CGD SEMINAR

NCAR

DATE: Tuesday, 26 March 2019

TIME: 11 am – 12 pm

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: Response of Resolved Polar Clouds to Idealized Climate Change

SPEAKER: Xiyue (Sally) Zhang, NCAR

ABSTRACT:

The uncertainty in polar cloud feedbacks calls for process understanding of cloud response to climate warming. We adopted a novel modeling framework that uses GCM output of advection and sea ice to parameterize large-scale dynamics in a large eddy simulation (LES) model. We ran simulations with a seasonal cycle and sea ice, and varied longwave optical thickness to mimic climate change. Water vapor and cloud radiative feedbacks are not represented in the gray radiative transfer in both GCM and LES. The seasonal cycle of liquid clouds in the reference climate is consistent with observations, mainly with maximum low cloud fraction occurring during summer and autumn. In the warm climate, liquid low clouds decrease significantly during summer and autumn despite decreased sea ice volume, while cloud top is elevated in all seasons. The decreased liquid cloud fraction is attributed to a drier and less statically stable lower troposphere, which is opposite to the instantaneous response of clouds to sea ice loss, as suggested by observational studies. Offline radiative transfer calculations suggest a positive net cloud radiative feedback, dominated by longwave cloud feedback in the annual mean. Our idealized setup provides insights into the projected Arctic clouds and cloud feedback in a warmer climate.

Live webcast: http://ucarconnect.ucar.edu/live

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