CGD SEMINAR

NCAR

DATE: Friday, 24 February 2017

TIME: 11 a.m.

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

TITLE: Oceanographic controls on the variability of ice-shelf basal melting and circulations of glacial meltwater in the Amundsen Sea Embayment

SPEAKER: Toshi Kimura, Nansen Environ. Remote Sensing

ABSTRACT:

Ice Shelves in the Amundsen Sea Embayment have thinned and accelerated the seaward flow of ice sheets upstream over recent decades. In particular, Pine Island Glacier (PIG) and its neighbour Thwaites Glacier have been highlighted as major drainage pathways for the West Antarctic Ice Sheet. The cause of such imbalance in ice sheets is due to change in ocean-driven melting of the ice shelves We quantify the melting of ice shelves in the Amundsen Sea Embayment and oceanic conditions between 1991 and 2014 using a general circulation model. Observations and numerical models have shown that the ocean heat reaching to the ice shelves is sensitive to the depth of thermocline, which separates the cool, fresh surface waters from warm, salty deep waters.

Recent studies have argued that the convective deepening of the surface water at the calving front by polynya formations play a key role in changing the depth of the thermocline. We demonstrate that the seasonal cycle and interannual variabilities of ice-shelf basal melting are tightly coupled to the offshore zonal wind stress and the polynya formations only play a role when the offshore wind forcing is weak. The ocean driven ice-shelf melting is enhanced by an asymmetric response to changes in ocean heat transport anomalies at the continental shelf break: melting responds more rapidly to increase in ocean heat transport than decreases. This asymmetry is caused by the inland deepening of bathymetry under the ice shelf and the glacial meltwater circulation around the ice shelf.

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