

**PARALLEL SESSION A : BENEFITS OF DOWNSCALING
A2: MODELS OF THE COUPLED REGIONAL CLIMATE SYSTEM**

**Simulation of the Arctic climate system with the Regional Arctic System Model (RASM):
Sensitivity to atmospheric processes**

John CASSANO

University of Colorado - United States

A new regional Earth system model focused on the Arctic, the Regional Arctic System Model (RASM), has recently been developed. The initial version of this model includes atmosphere (WRF), ocean (POP), sea ice (CICE), and land (VIC) component models coupled using the NCAR CESM CPL7 coupler. The model is configured to run on a large pan-Arctic domain that includes all sea ice covered waters in the Northern Hemisphere and all Arctic Ocean draining land areas.

Results from a suite of multi-decadal (1990 to 2014) simulations with RASM will be presented and will focus on the simulated climate system's sensitivity to atmospheric processes and parameterizations. These simulations show that the modeled climate is sensitive to changes in the boundary layer and cumulus parameterizations used in the atmospheric component of RASM. Depending on the WRF parameterizations used the model either overestimates or underestimates cloud cover over the ocean. Underestimation of clouds over land areas is common in all versions of the model evaluated. The differences in simulated cloud impacts the surface and top of the atmosphere radiation budget, alters biases in land and ocean surface temperature, changes precipitation distribution within the domain, and leads to different sea ice states being simulated. Simulations with only the atmospheric component of RASM were also run and highlight the model response that is solely due to atmospheric processes and the model response arising from coupled processes in RASM.

John Cassano¹, Alice DuVivier¹, Andrew Roberts², Mimi Hughes¹, Mark Seefeldt¹, Michael Brunke³, Anthony Craig³, Brandon Fisel⁴, William Gutowski⁴, Joseph Hamman⁵, M. Higgins¹, Wieslaw Maslowski², Bart Nijssen⁵, Robert Osinski⁶, Xubin Zeng³

¹University of Colorado, ²Naval Postgraduate School, ³University of Arizona, ⁴Iowa State University, ⁵University of Washington, ⁶Institute of Oceanology