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Influence of spatial resolution on precipitation simulations for the central Andes Mountains

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The climate of South America is highly influenced by the north-south oriented Andes Mountains. Their complex structure causes modifications of large-scale atmospheric circulations resulting in various mesoscale phenomena as well as a high variability in the local conditions. Due to their height and length the terrain generates distinctly climate conditions between the western and the eastern slopes. While in the tropical regions along the western flanks the conditions are cold and arid, the eastern slopes are dominated by warm-moist and rainy air coming from the Amazon basin. Below 35° S the situation reverses with rather semiarid conditions in the eastern part and temperate rainy climate along southern Chile. Generally, global circulation models (GCMs) describe the state of the global climate and its changes, but are disabled to capture regional or even local features due to their coarse resolution. This is particularly true in heterogeneous regions such as the Andes Mountains, where local driving features, e. g. local circulation systems, highly varies on small scales and thus, lead to a high variability of rainfall distributions. An appropriate technique to overcome this problem and to gain regional and local scale rainfall information is the dynamical downscaling of the global data using a regional climate model (RCM). The poster presents results of the evaluation of the performance of the Weather Research and Forecasting (WRF) model over South America with special focus on the central Andes Mountains of Ecuador. A sensitivity study regarding the cumulus parametrization, microphysics, boundary layer processes and the radiation budget is conducted. With 17 simulations consisting of 16 parametrization scheme combinations and 1 default run a suitable model set-up for climate research in this region is supposed to be evaluated. The simulations were conducted in a two-way nested mode i) to examine the best physics scheme combination for the target and ii) to analyze the impact of spatial resolution and thus, the representation of the terrain on the result.