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Regional Climate Models Downscaling in the Alpine Area with Multimodel SuperEnsemble

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The climatic scenarios show a strong signal of warming in the Alpine area already for the mid XXI century. The climate simulation, however, even when obtained with Regional Climate Models (RCMs), are affected by strong errors where compared with observations in the control period, due to their difficulties in representing the complex orography of the Alps and limitations in their physical parametrization.
In this work we use a selection of RCMs runs from the ENSEMBLES project, carefully chosen in order to maximise the variety of leading Global Climate Models and of the RCMs themselves, calculated on the SRES scenario A1B. The reference observation for the Greater Alpine Area are extracted from the European dataset E-OBS produced by the project ENSEMBLES with an available resolution of 25 km. For the study area of Piemonte daily temperature and precipitation observations (1957-present) were carefully gridded on a 14-km grid over Piemonte Region with an Optimal Interpolation technique.
We applied the Multimodel SuperEnsemble technique to temperature fields, reducing the high biases of RCMs temperature field compared to observations in the control period.
We propose also the first application to RCMs of a brand new probabilistic Multimodel SuperEnsemble Dressing technique to estimate precipitation fields, already applied successfully to weather forecast models, with careful description of precipitation Probability Density Functions conditioned to the model outputs. This technique reduces the strong precipitation overestimation by RCMs over the alpine chain and reproduces the monthly behaviour of observed precipitation in the control period far better than the direct model outputs.