Geophysical Research Abstracts
Vol. 19, EGU2017-16183, 2017
EGU General Assembly 2017

A review of selected physical parameterization sensitivity settings within Polar-WRF model over Svalbard area

Natalia Pilguj (1), Maciej Kryza (1), Bartosz Czernecki (2), Krzysztof Migała (1), and Leszek Kolendowicz (2)

(1) Institute of Geography and Regional Development, University of Wrocław, Wrocław, Poland (natalia.pilguj@uwr.edu.pl), (2) Institute of Physical Geography and Environmental Planning, Adam Mickiewicz University, Poznan, Poland (nwp@amu.edu.pl)

In this work we present the results of the sensitivity study using the mesoscale meteorological Polar Weather Research and Forecasting model (Polar-WRF) for high-resolution dynamical downscaling done over the Svalbard area. In total, 36 unique simulations were performed for January 2009 and June 2008. For each model run, we have used different configuration of physical parameters, including the tests of long and shortwave radiation schemes, planetary boundary layer, microphysics and cumulus parameterizations. Additionally, two model runs were tested using the same configuration for physical parameterizations, but with two different digital elevation models: the default one as provided in the WRF Preprocessing System, and a high-resolution layer available for the Svalbard area. The sensitivity of the model in terms of spatial resolution is also analyzed, as the Polar-WRF model was configured using three-way nested domains with 27km, 9km and 3km grid cell resolutions.
The results were compared against meteorological observations gathered at 9 weather stations. These preliminary results show high sensitivity of the obtained dynamical downscaling geophysical fields to the selected model configuration. For example, mean values of Pearson correlation coefficients for near-surface air temperature may vary from 0.3 up to 0.73 in June and from 0.79 up to 0.97 depending on analyzed locations. Significant differences of stations mean error (ME) distributions occur for longwave radiation schemes (particularly for CAM and New Goddard). This study is an attempt to address the most optimal model configuration for the area of Svalbard in order to downscale a future climate scenarios as accurate as possible.