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Title: High Resolution Fully Coupled Climate Simulations for Investigation of Regional Interactions

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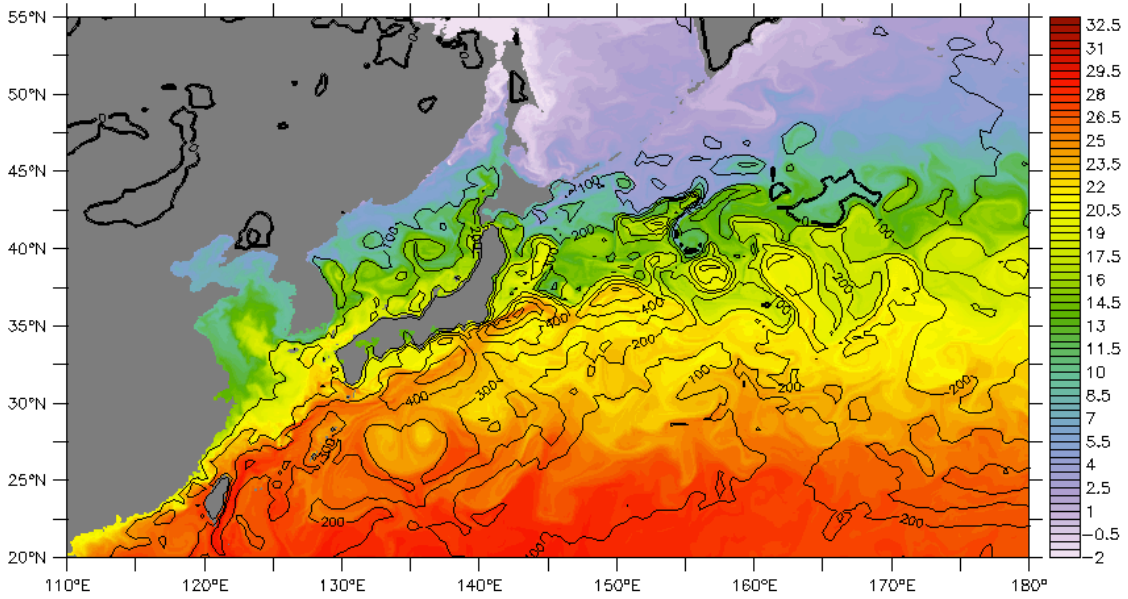
High Resolution Fully Coupled Climate Simulations for Investigation of Regional Interactions (w12_cesmregion)

PI: Mathew Maltrud, T-3

- Simulation #1
  - Fully coupled using the Community Earth System Model (CESM)
  - High resolution for all components (Atmosphere, Ocean, Sea Ice, Land)
  - Completed 32 model years
  - Shows the importance of high resolution on mean, variability and extremes
  - Baseline simulation for comparisons with new DOE runs
  - In support of LANL's $700k/year DOE-OBER "Ultra-High Resolution" project



Snapshot of sea surface temperature (ºC) near Japan with atmospheric evaporation rate contoured on top showing the need for comparably high resolution in both model components to create proper coupling, which in turn affects storm tracks and ocean heat uptake.

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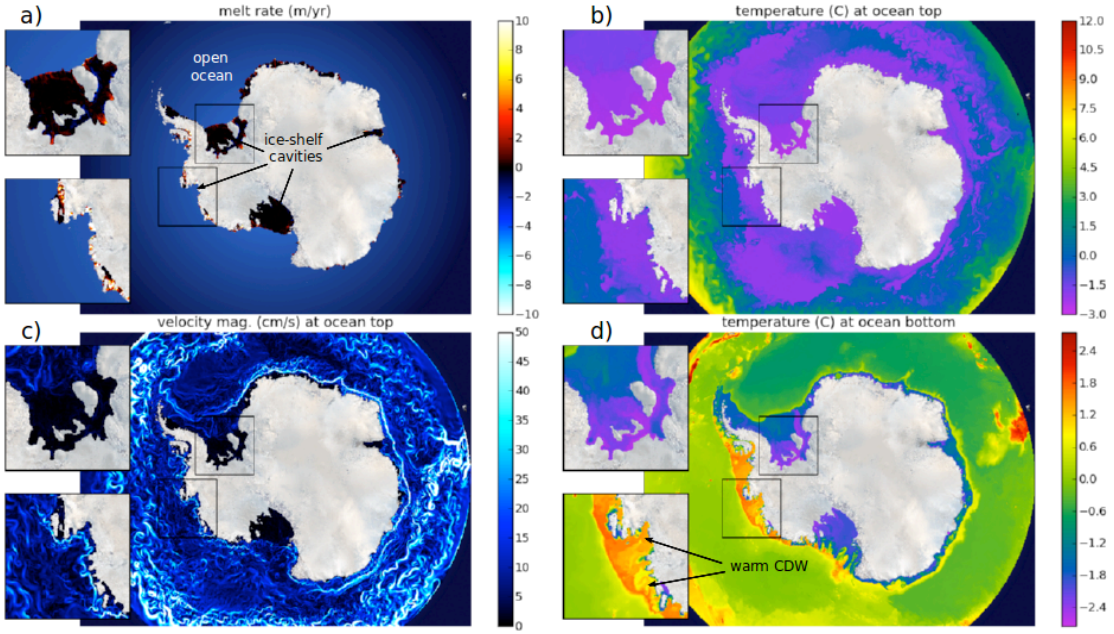
- Simulation #2
  - Ocean only using high resolution LANL Parallel Ocean Program (POP)
  - Enable flow under realistic Antarctic ice shelves
  - Quantify mechanisms and time scales of sea level rise
  - Performed a large suite of decade-long runs to explore biases, sensitivities
  - In support of LANL's $600k/year DOE-OBER "IMPACTS" project



Snapshot from year 6 of a sample simulation showing ice melt rate due to interaction with the ocean, ocean surface temperature, ocean surface current speed, and ocean bottom temperature. Lower right shows the invasion of relatively warm water onto the continental shelf that can rapidly melt the Pine Island Glacier.