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Comparison of bias correction methods for the RegCM4-ICTP daily precipitation simulation over the Great Alpine Region

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Global Circulation Models (GCMs) are tools of primary importance to obtain future climate projections under different anthropogenic forcing scenarios. However, the GCM coarse resolution (generally few hundred kilometres) it is not suitable to analyse the projections at regional scale (generally few tens kilometres). Usually the gap between the coarse resolution GCMs and the appropriate scale for regional climate studies is bridged by means of dynamical and/or statistical downscaling techniques.

The dynamical downscaling approach is based on high–resolution Regional Climate Models (RCM) — with typical resolutions of tens of kilometres— driven by GCMs within a limited domain. The RCMs explicitly solve mesoscale atmospheric processes and provide spatially coherent and, to a certain degree, physically consistent output. However, they have in general considerable biases and therefore often cannot directly be used as input for impact models but they must be corrected/calibrated.

In this work, of preliminary nature, we focus on precipitation, a key variable for many impact sectors (agriculture, hydrology, etc.) which has a large uncertainty in RCMs and we describe a simple strategy to develop high-resolution precipitation projections over the Great Alpine Region (GAR) combining dynamical downscaling and statistical methods. Specifically, we compare three different bias correction methods to refine the precipitation simulated by the RegCM4 model and we assess the strengths and limitations of this approach in terms of its robust applicability for climate change studies.