Geophysical Research Abstracts
Vol. 17, EGU2015-10916, 2015
EGU General Assembly 2015

Characterizing sea ice surface morphology using high-resolution IceBridge data

Alek Petty (1), Sinead Farrell (1), Thomas Newman (1), Nathan Kurtz (2), Jacqueline Richter-Menge (3), Michel Tsamados (4,5), and Daniel Feltham (4)

(1) NOAA Center for Weather and Climate Prediction, University of Maryland , (2) NASA Goddard , (3) USA CRREL , (4) CPOM, Meteorology Department, University of Reading, (5) CPO, Earth Sciences, University College London

Sea ice pressure ridges form when ice floes collide while drifting under the combined forces of atmospheric drag, oceanic drag and ice-ice interaction. Sea ice ridges, in-turn, affect the resultant form drag on the sea ice cover and thus impact the fluxes of momentum and heat between the atmosphere and ocean. Here we present initial results of a new sea ice ridge detection approach that utilizes high resolution, three-dimensional ice/snow surface elevation data from the NASA Operation IceBridge Airborne Topographic Mapper (ATM) laser altimeter merged with coincident high-resolution imagery from the Digital Mapping System (DMS).

We derive novel information regarding sea ice deformation across a variety of ice types and regimes. Statistical information regarding sea ice ridges (height/frequency/orientation) and floe edges (freeboard height) are presented for several IceBridge flight lines. These novel characterizations of sea ice surface morphology will be used to validate and inform drag parameterizations in state-of-the-art sea ice models. Furthermore, they will advance our ability to quantify uncertainties introduced by pressure ridges in the estimation of sea ice freeboard/thickness from airborne and satellite altimeters.