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Evaluation of regional European re-analyses for precipitation in the Alpine region

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There are prospects and high expectations from regional re-analyses to provide multi-variate information on climate variables at high spatial resolution consistently over large domains. In EURO4M, a FP7 research project of the EU, several regional re-analyses, as well as downscaling procedures based on these re-analyses, are being developed for the European continent. The aim of the present study is to test these new re-analyses in a sub-region and for a climate variable that pose particular challenges, namely precipitation in the region of the European Alps. To this end, early results of the new re-analyses are compared against a gridded dataset of high-resolution rain-gauge observations that expands over the entire Alpine region (territory from seven countries). The exceptional station coverage (more than 5300 observations on average per day) feature this dataset as a suitable observation-only reference, yet uncertainties are present too and are taken into account during the interpretation of results.
The study examines precipitation output of the 20-km regional HIRLAM re-analysis (produced at SMHI), the 12-km reanalysis of the UK Met Office and the 5-km MESAN and MESCAN downscalings (conducted at SMHI and MeteoFrance respectively) relying on HIRLAM as a background. Results from ERA-interim (the driving global analysis) and other observational datasets (GPCC and E-OBS) are compared alongside to investigate the gain of higher resolution. Our evaluation encompasses a qualitative visual assessment for selected cases of heavy precipitation (including large-scale and convective events), a comparison of long-term aggregates (including common indicators of daily precipitation variations), and an assessment of interannual variations. Preliminary results attest the re-analyses capability for providing patterns of enhanced and more realistic spatial variations compared to global re-analyses. Yet during some seasons, biases can be substantial and spatial variance during convective episodes is generally underestimated.