Arctic Processes in GEOS Models and Analyses
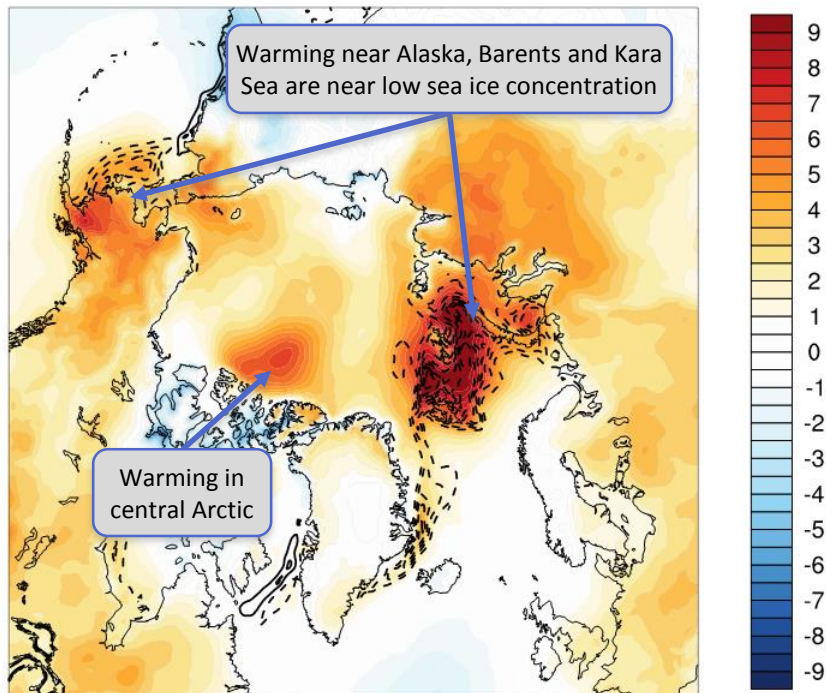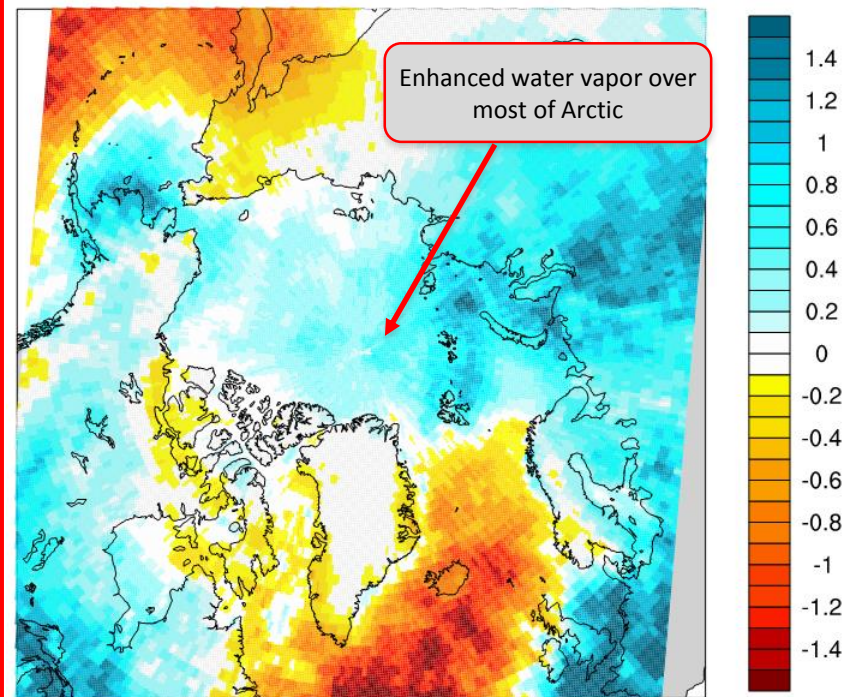
MERRA-2 2m Temperature Anomaly [K]
SSM/I Sea Ice Anomaly (black dashed)

Warming near Alaska, Barents and Kara Sea are near low sea ice concentration

Warming in central Arctic

AIRS Column Water Vapor Anomaly [mm]

Enhanced water vapor over most of Arctic
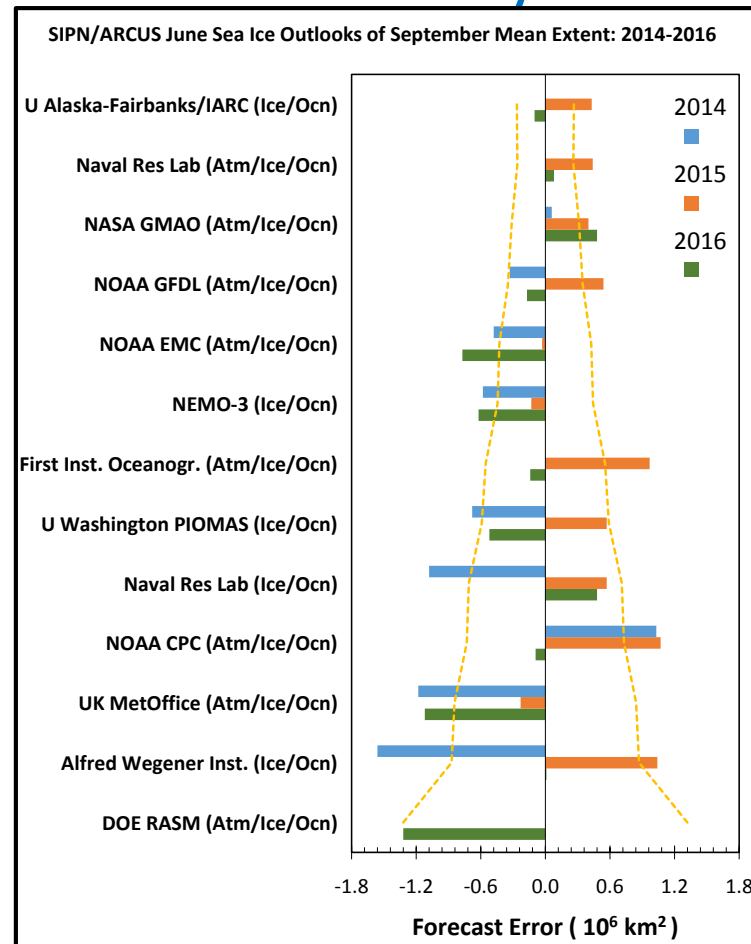
Cullather et al., 2016

Arctic Processes in GEOS Models and Analyses

- **Overview**
  - Provide global weather forecasts in support of Arctic field studies.
  - Global atmospheric reanalyses (MERRA-2).
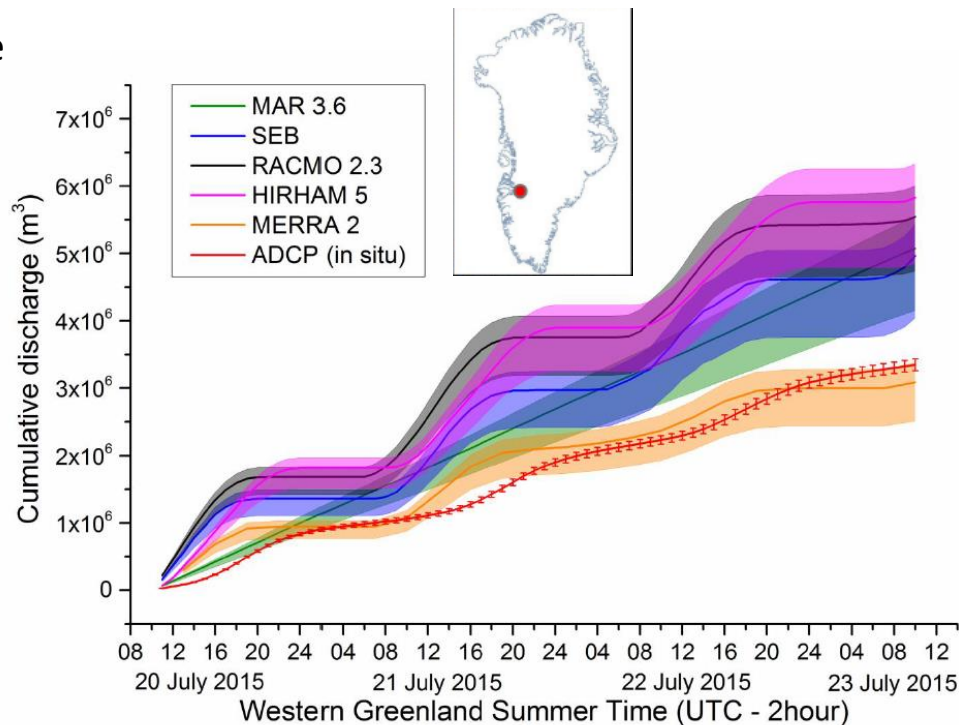 - Sub-seasonal and seasonal predictions (NMME).

- **Sea Ice**
  - Participation in Sea Ice Outlook, Sea Ice Prediction Network.
  - Experiments with initialization of sea ice thickness in coupled seasonal forecasts.

SIPN/ARCUS June Sea Ice Outlooks of September Mean Extent: 2014-2016

Arctic Processes in GEOS Models and Analyses

- **Land Ice (e.g., Greenland Ice Sheet)**
  - Development of improved surface hydrology, competitive with regional climate models.
  - Coupling with JPL land ice model.

- **Non-Glaciated Land**
  - Permafrost representation.
  - NCAR phenology/carbon model.
  - Support of ABoVE mission.

- **Atmosphere**
  - Moist turbulent boundary layer scheme.
  - Proposed two-moment cloud microphysics: mixed-phase.
  - Support of ARISE mission.
  - High resolution topography.

Cumulative Surface Runoff, Behar Catchment

Smith et al. (2017)