



Paleoglacial history of Dronning Maud Land: Numerical modeling guiding field investigations in East Antarctica

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Reconstructing and predicting the response of the Antarctic Ice Sheet to climate change is one of the major challenges facing the Earth Science community. Numerical models of ice sheets are a central component of work to address this challenge, and these models are tested and improved by comparing model predictions of past ice extents with field-based reconstructions (from geological and geomorphological data). However, there are critical gaps in our knowledge of past changes in ice elevation and extent in many regions of East Antarctica, including a large area of Dronning Maud Land. In addition, there exist significant uncertainties in regional climate history along the ice sheet margin due to remoteness of these areas from ice core locations where detailed reconstructions of past climate conditions have been performed. This leaves numerical models of regional glaciation history largely unconstrained.

MAGIC-DML is a new Swedish-UK-US-Norwegian-German project that aims to reconstruct vertical changes in ice extent across Dronning Maud Land as the basis for constraining numerical models of ice sheet behavior. The focus of the two planned field seasons will be in areas that have been identified as being critical for differentiating between possible past ice sheet configuration and timing. Geological reconstruction will involve the identification, mapping, and dating of glacially sculpted bedrock, ice-marginal moraines, drift sheets and erratic boulders that provide evidence for past changes in ice levels over thousands to millions of years. Prior to the field investigations, the German team is performing a detailed high-resolution modeling of the paleoglacial history and identifying areas across Dronning Maud Land that are most sensitive to the uncertainties in regional climate history and the choice of model parameters. These modeling results will be used as a basis for planning and guiding the field campaigns in East Antarctica in 2015 and 2016.