



Dynamical downscaling of the ERA-40 reanalysis in complex terrain in Norway

Ulla Heikkilä (1), Nils Gunnar Kvamstø (2), and Anne Sandvik (3)

(1) Bjerknes Centre for Climate Research, Bergen, Norway (ulla.heikkila@bjerknes.uib.no), (2) Bjerknes Centre for Climate Research, Bergen, Norway, (3) Institute of Marine Research, Bergen, Norway

The increase in resolution of numerical mesoscale models in the last few years has enhanced the level of detail of atmospheric parameters, such as precipitation. It is however not straightforward to evaluate if the higher resolution actually improves the representation of these parameters. This is an especially interesting issue in complex terrain, such as the west coast of Norway where there is a strong orographic enhancement of the precipitation. A high-resolution model allowing for a more accurate representation of the orography can be expected to improve the modelled precipitation in comparison with GCM or reanalysis data.

In this work dynamical downscaling of the ERA-40 reanalysis data down to 10 km resolution over Norway was performed. We used the WRF regional climate model (www.wrf-model.org). Results from a 30-year period ranging from 1961 to 1990 are presented and evaluated against daily mean observations of precipitation, 2-meter temperature and 10-meter wind speed from a number of surface stations. The WRF model is reproducing the probability density functions of the modelled and observed daily mean parameters reasonably well. We also investigate the frequency of wet days as well as the occurrence of extreme events which is of high importance for future climate studies. The downscaled WRF results show clear improvement from the ERA-40 reanalysis in precipitation. Especially the number and intensity of high precipitation events is much improved due to the higher model resolution and therefore a better representation of the mountains on the Norwegian west coast. On the other hand, temperature and wind are reasonably well represented in the ERA-40 reanalysis and not significant improvement was found in the downscaled data set. We will also present a model intercomparison of these parameters with some of the models used in the PRUDENCE project.