Progress on High-Resolution POP and Coupled Integrations

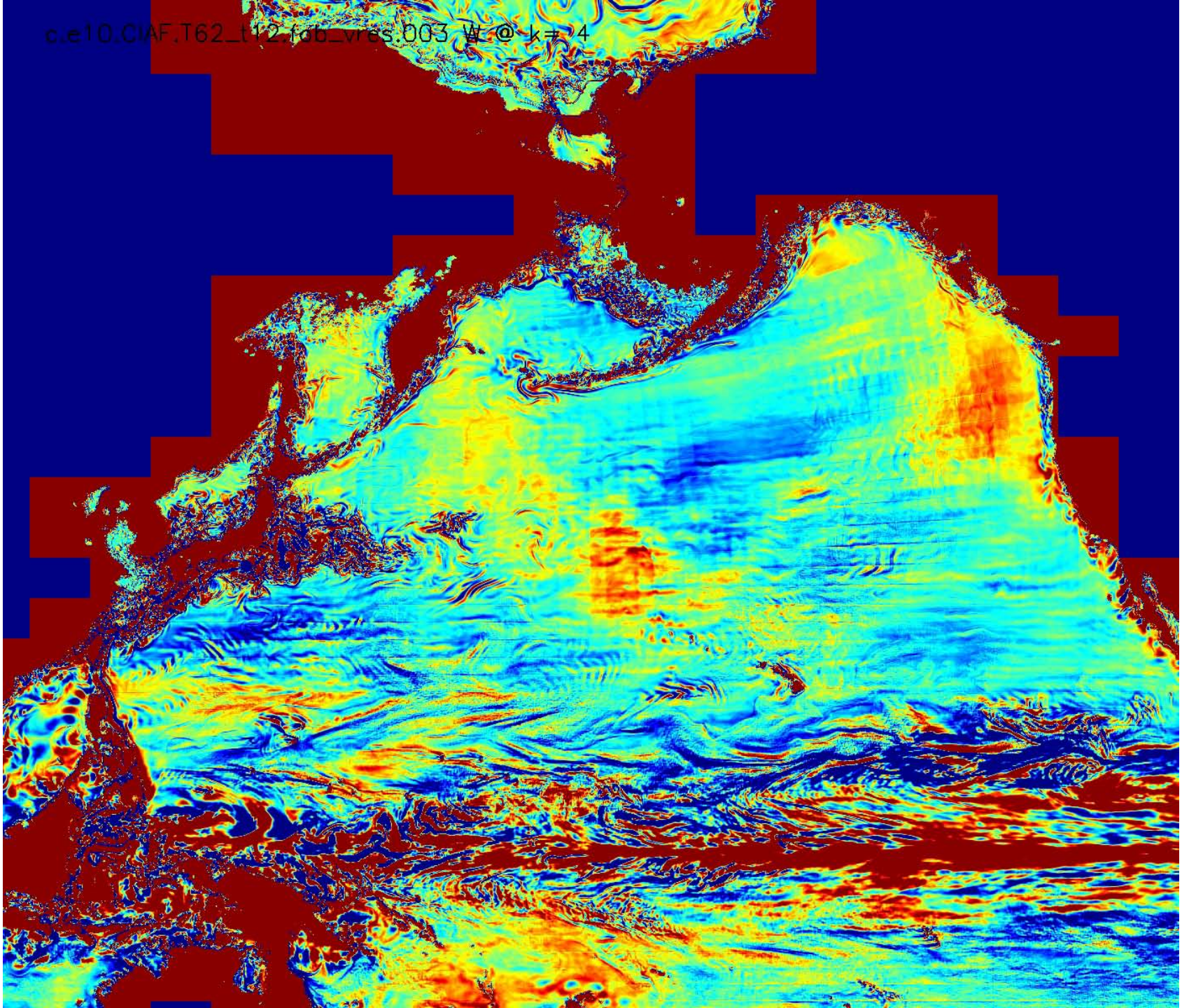
Frank Bryan
David Bailey
ASD Team

New Reference 0.1° Tripole Configurations

- Establish a scientifically validated high-resolution configuration for use by broader CESM community
- Run within CESM framework with CORE forcing
- Bring vertical resolution to ~60 levels commensurate with 1° configuration
- Begin to update physics options (tidal mixing, submesoscale, …)
- Issues so far:
  - Large resolution gap between CORE forcing and model
  - Limited choices in advection schemes
  - Timestep limitations at 62 levels

Experiments

- CORE Forced Ocean and Ocean-Ice
  - Setting up 62 level vertical grid and topography
  - Working through issues of running through coupler
  - Baseline for sensitivity experiments (currently 15 years with CORE-NY)
- Coupled Experiments
  - Coupled to CAM5-SE ne120 (~0.25°)
  - Initialized from short (~1 year integration of above)
  - Currently ~35 years on integration + several short sensitivity experiments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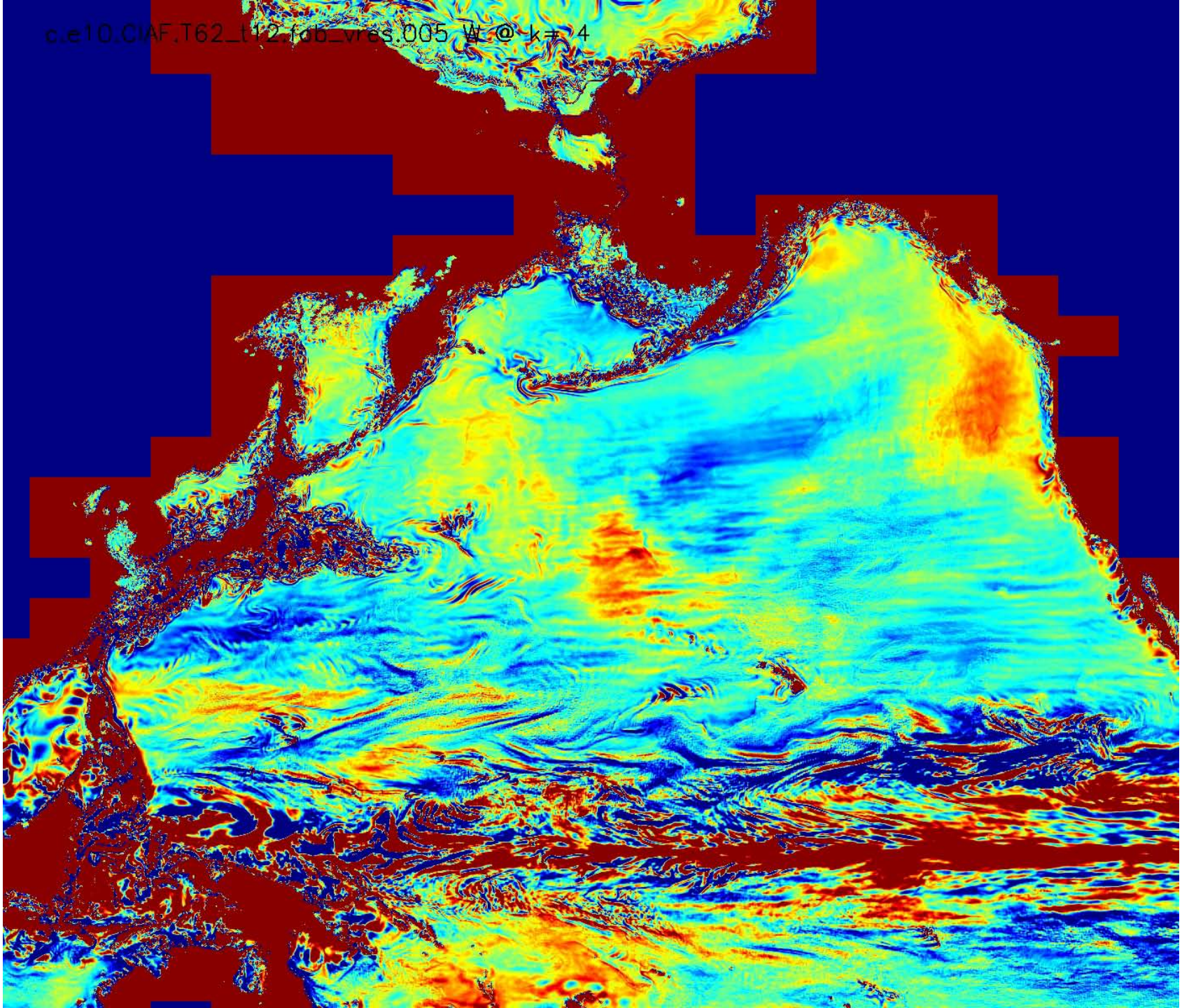
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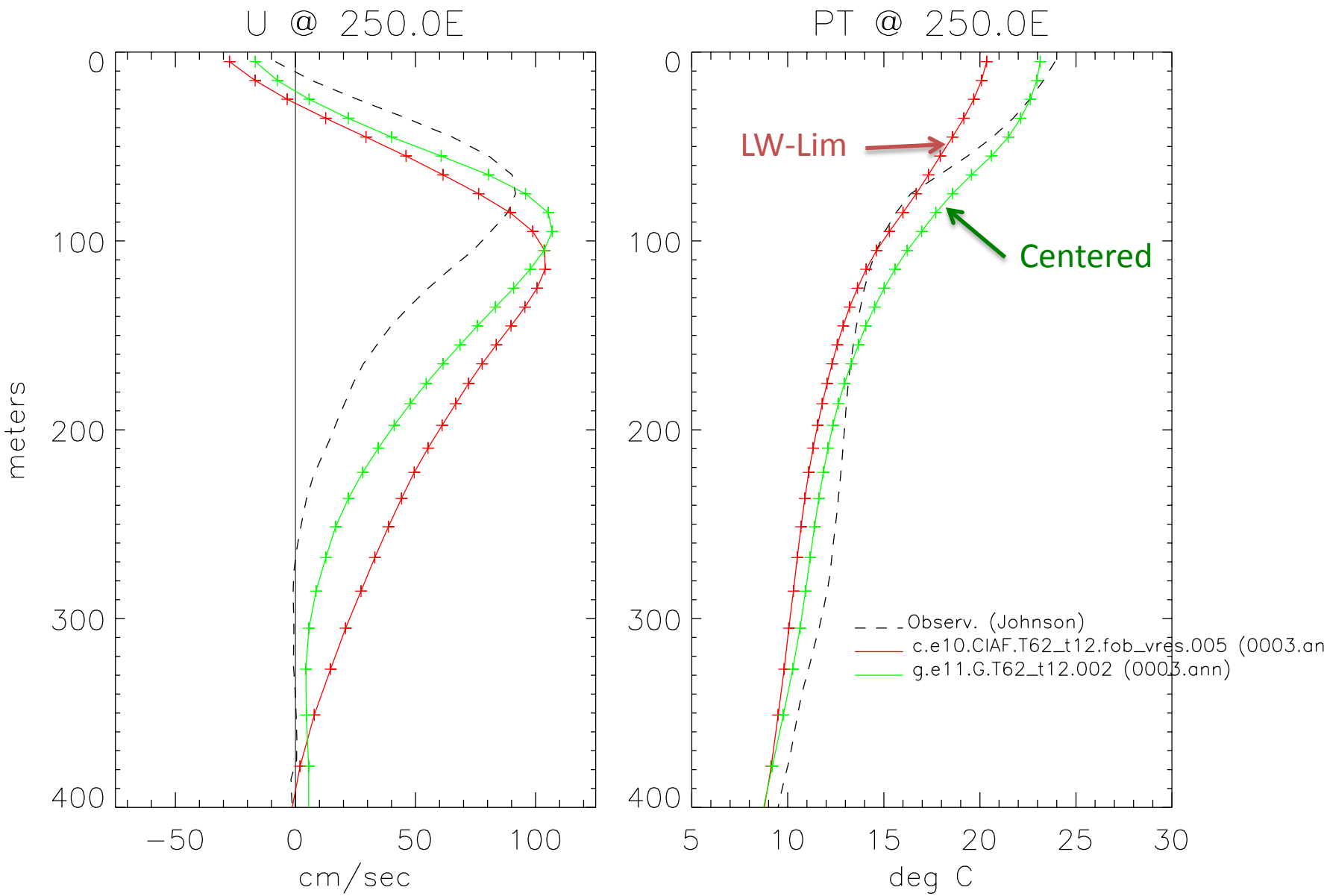
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meters
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Observ. (Johnson)
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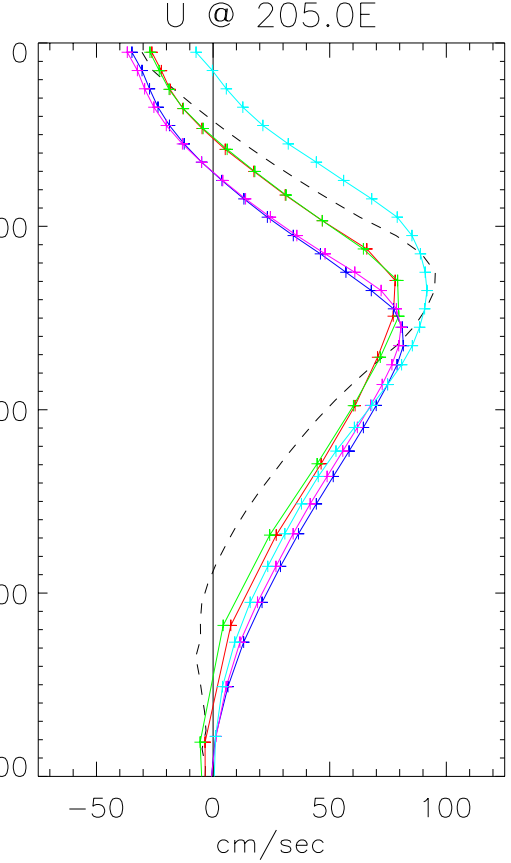
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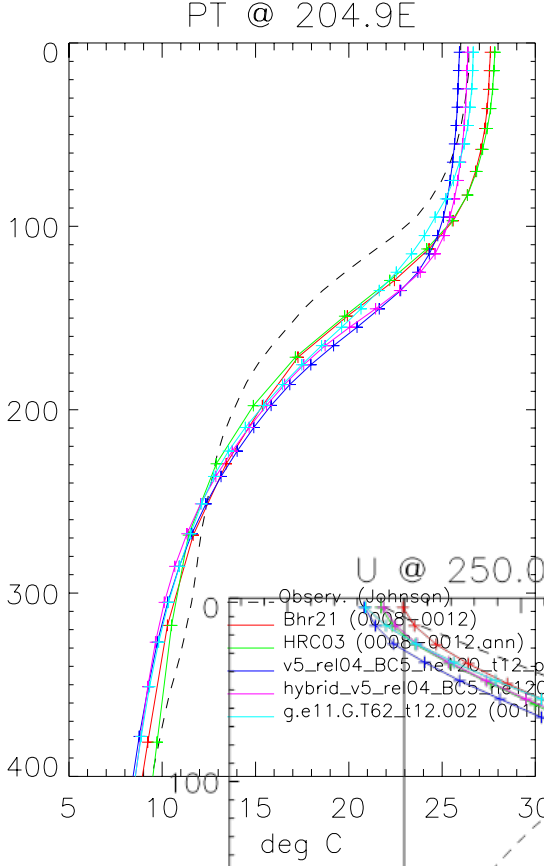
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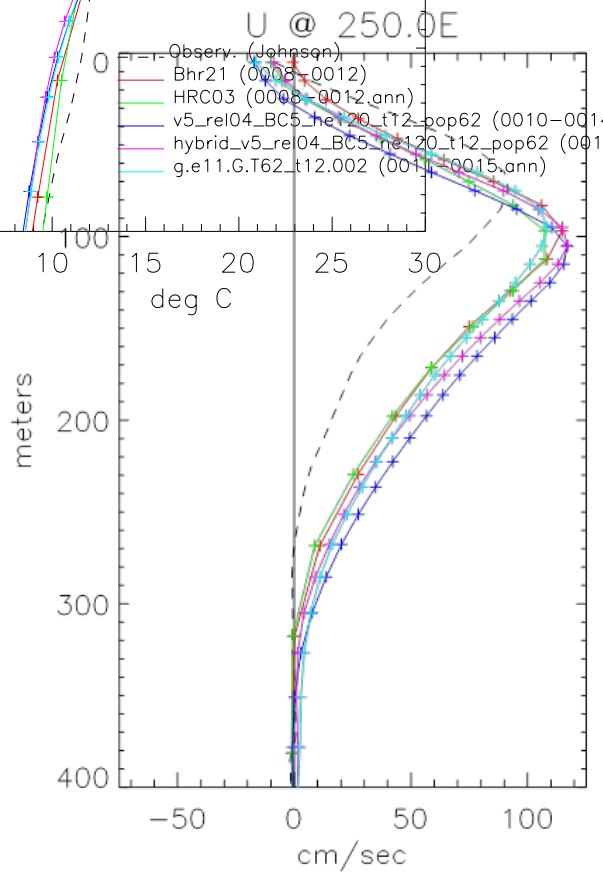
Pacific EUC


U @ 250.0E
Observ. (Johnson)
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HRC03 (0008−0012.ann)
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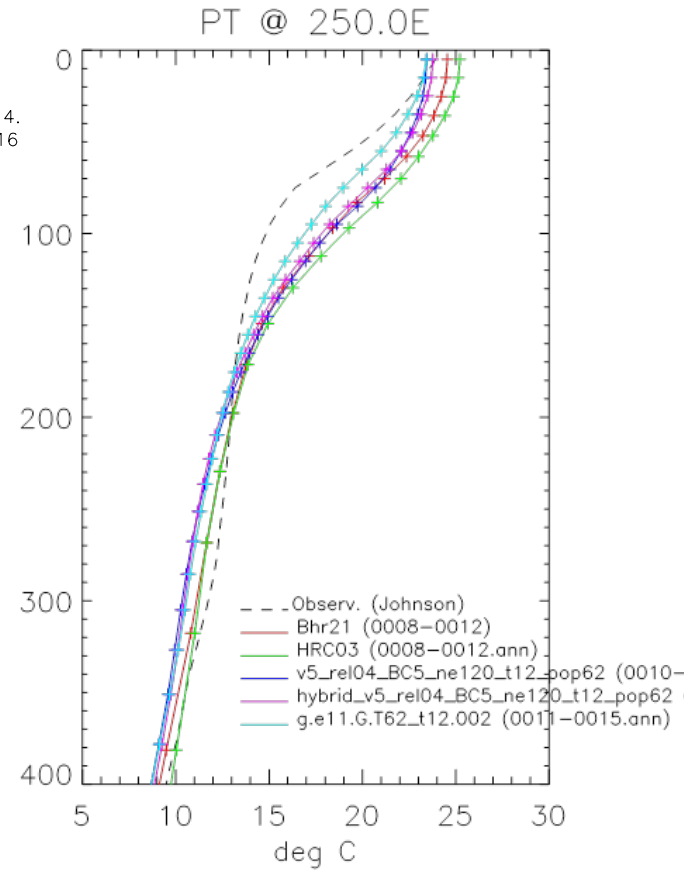
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HRC03 (0008−0012.ann)
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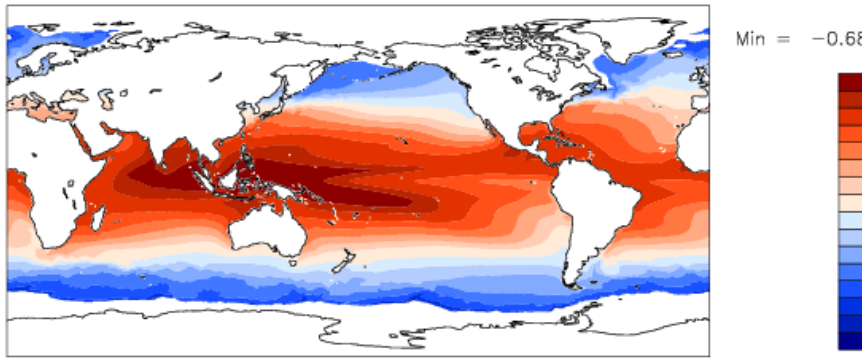
hybrid_v5_rel04_BC5_ne120_t12_pop62
g.e11.G.T62_t12.002 (0011−0015.ann)

hybrid_v5_rel04_BC5_ne120_t12_pop62 (yrs 1-20)

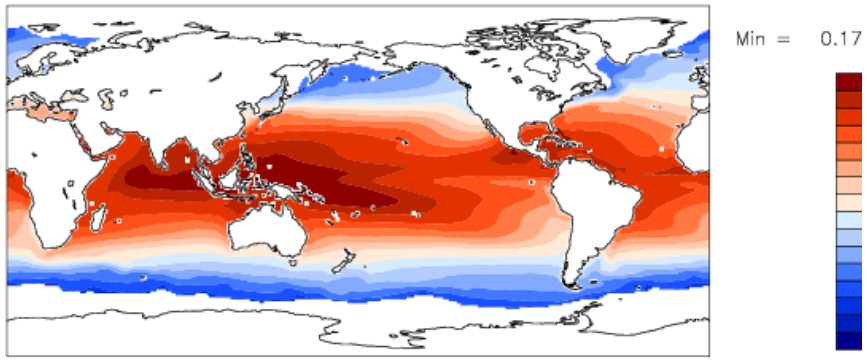
Sea surface temperature mean= 20.26 C



Min = −0.68

HadISST (present-day)

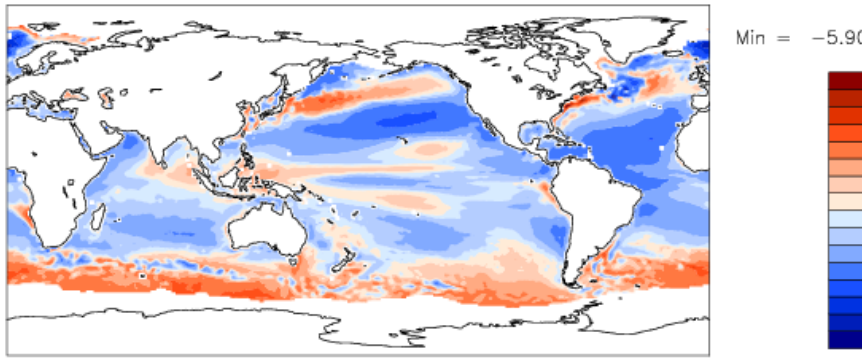
Sea surface temperature mean= 20.47 C



Min = 0.17

hybrid_v5_rel04_BC5_ne120_t12_pop62 - HadISST (present-day)

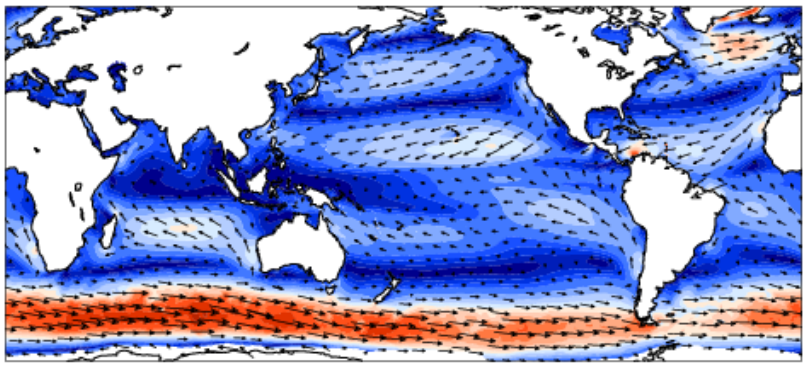
mean = −0.21 rmse = 0.77 C



Min = −5.9

hybrid_v5_rel04_BC5_ne120_t12_pop62 (yrs 1-20)

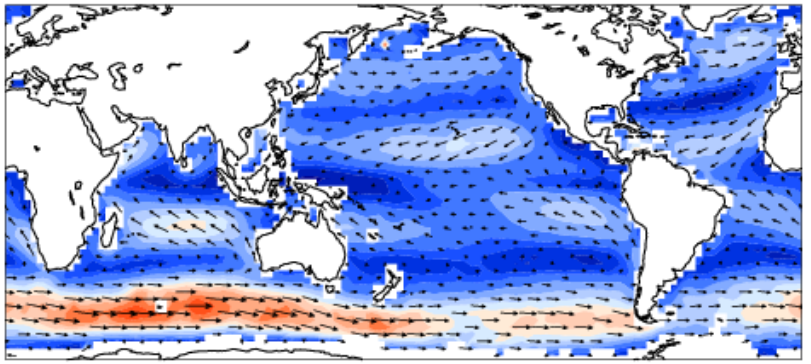
Surface stress mean= 0.07 N/m²



MIN = 0.00

ERS

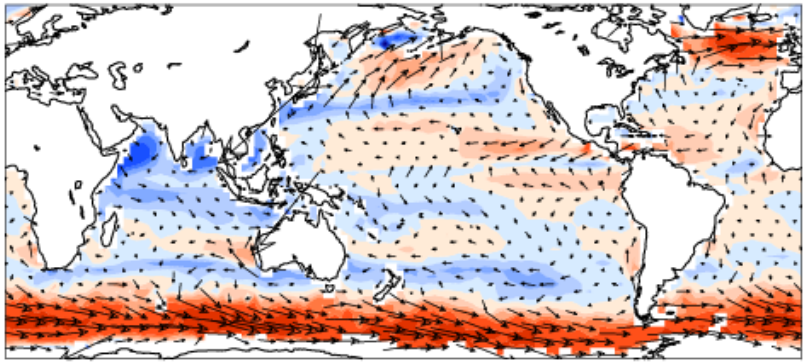
Surface stress mean= 0.07 N/m²



MIN = 0.00

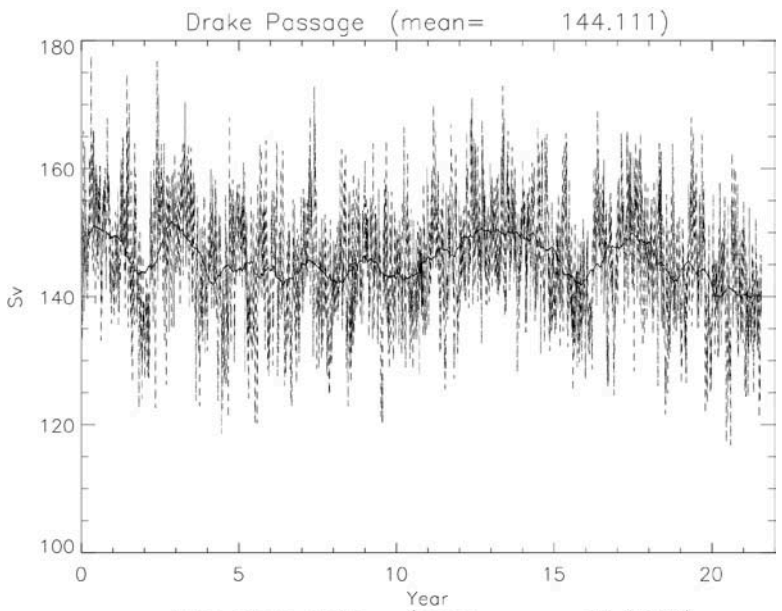
hybrid_v5_rel04_BC5_ne120_t12_pop62 - ERS

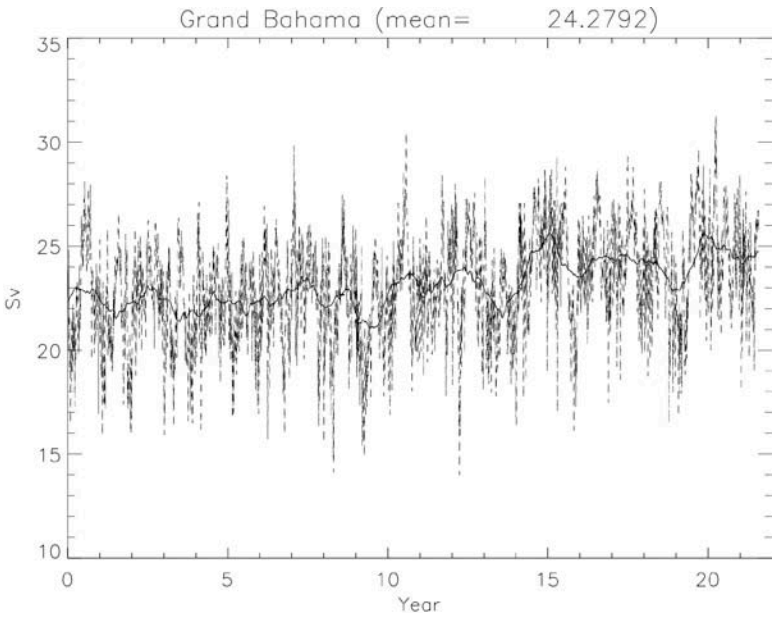
Surface stress mean= 0.01 N/m²

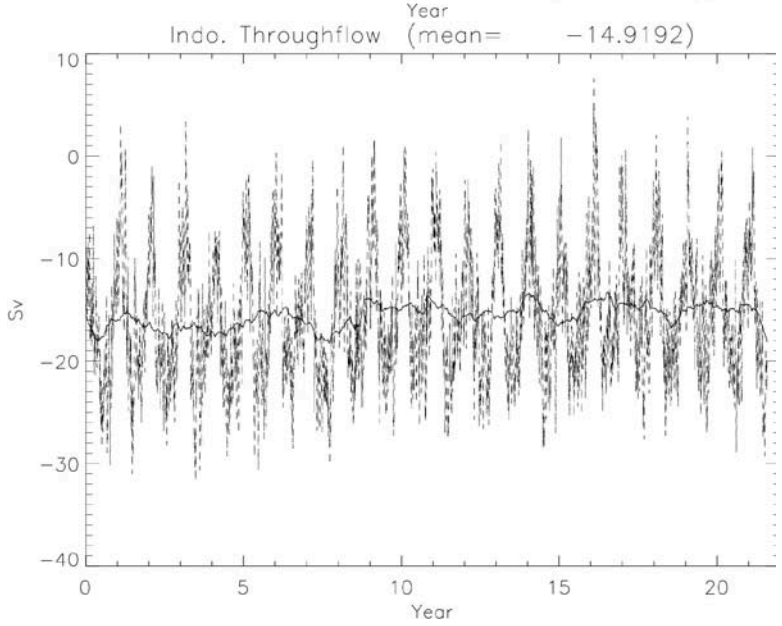


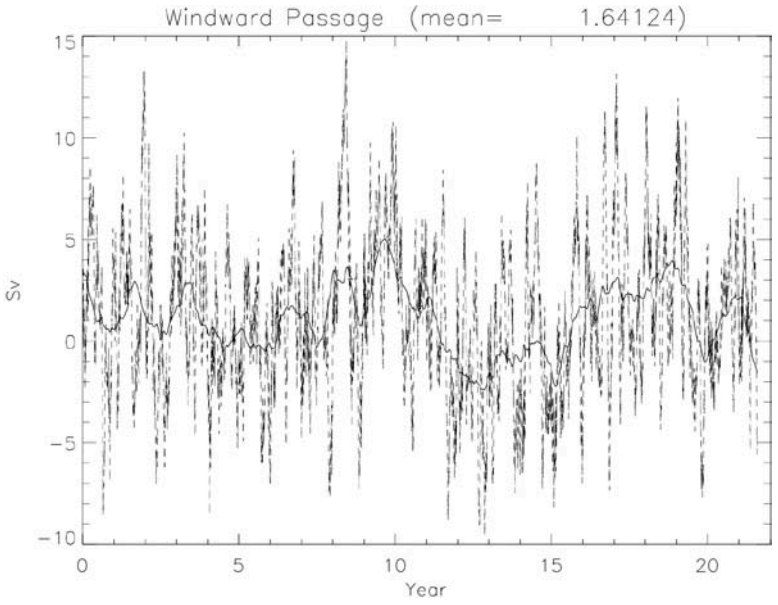
MIN = −0.19

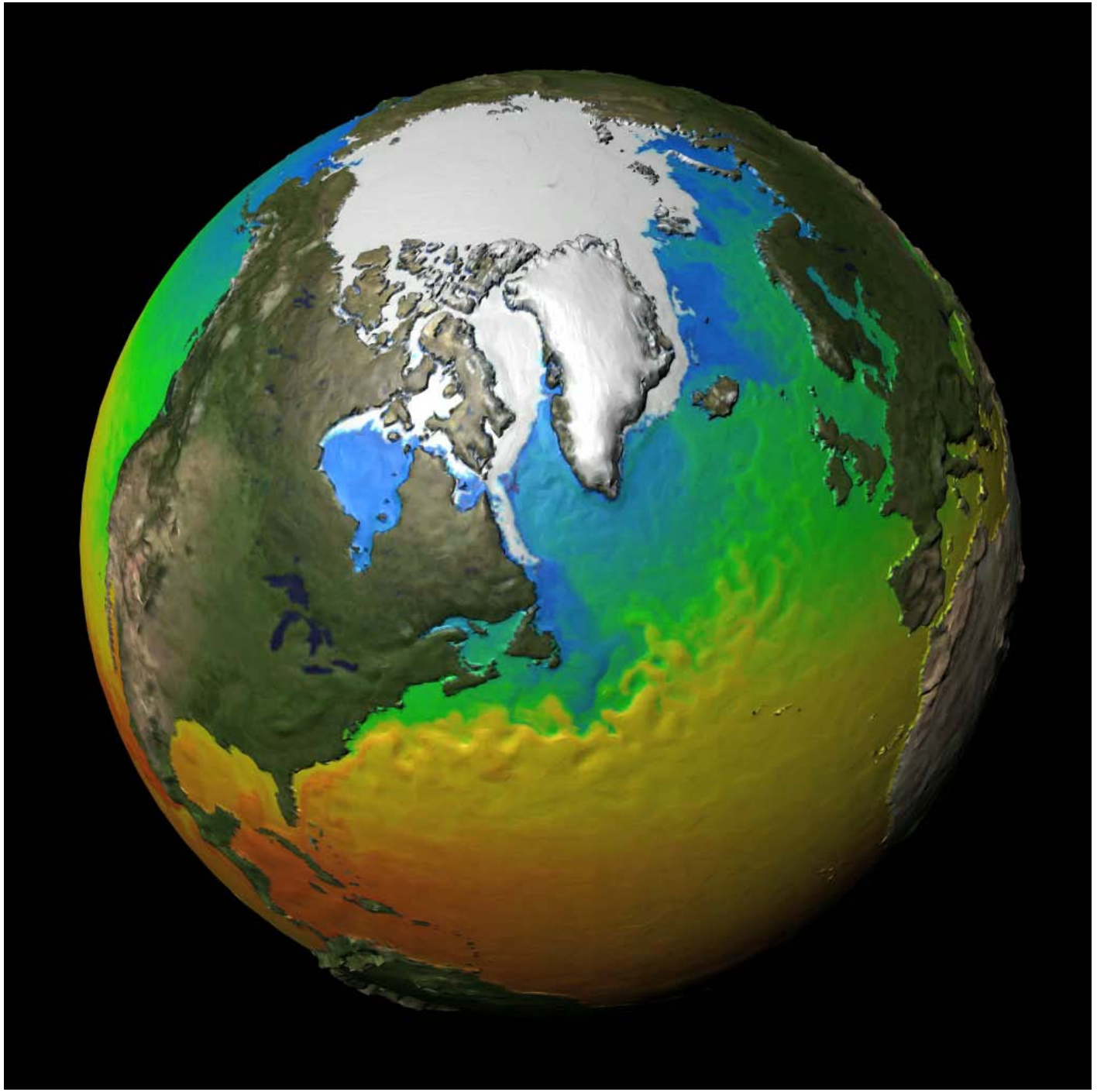
Mass Transports

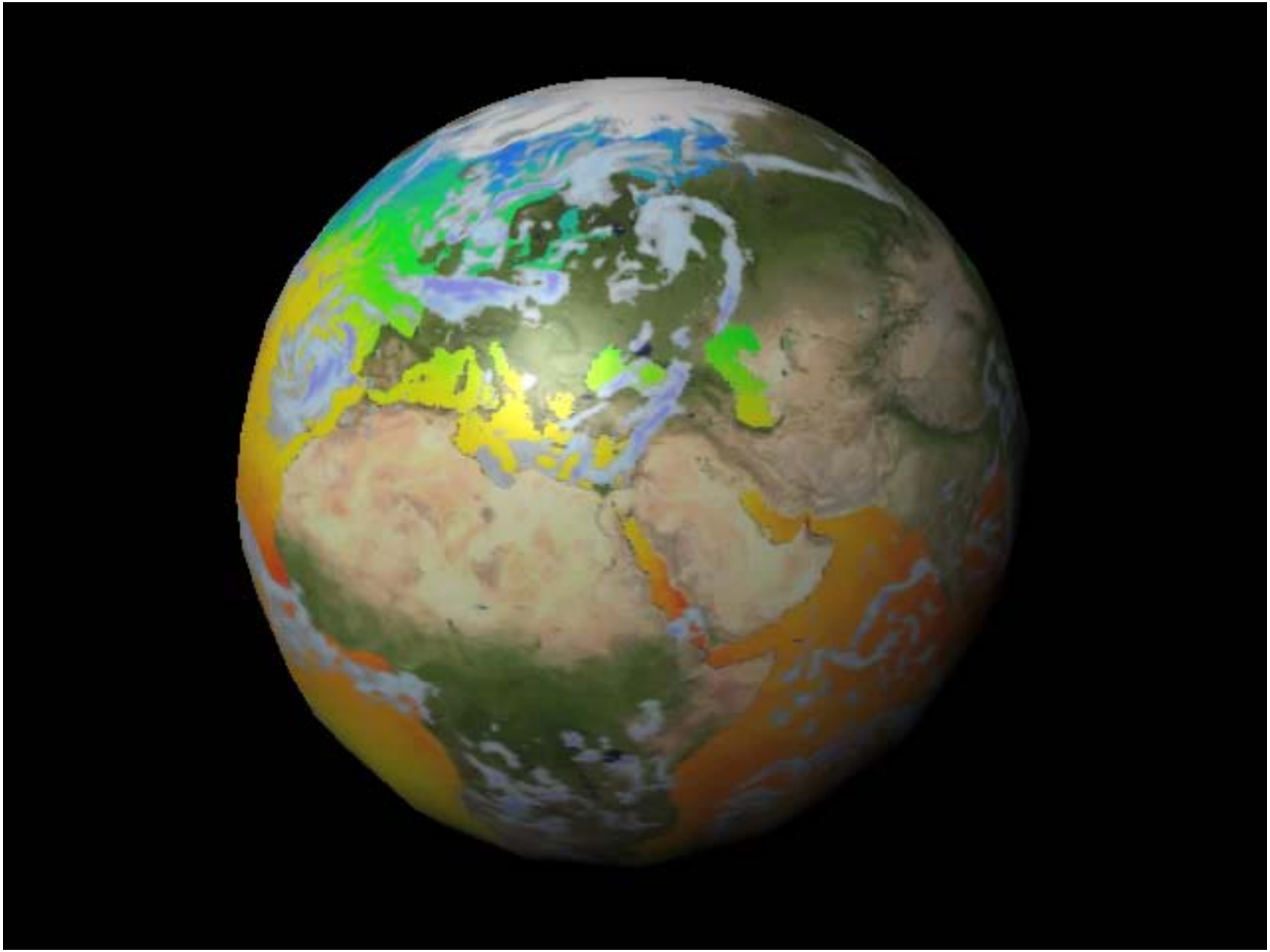












Plans, Questions, Priorities

- ASD and NSC Experiments
  - About 20 more years of coupled integration under ASD (by end of Feb.)
  - About 50 more years under NSC
  - Any quick fixes to try under ASD? Longer term (this calendar year) for NSC integration?
  - Preferable to keep model the same and extend experiment for maximum number of years?

- Infrastructure
  - Do we need to develop a higher resolution CORE forcing data set? Source data (CFSR?)
  - Smooth conservative remapping in coupler
  - Additional output streams for subsetting or higher order statistics. Isopycnal mapping of output.
  - Standard diagnostics appropriate for high-resolution simulations (EKE, RMS SSH, eddy heat flux, residual mean overturning …)
- Parameterizations and Numerics
  - How much more do we want to invest in POP development?
  - Current advection schemes significantly impacting solution quality
  - Revisit topography and land-mask for high resolution
  - Revisit dissipation vis a vis WBC separation
  - Physics priorities (submesoscale, tidal and interial mixing, …)