Geophysical Research Abstracts
Vol. 17, EGU2015-11551, 2015
EGU General Assembly 2015

Spatial and Temporal Patterns of Blowing Snow Flux and Related Near-Surface Atmospheric Processes over Antarctica (2001-2011) from the Modèle Atmosphérique Régionale (MAR), Assessed With In Situ and Satellite Data

Rajashree Datta (1,2), Marco Tedesco (3,2,1), Xavier Fettweis (4), Hubert Gallee (5), and James Booth (2)

(1) Dept. of Earth and Environmental Sciences, The Graduate Center, CUNY, NY, NY, USA., (2) Dept. of Earth and Atmospheric Sciences, The City College of New York, NY, NY, USA., (3) The National Science Foundation, Arlington, VA, USA, (4) Dept of Geography, University of Liège, Liège, Belgium., (5) CNRS - Laboratoire de Glaciologie et Géophysique de l'Environnement, Grenoble, France.

The effects of blowing snow (both erosion and sublimation) have a substantial impact on thermodynamic processes on the Antarctic Ice sheet and are a significant source of uncertainty in surface mass balance estimates. In order to capture effects specific to blowing snow at the continental scale, two versions of the model Modèle Atmosphérique Régionale (MAR) RCM have been run at a 50 km resolution over Antarctica for the period 2000-2011. The two MAR configurations are identical except for the implementation of blowing snow dynamics. The model is forced at the boundaries with 6-hourly reanalysis data provided by the European Centre for Medium-Range Weather Forecasts (ECMWF). The differences in surface and atmospheric outputs between the models can highlight the cumulative effects of blowing snow.

Due to the difficulty of obtaining reliable large-scale measurements of blowing snow phenomena directly, comparisons of near-surface atmospheric variables between model outputs and satellite as well as in-situ data are necessary to assess the success of the blowing snow physics implemented in the model. For the purposes of assessment, we will use available surface temperature and pressure data from Automatic Weather Stations as well as radiosonde data at the ice sheet margins (made available by the University of Wisconsin-Madison). Additionally, satellite data at multiple atmospheric levels will be provided from the Atmospheric Infrared Sounder (available from NASA Goddard and the Jet Propulsion Labs).

Finally, Empirical Orthogonal Function (EOF) analysis will be employed to find the most prominent spatio-temporal patterns of blowing snow flux with the seasonal and decadal trend removed. Model output composites of anomalies for the time series produced can suggest the large-scale climate dynamics which contribute to prominent patterns of blowing snow flux. Spatial trends of correlations between model output and satellite/in situ during these time-series should help to point out the climate conditions (as well as regions and surface conditions) where the blowing snow model is successful, and where it can be improved upon in future work.