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Downscaling of near surface wind fields in the Alpine region from the 100 km to the 100 m scale

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In the framework of the Austrian project “Research for Climate Protection: Model Run Evaluation” (reclip:more), which analyses the meteorological effects of climate change in the Alpine region, results from general circulation model (GCM) runs are downscaled from about 100 km horizontal resolution to meso- and microscales. One part of the project is the development of a downscaling technique for near surface wind to 200 m resolution.

The method approximates the 3-dimensional air flow within the planetary boundary layer by the sequential application of the dynamic mesoscale model MM5 and the diagnostic microscale model CALMET under consideration of kinematical terrain effects, slope flows and thermo-dynamical blocking effects. In order to obtain realistic wind fields over complex terrain, it is vital to carefully take into account the stability of the atmosphere, which is influenced by local sensible and latent heat fluxes at the earth’s surface. For the simulation of these effects, high-resolution topography and land cover information are used (CORINE land cover data set CLC90, version 12/2000, and NASA’s elevation model from the Shuttle Radar Topography Mission (SRTM)).

The first version of the wind-downscaling method has recently been applied to reconstruct the air-flow of the year 1999 over the Hohe Tauern region in the Eastern Alps. Currently, these results are under evaluation using SODAR (sonic detection and ranging) and surface wind observations from the Mesoscale Alpine Programme (MAP) performing statistical analysis on wind speed and direction. First results on the method’s performance in terms of wind climatology aspects (e.g. Weibull parameters,

daily distributions, vertical wind profile, extreme events) will be presented.