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Evaluation of precipitation in a set of sensitivity experiments at convection-permitting resolution over the Alps

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While the added-value of convection-permitting regional climate models has been demonstrated for the representation of precipitation, the sensitivity to the model configuration of such RCMs remains largely unknown.
This question is addressed in the framework of the projects NHCM-2 (Non-Hydrostatic Climate Modeling II, FWF project 24785-N29) and HighEnd:Extremes (ACRP project KR13AC6K10981). With COSMO-CLM version 5.0, a set of sensitivity experiments with 3 km grid spacing are conducted over the greater Alpine region, from January 2006 to December 2010. Ten parameters are tested, that are expected to have a critical influence on the representation of precipitation. It also includes a comparison to WRF with a similar setup.
The evaluation of high-resolution precipitation uses a set of meaningful skill scores derived from NWP, for daily and sub-daily scales. A set of high-quality, high-resolution gridded observational datasets has been used: the Wegener Net high-density high-frequency stations network located on the South-Eastern part of Austria (151 stations, 15 km * 20 km); INCA (hourly, 1km resolution) GPARD1 (daily, 1 km) for Austria, and EURO4M (daily, 4km) for the full Alpine chain. Challenges related to the evaluation at high resolution are also discussed, and a set of indices is proposed to characterize and evaluate precipitation with the Wegener Net stations network.
While the physics and micro-physics tuning experiments show robust representation of precipitation, the driving data plays a major role in the representation of precipitation. A dry bias in the low-land regions in summer and autumn exists both in CCLM and WRF, independently to the parameters tested in CCLM. The origin of this dry bias is also investigated.