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Building a simulated and observed Time Series for Precipitation from a relatively short Time Period

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One of the major research parameters in meteorology is precipitation. Extended networks of measurement stations try to capture the areal and temporal variability of precipitation. This study uses the observations of the standard network of the German Weather Service (DWD) and the Austrian Weather Service (ZAMG). Regional climate models (RCMs) try, with input data from Global Circulation Models (GCMs), to simulate precipitation. The applied model in this study is MM5, which is the Fifth-Generation NCAR/Penn State Mesoscale Model, with a resolution of 45 km. Altogether, this work grew out of the interdisciplinary project called GLOWA-Danube, which concentrates on simulating the water cycle of the Upper-Danube catchment area, which is 450x450 km large. The integration period was 10 years (1991-2000). In order to build a simulated and observed climatological time series in the research area, two major aspects are important.

First, RCMs have many options concerning parameterisations of meteorological processes nowadays, which are applicable to a wide variety of meteorological circumstances. Therefore, it is important to find the combination of parameterizations, which is most suitable to precipitation in the research area. Here, we present a sensitivity study in which we use 16 combinations of four different parameterisations, which are the cumulus parameterisation, the boundary layer parameterisation, the moisture scheme, and the radiation scheme. This study was performed using two, in meteorological view, extreme months. One of these months was February 1998, which was dominated by large scale precipitation during almost the complete month. The other month was May 2000, which was dominated by much convective precipitation. We found that the amount of precipitation, as well as the ratio of resolved scale and convective precipitation, is very sensitive to the configuration used. After comparing the model results with the observations a configuration was chosen, which was believed

to be the best in our research area.

Second, to build a climatological year from a 10 years period, daily values need to be averaged. This study focusses on several averaging methods as well and tries to find significant meteorological phenomena in both the simulations and the observations. The used averaging methods are: linear average, Fourier analysis, running average, and spline interpolation. Although these four methods approach the 10 years time series quite differently, they all show more or less the same temporal features in the simulations and the observations. The method of Fourier analysis was chosen for our time period, because it uses all available information most effectively.

The chosen configuration showed the best precipitation results during February 1998 and May 2000. Using this configuration, it is believed that the gained climatological year is most representative to the Upper-Danube catchment area for the time period of 1991-2000.