Evaluating the Arctic System Reanalysis using ASCOS data

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Arctic System Reanalysis (ASR)

The Arctic System Reanalysis (ASR) is an attempt to produce a dynamically consistent three-dimensional dataset describing the time evolution of the Arctic climate system by assimilating all available data into a numerical model.

The model provides gridded fields of temperature, radiation and wind and can serve as a driver for ice-ocean, land surface and other models. It is a state-of-the-art tool assessing Arctic climate variability and monitoring of Arctic change. The ASR is a US project developed in collaboration between four different institutions. The ASR lead institution is the Polar Meteorology Group (PMG) of Byrd Polar Research Center (BPRC) at The Ohio State University in USA.

The ASR is based on the Polar WRF (Weather Research and Forecasting model modified for use in Polar Regions) and has an inner and outer domain with different resolutions. In this project the inner domain with the low resolution system of 30 km is used. New data is provided every three hours.

Using the ASCOS data it is possible to evaluate summer data from ASR. The data is interpolated in time and space into corresponding points of the ASCOS measurements. A linear and nearest interpolation have been done and some preliminary results are presented here.

The Arctic and clouds

The cryosphere is a very important component of the global climate system and we need to know more about how it interacts with the atmosphere and ocean, to be able to better produce further climate scenarios. Especially the interactions that occur in the boundary layer between the ice surface and the troposphere is interesting since it effects the formation of clouds and can alter the global energy budget.

Clouds can both reflect incoming solar radiation back to space and re-radiate infrared energy back towards the earth’s surface, thereby moderating the temperature of the lower atmosphere. In the global climate system, low clouds have a net cooling effect, because of their high absorbs. But, in Polar Regions, with a high surface albedo, low clouds seem to have a net warming effect. The attenuation solar radiation is outweighed by the increase of longwave radiation to the surface, due to the clouds.