Overarching Science Hypothesis: Model-simulated processes and resulting feedbacks across ocean, ice, and atmosphere are critical to improved model representation of the Arctic climate state, prediction of polar amplification and teleconnection to lower latitudes.

Arctic Climatic Predictive Models need to:
- Resolve key processes (e.g., ocean mesoscale eddies, sea ice deformation) and resulting feedbacks (e.g., air-sea-ocean coupling).
- Understand space-dependence & optimize parameter space.
- Evaluate validation data (e.g., fluxes across the air-sea-interface).
- Reduce computational cost & guide requirements of future high-resolution coupled climate simulations. 

RASM - a tool toward a climate model hierarchy to:
(1) Better understand Arctic processes and feedbacks,
(2) Guide future field campaigns and Models (ESM) development,
(3) Reduce uncertainty and
(4) Improve prediction

Arctic Ocean Exchange Gateways

Global warming has increased the importance of Arctic sea ice.

RASM Analyses of Oceanic Budgets and Fluxes

- Funder to investigate the role of oceanic forcing, models need to realistically represent Arctic-Gabarchick exchanges and Arctic-Cross budgets;
- Observational constraints are limited and highly depend on estimates of volume fluxes in/out of the Arctic Ocean;
- Use of this research is to understand model sensitivity to spatio-temporal resolution, and feedbacks in improving seasonal simulations and climate change, as well as oceanic-air exchanges and their role in climate change.

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Summary
- Fully coupled Arctic climate models are needed to investigate coupling
- Climate model components require spatial-temporal configurations sufficient to resolve critical physical processes and resulting feedbacks across coupling interfaces
- Sea ice thickness distribution, deformations and ice-edge dynamics, in addition to sea ice area, impose significant control of air-sea fluxes in winter
- Resulting local air-sea fluxes are not accurately represented in state-of-the-art models and remain a major source of atmospheric sensitivities.
- Regional impacts of locally and seasonally enhanced air-sea fluxes are yet to be determined, as well as their possible linkage to lower latitudes
- Global climate models with optimally refined grids over the Arctic might provide important, new insights into Arctic/ mid-latitude teleconnections