

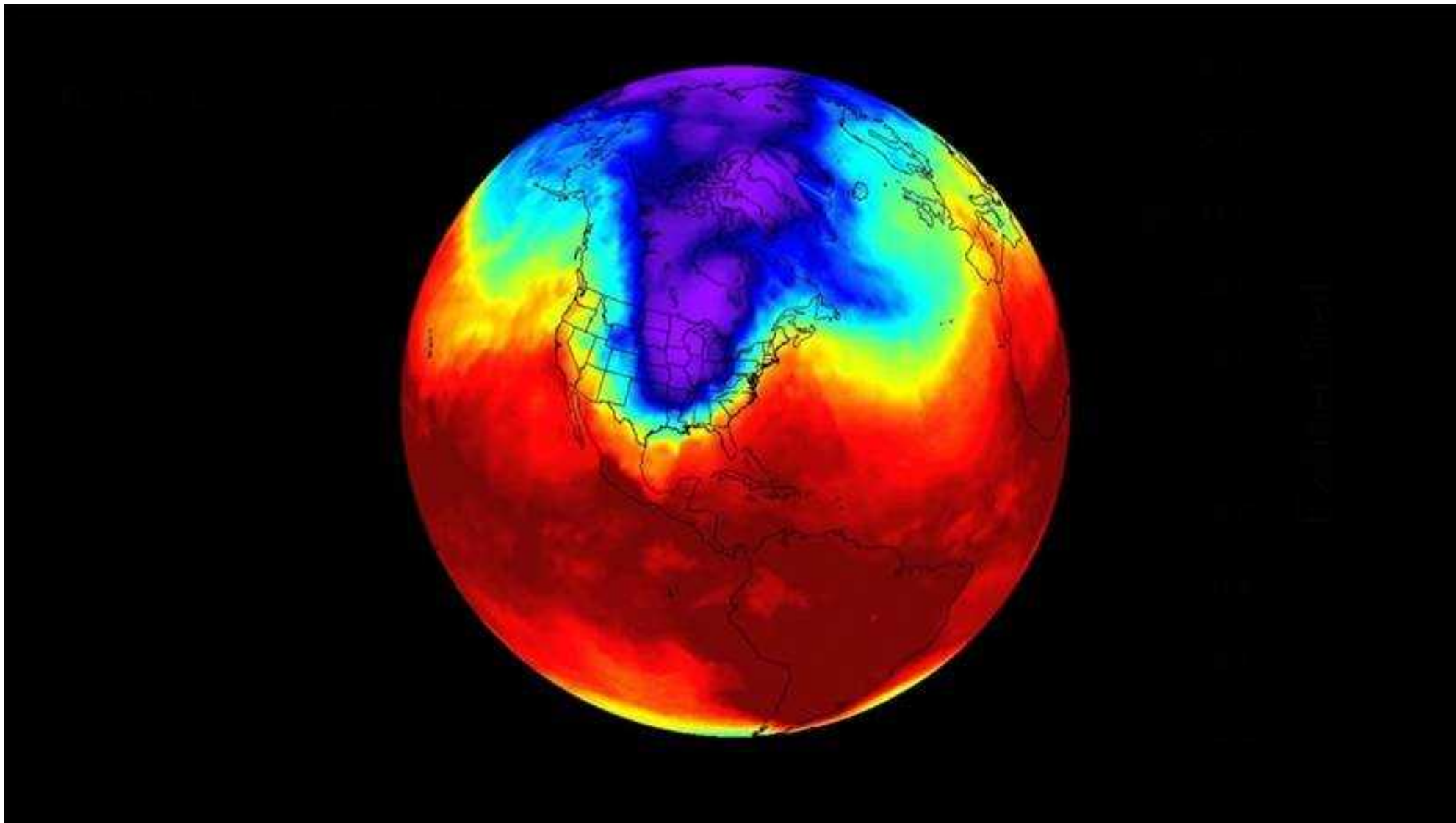
# A Variable Resolution Atmospheric General Circulation Model for a Megasite at the North Slope of Alaska

**Lauren Dennis**

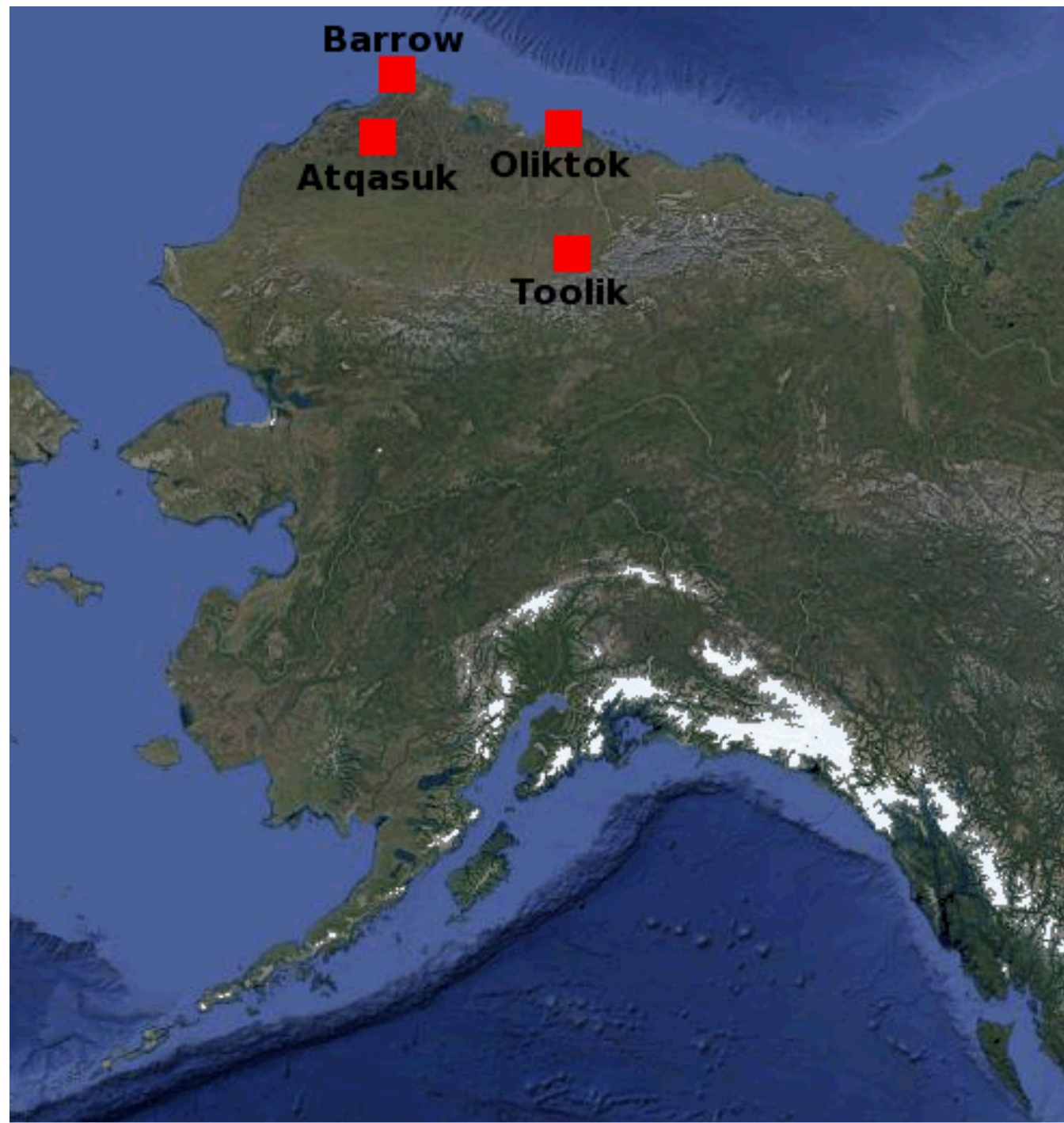
**Erika L. Roesler, Oksana Guba, Benjamin R. Hillman, Matthew McChesney**

**Sandia National Laboratories**

# Why should we care?



(NASA)



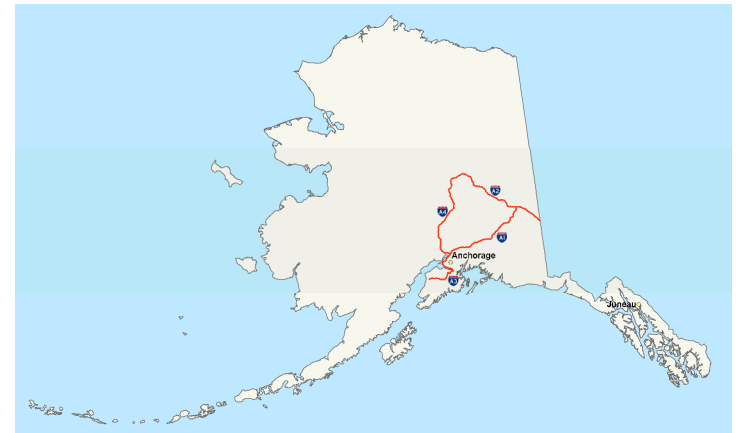
# Atmospheric Radiation Measurement Program (ARM)

- Multi-platform scientific user facility providing a detailed and accurate description of Earth's atmosphere in diverse climate regimes to resolve uncertainties in climate and earth system models
- Continuous measurements



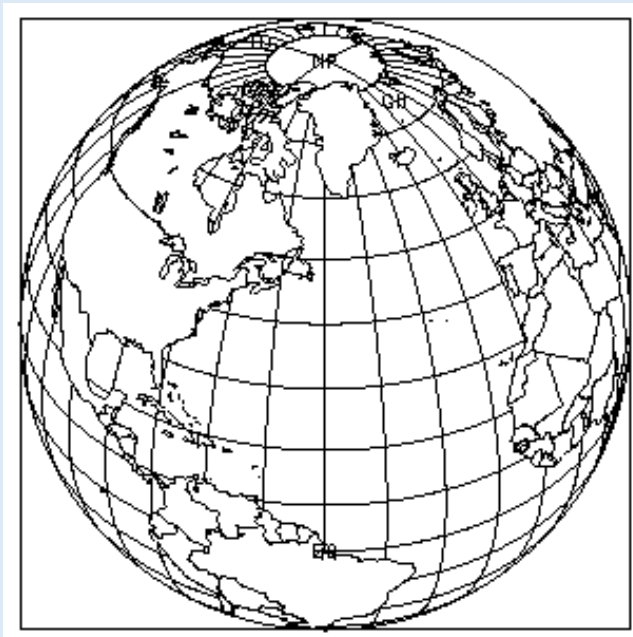
# Areas Important for Climate

- Topology of Alaska
  - Brooks Range
  - Coasts (differential heating)
  - Southern Alaskan coastal terrain (wind) (Hughes and Cassano 2015)
- Aleutian Islands
  - Aleutian semipermanent low
  - Moisture transport, Rossby waves breaking (Liu and Barnes 2015)
  - Cyclones (Vavrus 2013)
- Bering Strait
  - Loss of sea ice, change in SST (Carton et al. 2015)
  - Cyclones (Vavrus 2013)
  - Extreme moisture transport (Liu and Barnes 2015)

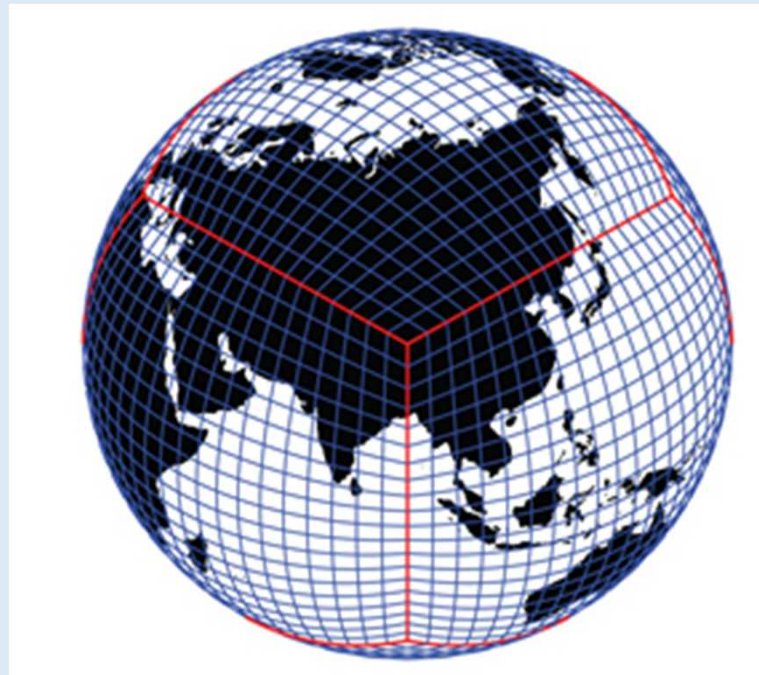


# Grid Evolution

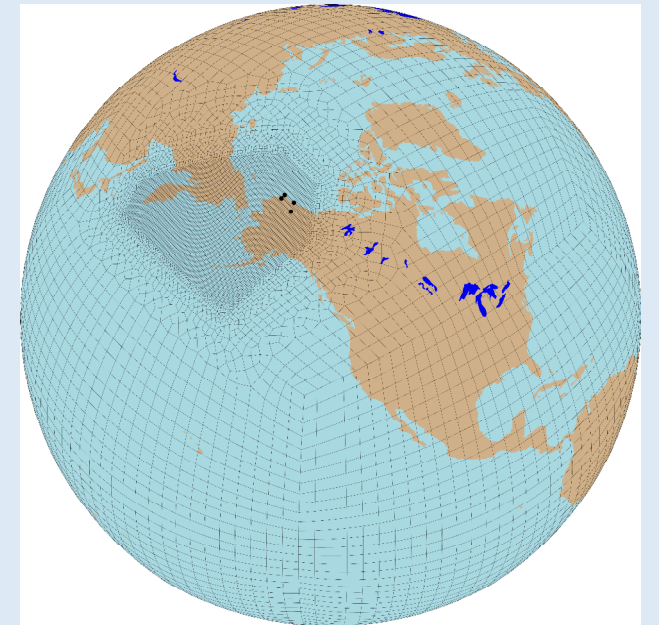
Latitude/Longitude -> Cube Sphered -> Regional Refinement



<http://ngwww.ucar.edu/conmaptutor/ezmap/ezmap.html>

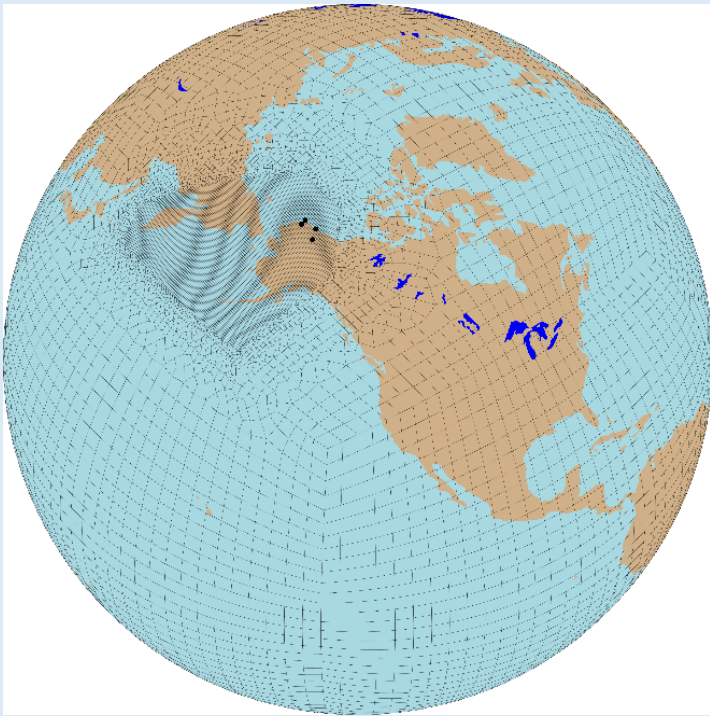


<http://www.ucar.edu/communications/quarterly/spring09/latitude.jsp>

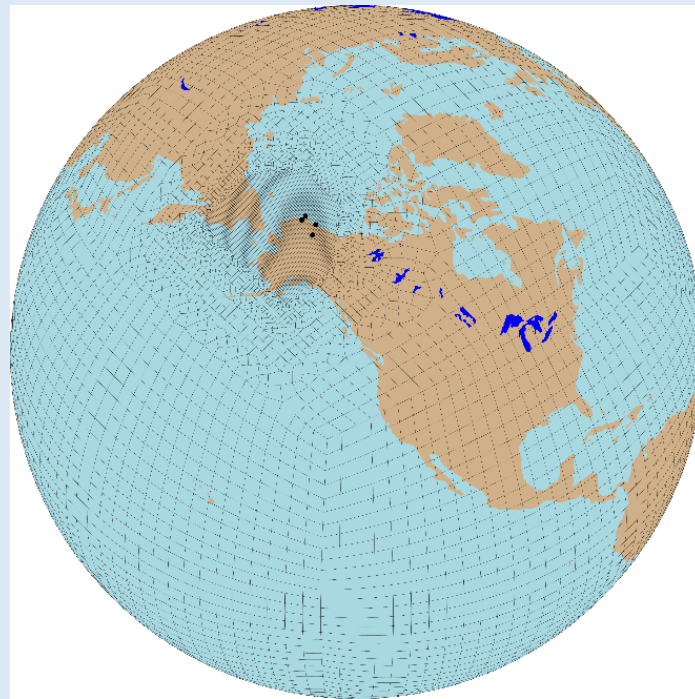


# Grids

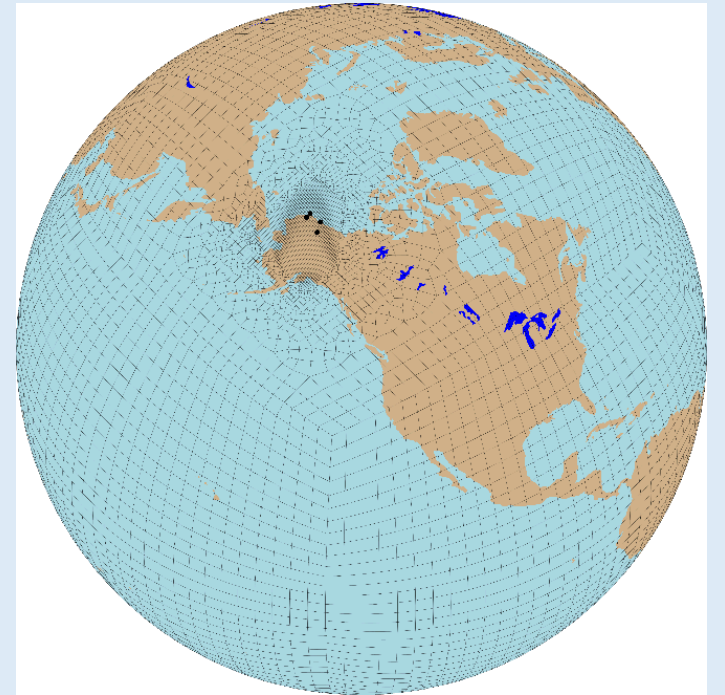
Large



Medium



Small



# Grid Creation

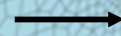
SQuadGen



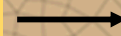
NCL



GIMP



SQuadGen



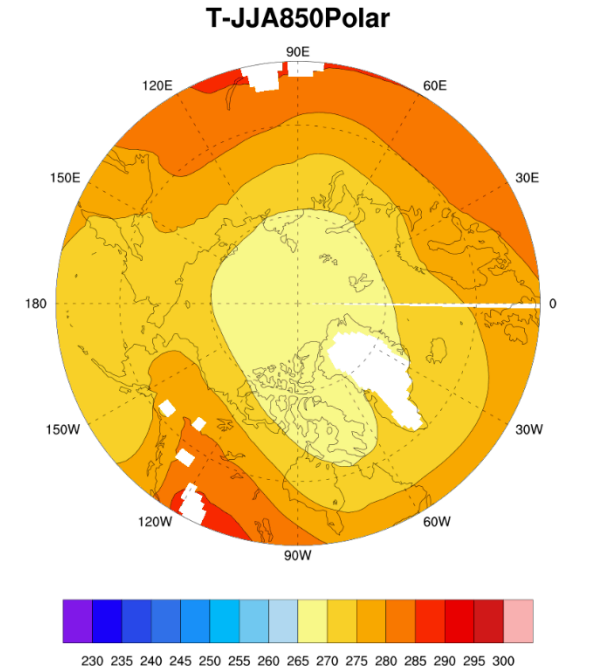
NCL

- **SQuadGen**: open-source mesh generation utility
- **NCL (NCAR Command Language)**: open-source interpreted language created by the National Center for Atmospheric Research (NCAR) used for data processing and to create visualizations
- **GIMP (GNU Image Manipulation Program)**: open-source graphics editor

# Next Steps

- Run an Atmospheric General Circulation Model with the variable resolution grids
- Determine whether this model better represents clouds and lower level mixing

CMIP



JJA: Temperature p=85000 K

ASR

