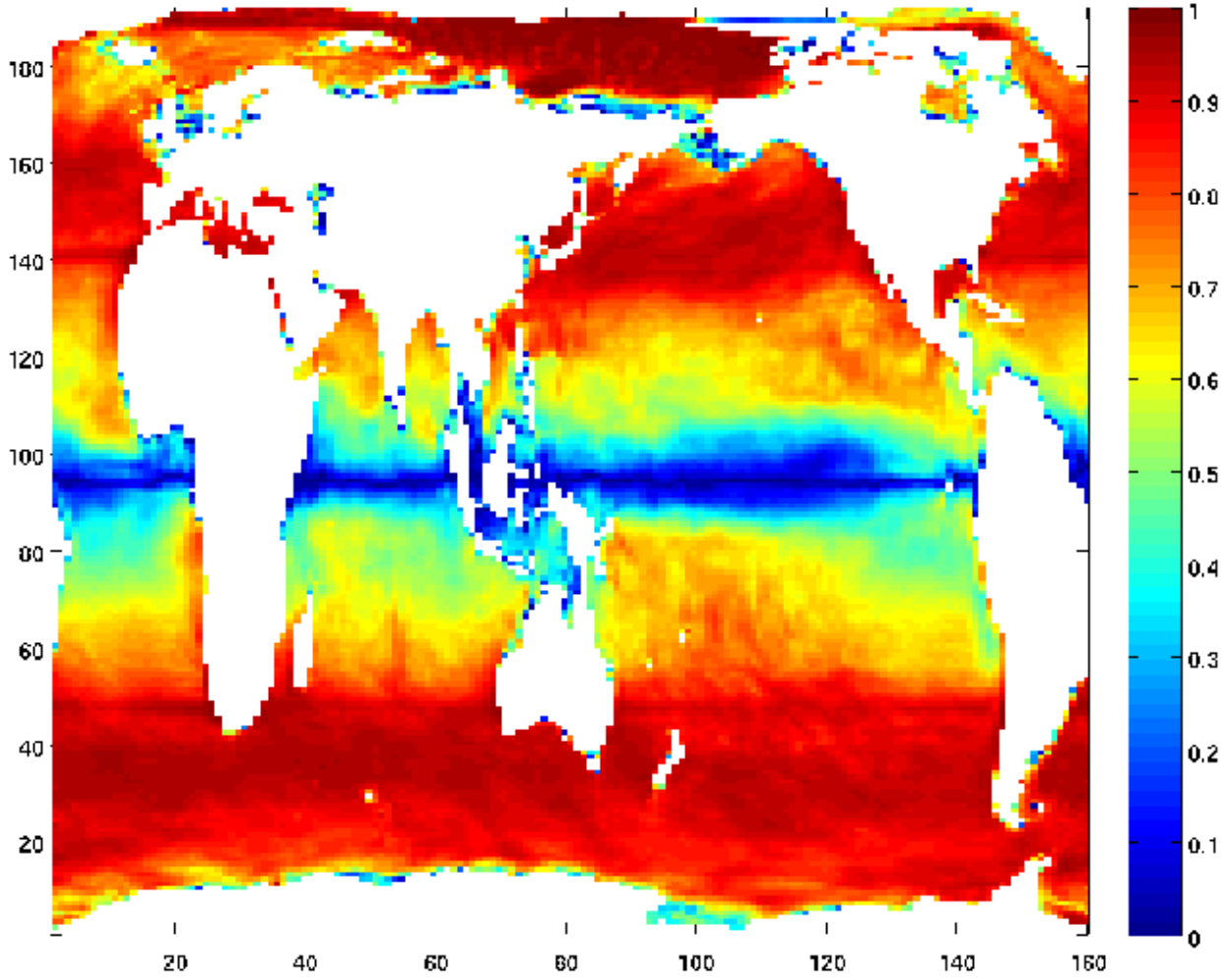
Observations of NIWs during Ocean Storms (1987)

Dohan and Davis 2011

Near-Inertial velocities in CCSM4 with 2 hourly coupling

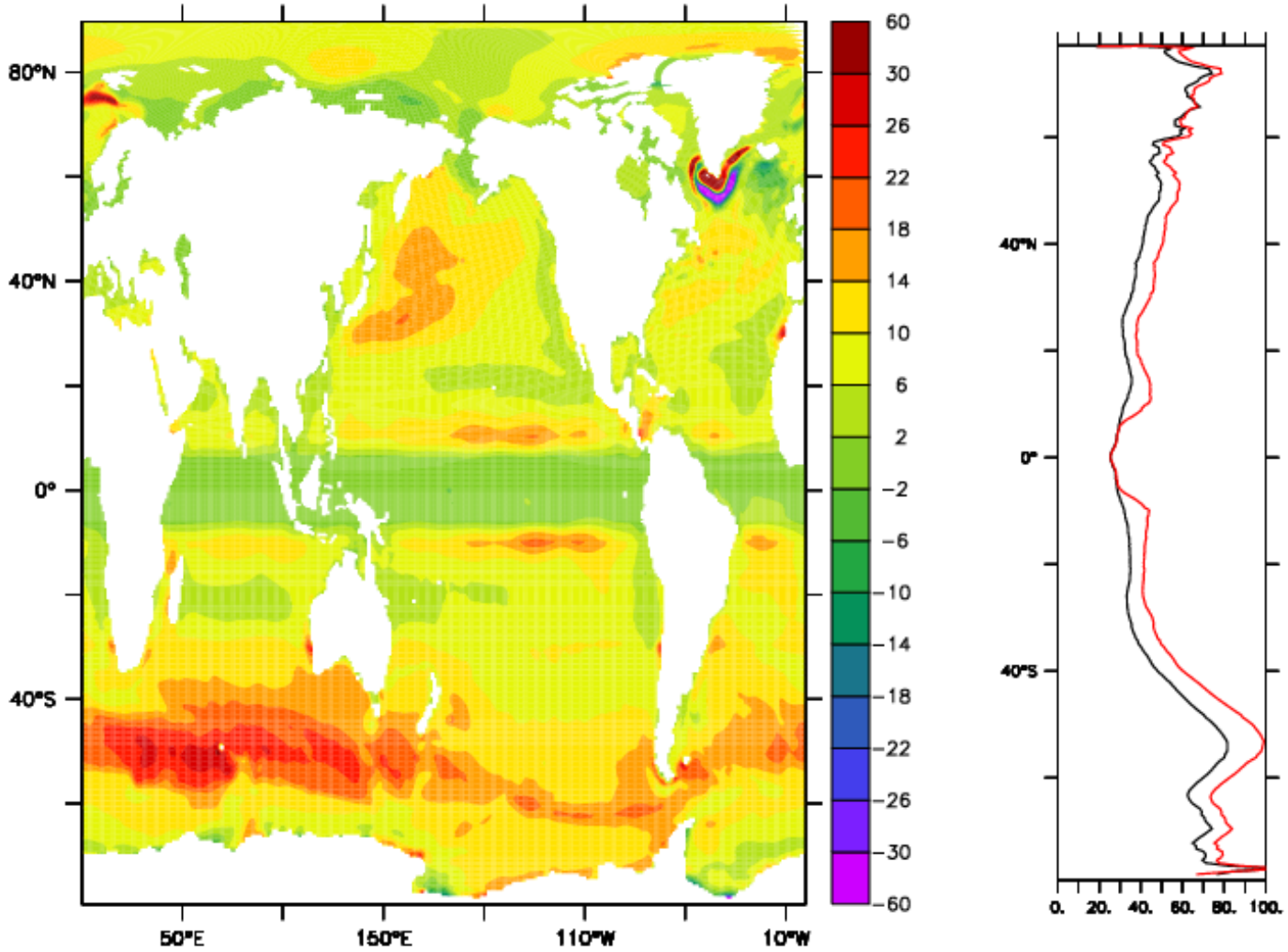


Correlation between NI zonal velocity and its parameterization



$$Ui = - Ti / 2pi \ dV/dt$$

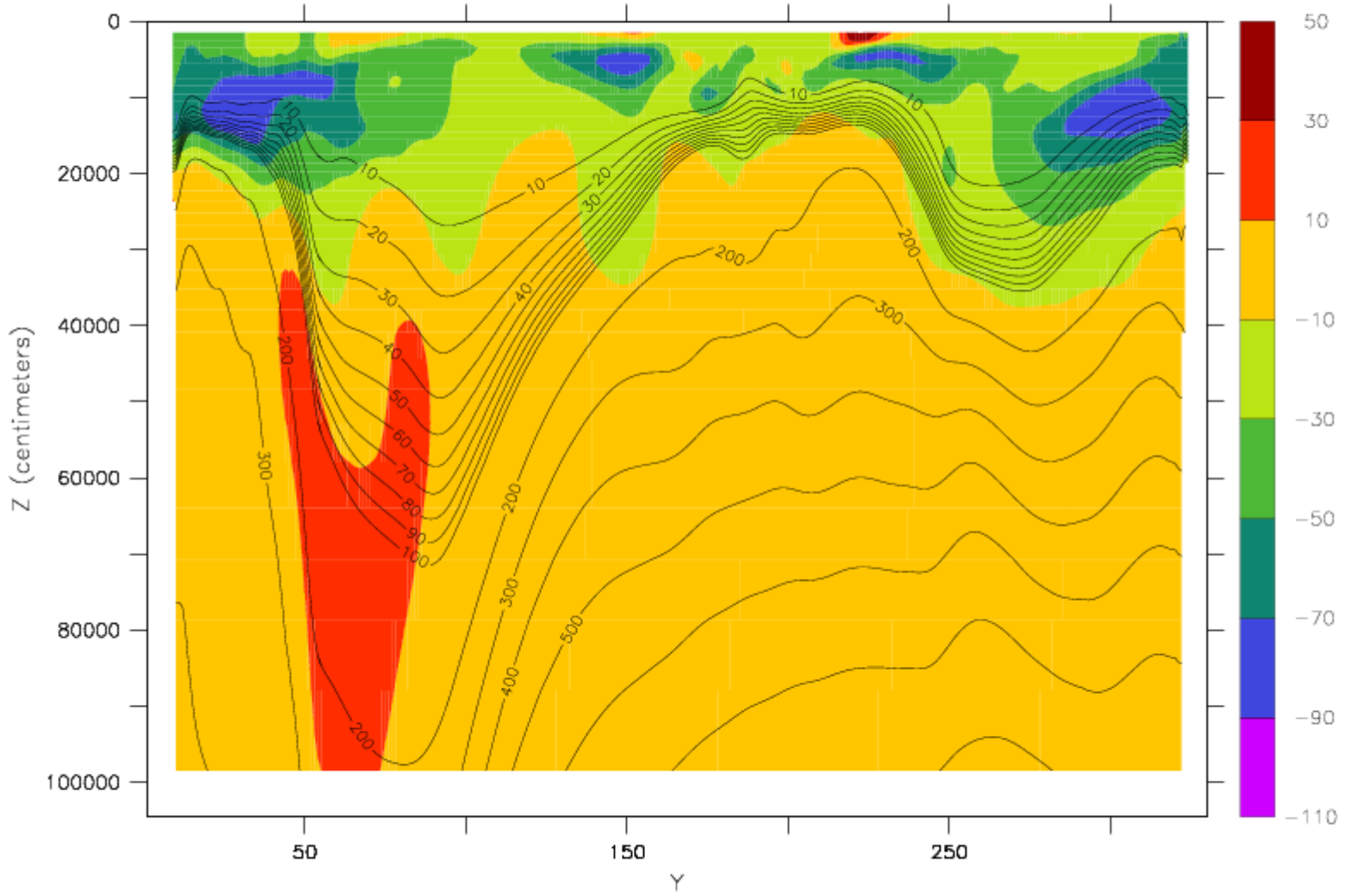
Differences between CCSM4 control and 2 hourly coupling + NIW param.



change in boundary layer depth

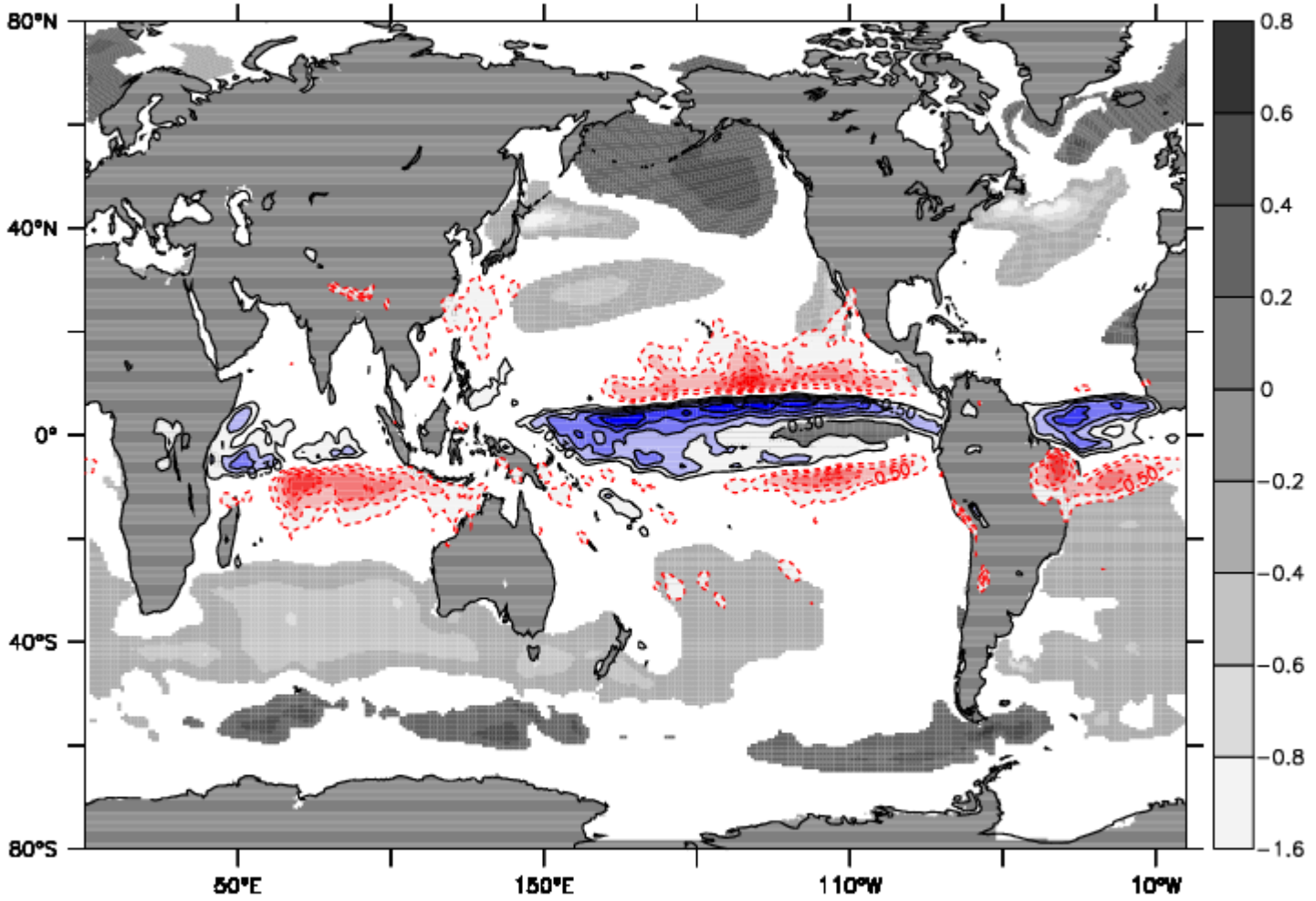
This, and all the following, is based on the last 40 years of fully coupled 100 yr integrations.

Meridional section of ideal age across the Pacific.



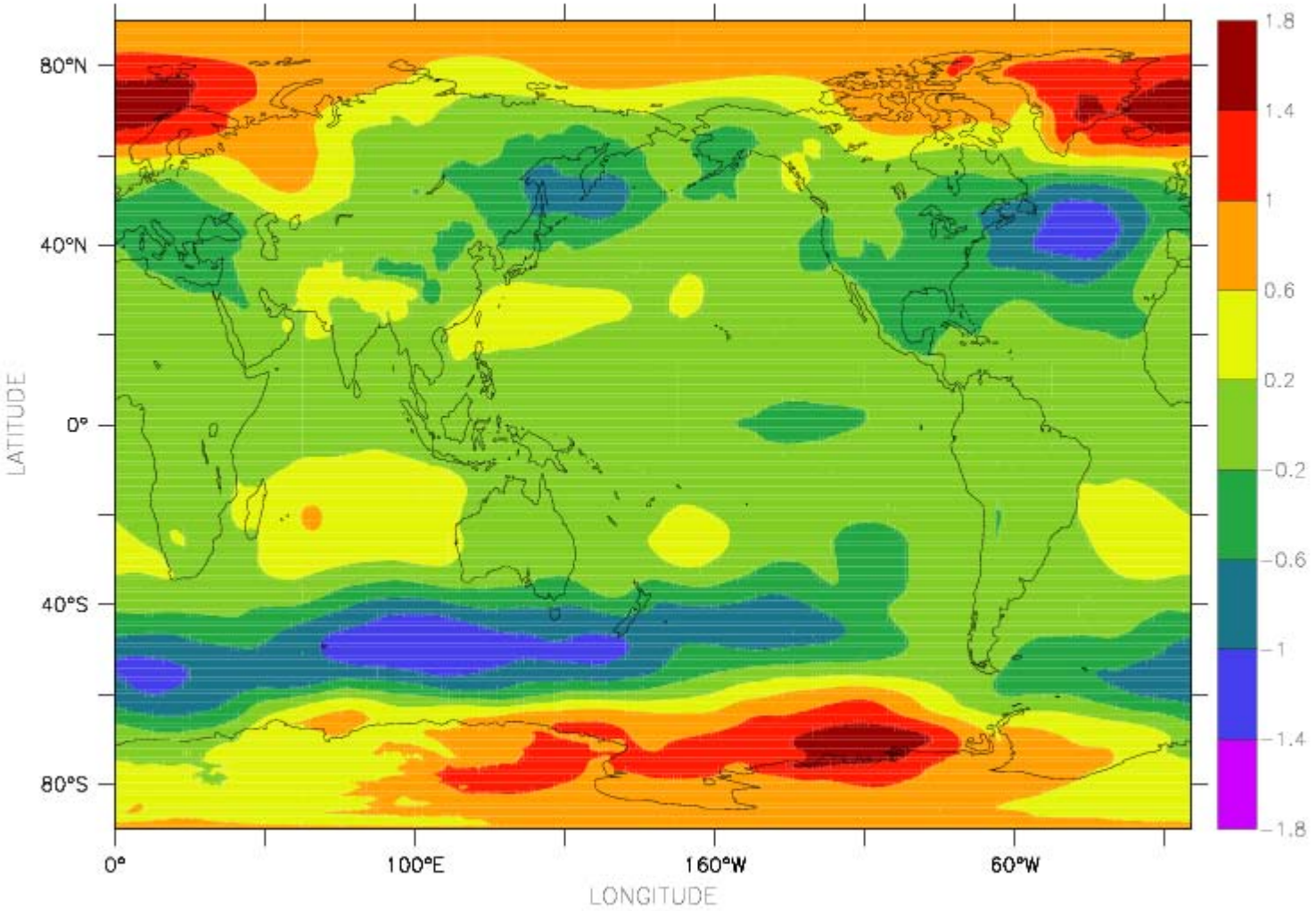
relative change in ideal age after 100 years at 140W, between Antarctica and Alaska (in %)

Annual mean differences of precipitation and SST.



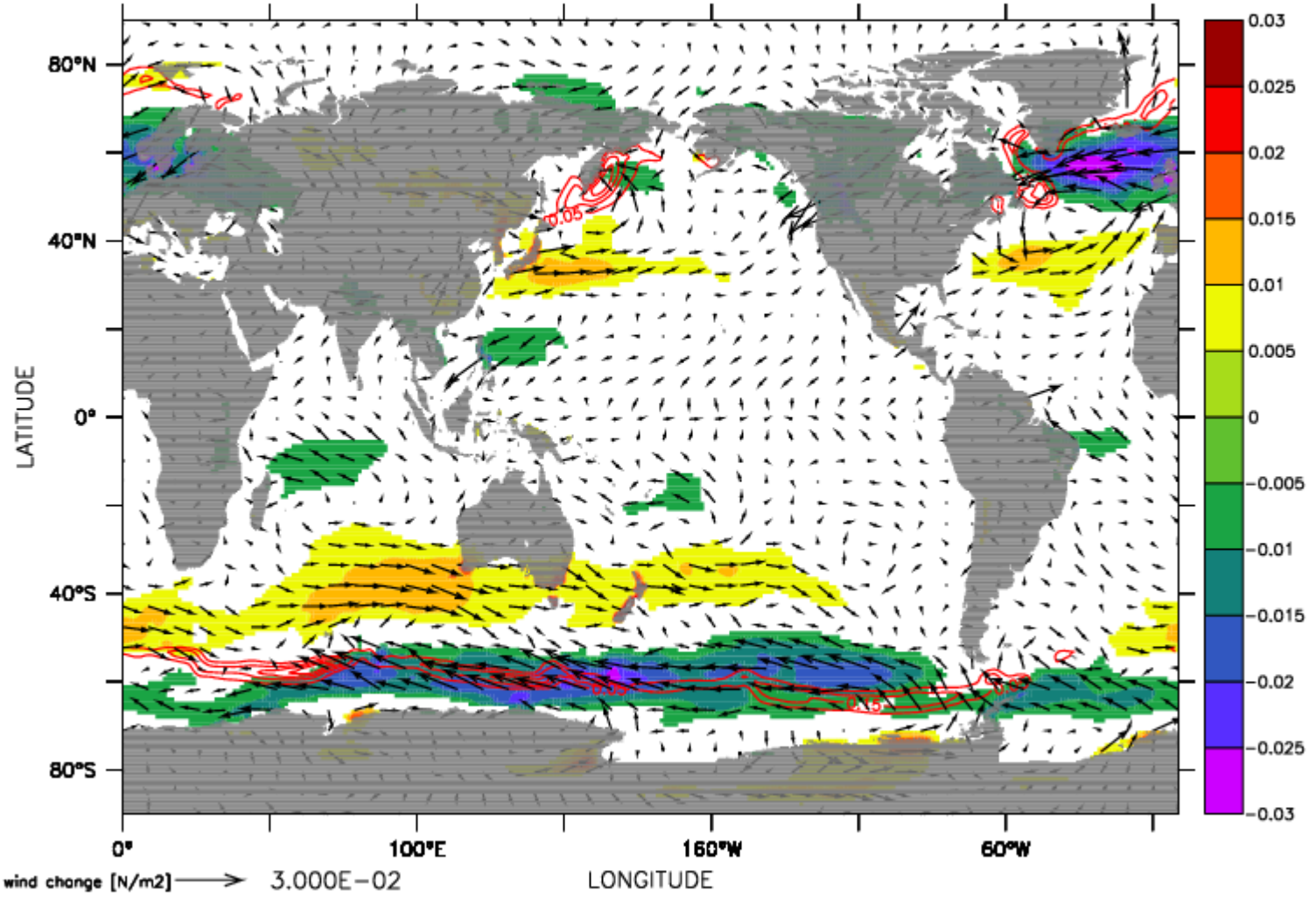
blue: more rain, up to 1.5 mm/day
red: less rain, up to 1.5 mm/day

dark gray: SST warming
light gray: SST cooling



difference in sea level pressure (mbar)

Changes in annual mean wind stress and sea ice



color: change in zonal wind stress red: reduction in sea ice conc. (up to 35%)
note: max biases in the control are 0.07 N/m2 over NA and SO

Conclusions

- the NIW parameterization is ready to go
- it leads to a deepening of the mixed layer, but not to a better ventilation of the sub-thermocline
- it moves the Atlantic ITCZ north, and weakens the double ITCZ in the Pacific ...
- ... thereby improving the westerlies over the SO and the NA
- future work will have to address the mixing in the deep tropics