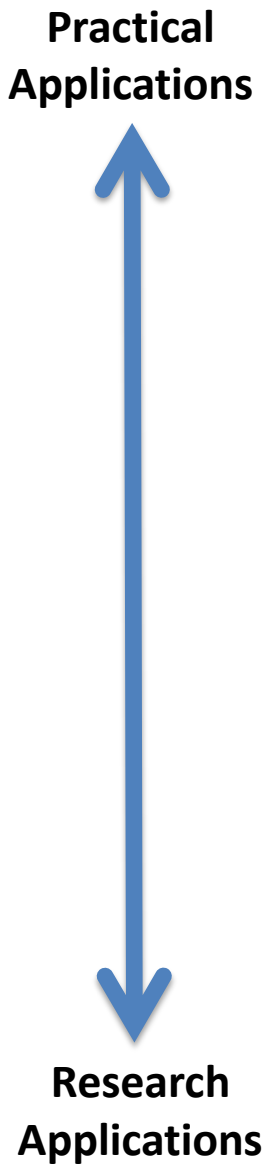
Why model the ocean?

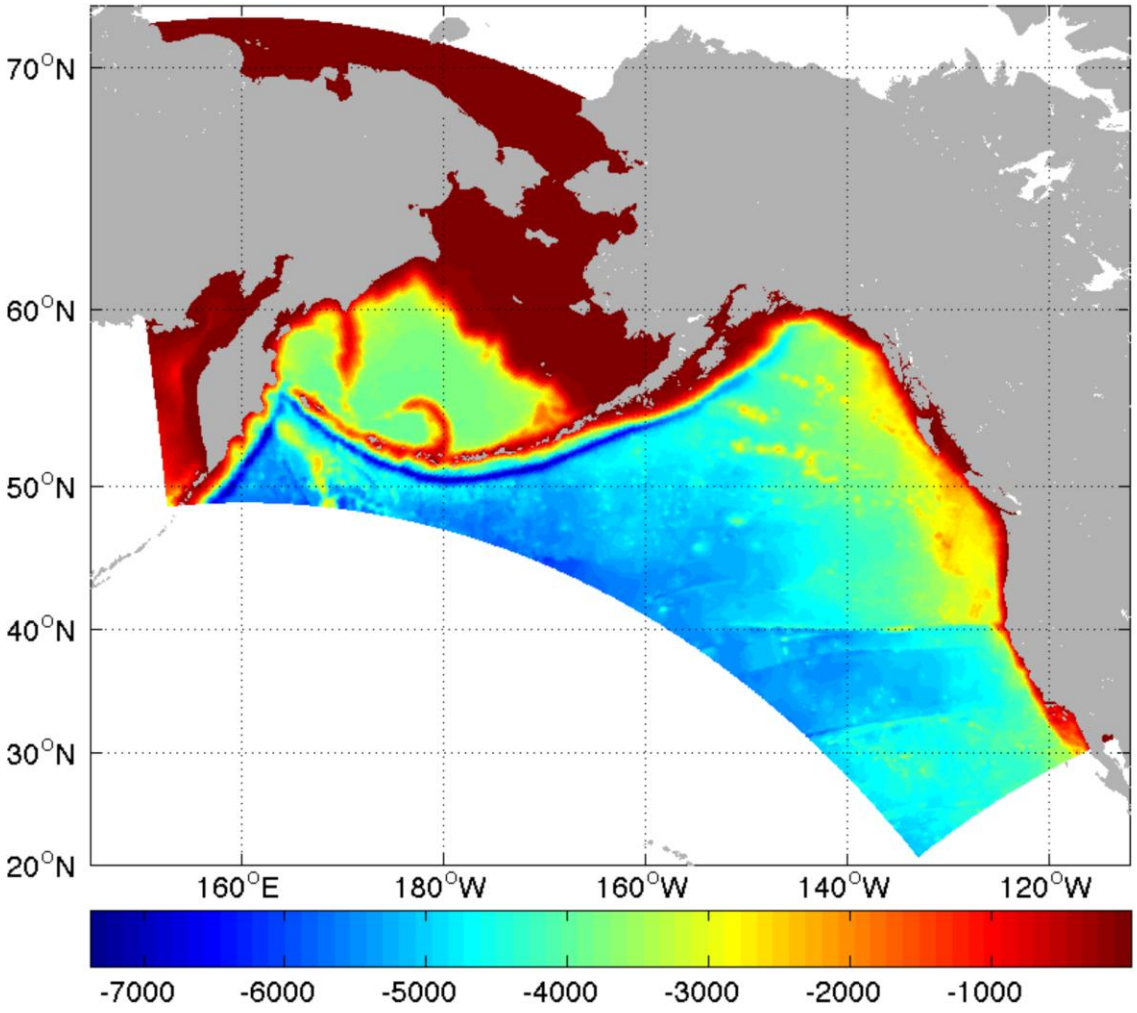
- Improve forecasts
- Support daily operations of mariners
- Assist emergency response efforts
- Inform policy decisions
- Make predictions (days to decades)
- Fill gaps between observations
- Build better models
- Guide the planning of field observations
- Explain observations
- Advance retrospective analyses
- Constrain fluxes and budgets
- Explore range of system responses to changing inputs
- Illuminate underlying dynamics
- Test theories
- Develop new questions and new hypotheses



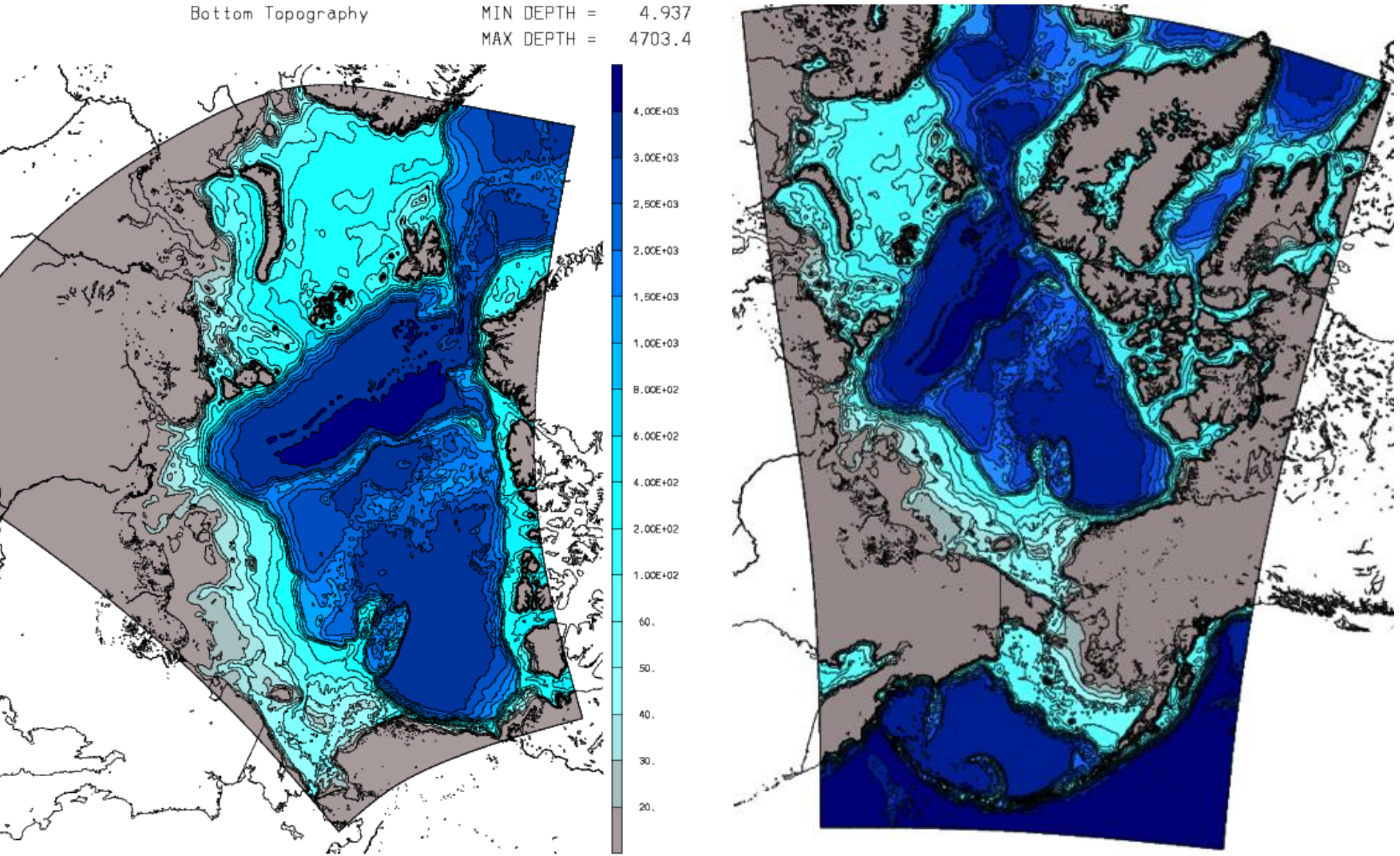
UAF/Rutgers
Ocean circulation modeling

- ROMS: the Regional Ocean Modeling System
- Computing clusters at ARSC and Rutgers
- Multi-decade integrations
- “Complex” 3-d models using realistic surface forcing, terrain-following vertical coordinate system, 50 vertical levels, tides, ice model, coupled NPZ/ecosystem/carbon dynamics modules
- “Simple” 2-d models with idealized and/or realistic forcing

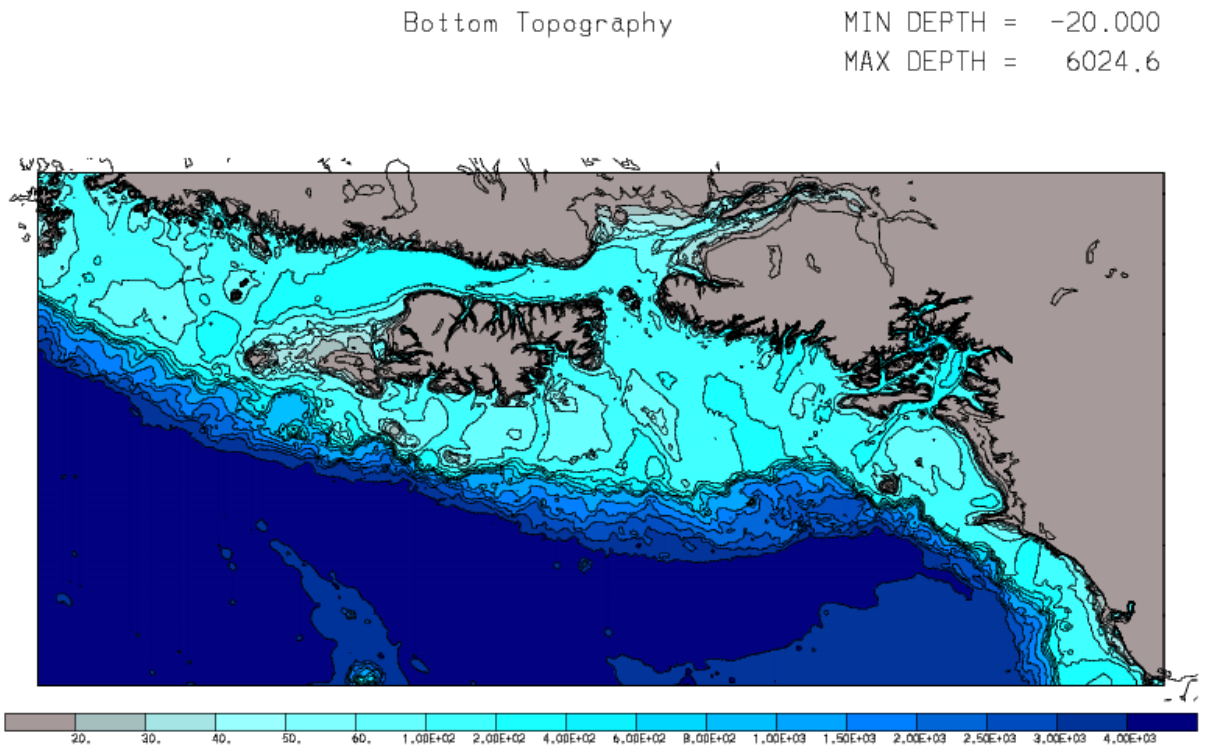
Northeast Pacific (NEP) model



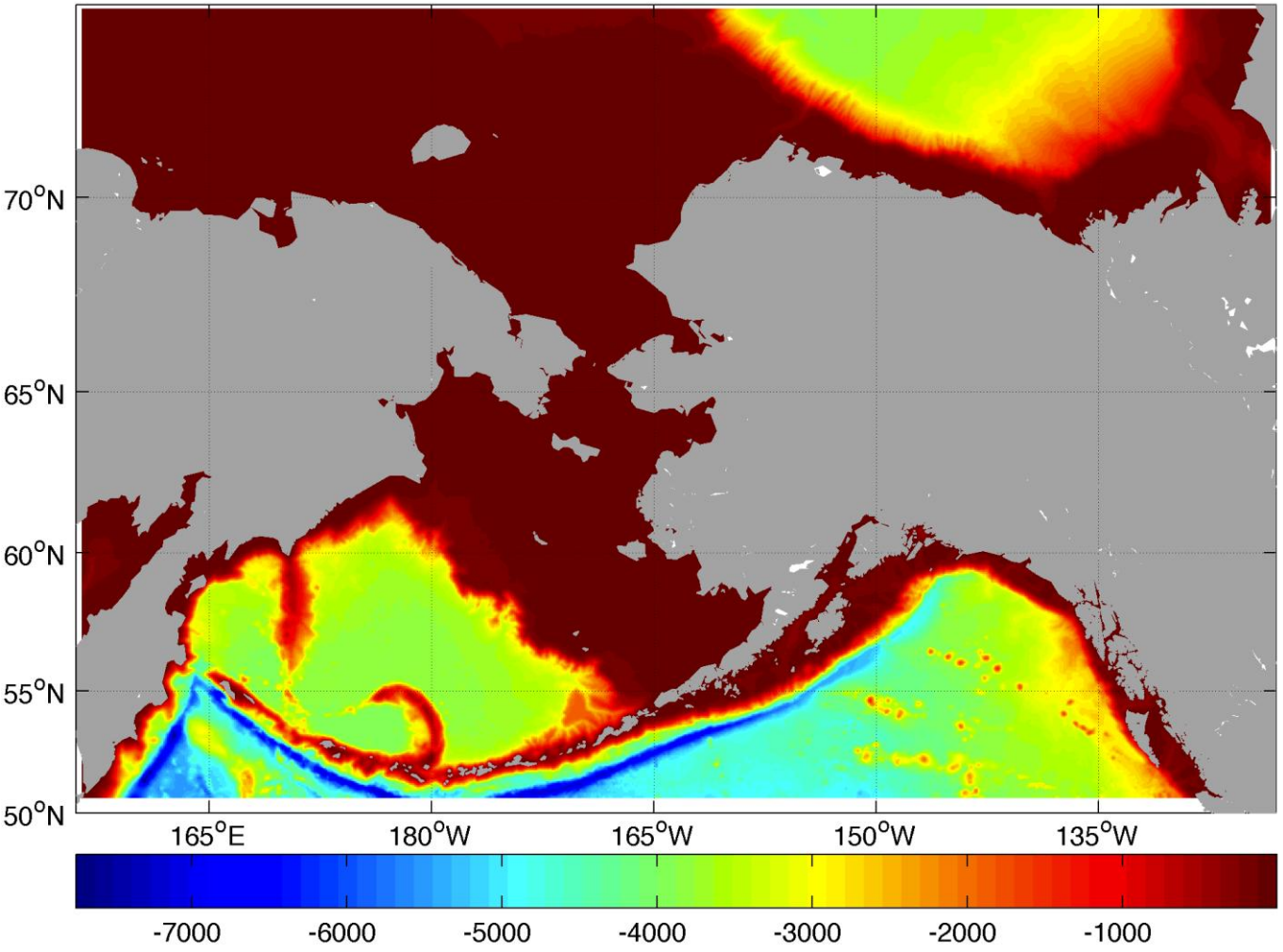
Two pan-arctic models



Northern and Western Gulf of Alaska

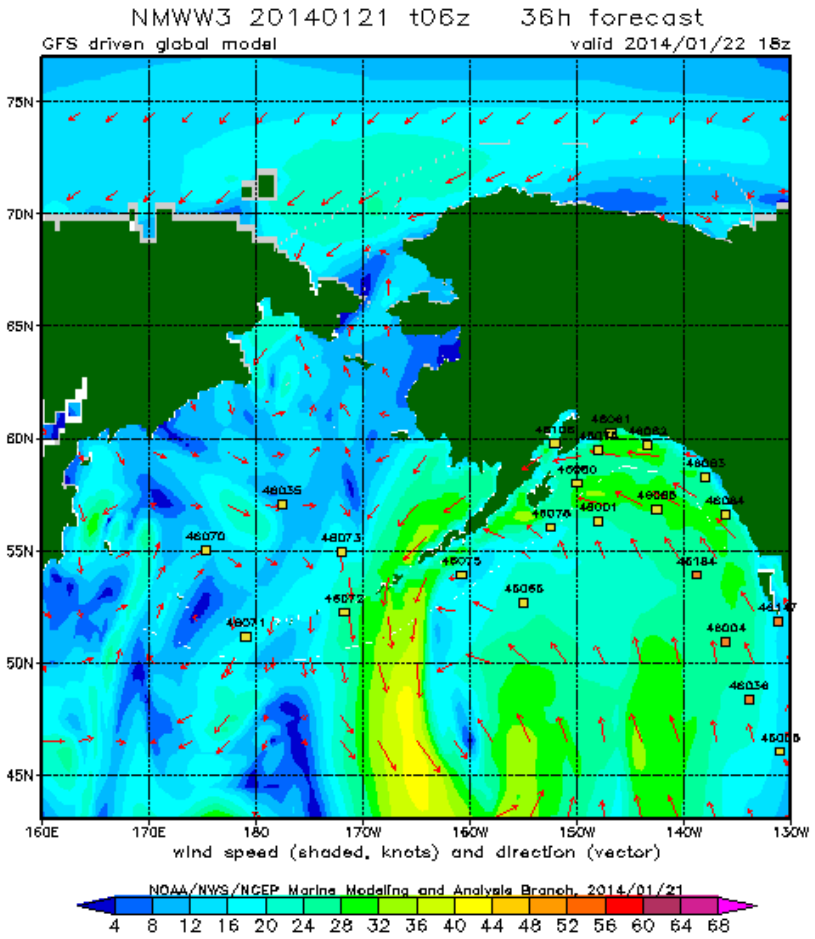


Alaska Region Vertically Integrated Model (ARVI)

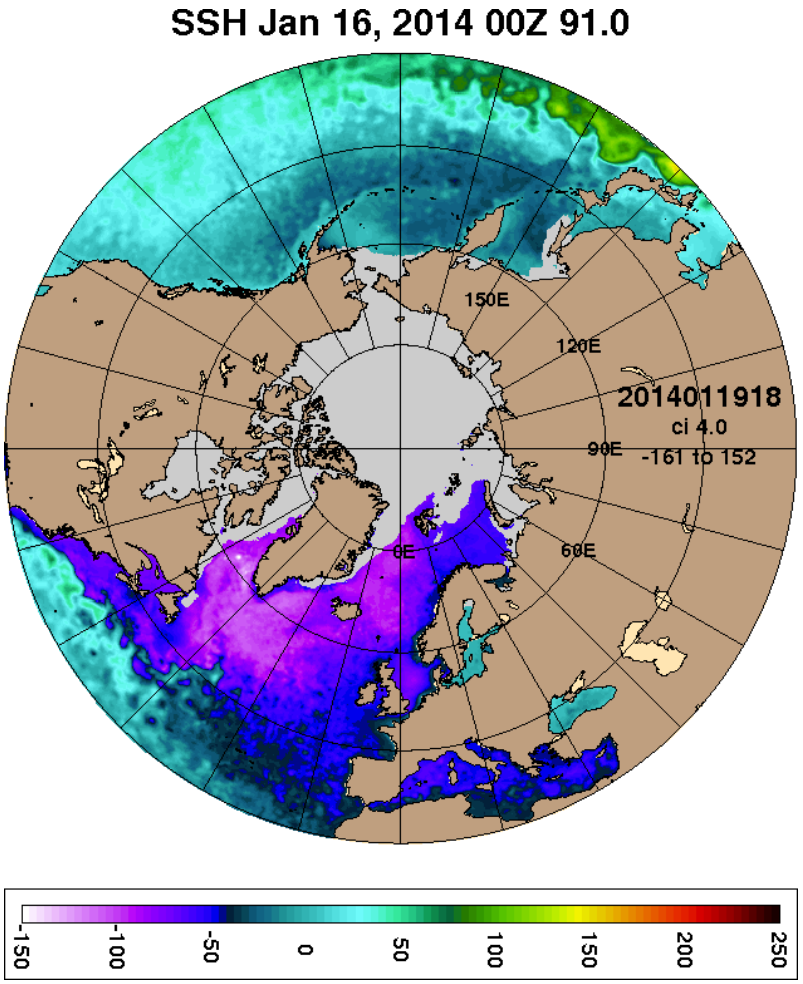


Operational Models

Wavewatch III
NOAA/NWS/NCEP

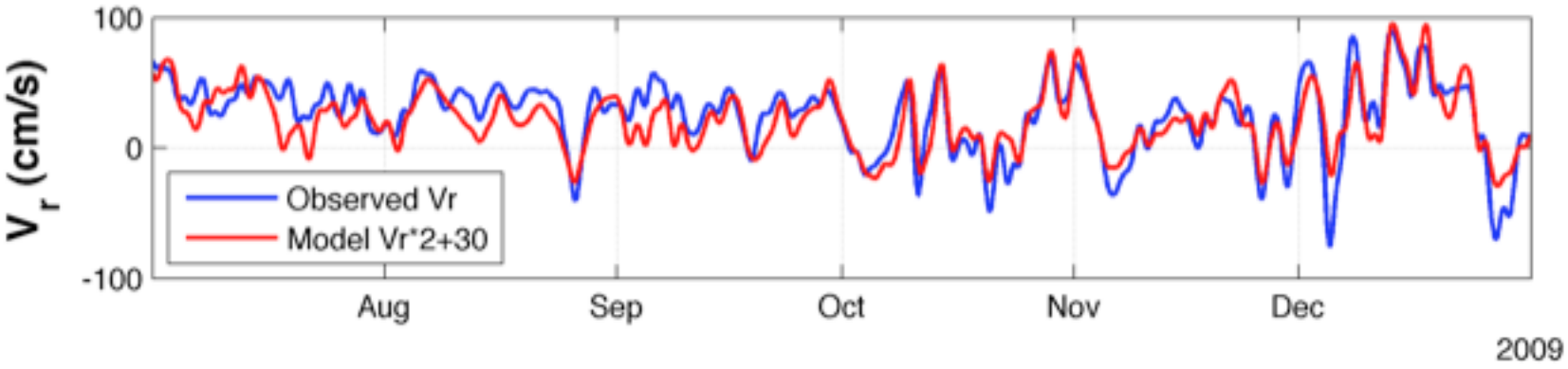


Hycom
Multi-institutional partnership



Some questions

- What user group(s) should AOOS modeling serve?
- What type of predictions?
  - (Storm surge? Currents? Ecosystem? Atmosphere?)
- Given the target users and applications, what improvements are needed above and beyond existing operational models?
- Does AOOS want to be in the business of model development, operational modeling, or some other aspect?
- Complex or simple modeling approach?



Reality check

- Relatively coarse models are not much use in regions of small-scale bathymetric features (e.g., SE Alaska; Aleutian passes) but the race to higher model resolution is not the only hurdle….
- Errors in ice concentration lead to errors in air-sea coupling, wave height, wave direction, atmosphere-ocean fluxes. Are the ice observations always good enough to help constrain the models at important locations and times?
- Without better knowledge of the coastal discharge, we don't have much hope in reproducing coastal plumes or buoyancy-driven currents.
- We lack sufficient high-resolution observations of coastal plumes to even know how far off the models are. Lots of opportunities!