



## **1961-1990 high-resolution monthly precipitation climatologies for Italy**

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High-resolution monthly precipitation climatologies for Italy are presented. They are based on 1961-1990 monthly precipitation normals obtained from a quality-controlled observational dataset of about 6200 stations covering the whole Italian surface and part of the Northern neighbouring regions. The climatologies are computed by means of a weighted local linear regression of precipitation versus elevation: for each cell of a smoothed 30-arc second resolution grid the regression is performed considering the 15 stations with the highest weight. The station weights are expressed as the product of several weighting factors in the form of Gaussian functions in which the distances and the level of similarity between the station cells and the considered grid cell in terms of orographic features are taken into account. The performance of this approach is evaluated by comparing, with a leave-one-out approach, the precipitation normals computed for each station to the corresponding observed values in terms of mean error (BIAS), mean absolute error (MAE) and root mean square error (RMSE), both in absolute and relative form. In order to properly apply this procedure to the complex Italian domain, the coefficients regulating the decreasing of the weighting factors are locally optimised by an iterative method. At each point of a  $1^\circ \times 1^\circ$  resolution grid covering the whole study area, the normals of the stations in the range of 200 km are recursively computed and the optimal values of the coefficients are those which minimise the error estimators. Optimised coefficients are then estimated for the high-resolution grid interpolating by inverse distance weighting (IDW) the  $1^\circ \times 1^\circ$  grid results and they are used to produce the climatologies. This procedure allows to obtain lower errors than simpler approaches, such as IDW of the station normals: the MAE for reconstructed normals turns out to be about 8 mm corresponding to about 10% in relative terms.