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# Use of a random cascade approach for downscaling of GCMs projections of future precipitation

Bibiana Groppelli, Daniele Bocchiola, and Renzo Rosso

Dept. of Hydraulic, Environmental, Surveying and Road Structures Engineering, Politecnico di Milano, L. Da Vinci Square 32, 20133 Milano, Italy (bibiana.groppelli@polimi.it)

We present a Stochastic Space Random Cascade (SSRC) approach to downscale precipitation from a GCM for the purpose of water resources projection under climate change scenarios for a meso-scale Italian Alpine watersheds, Oglio river (1440 km2). The snow fed Oglio river displays complex physiography and statistical downscaling methods are required for hydrological projections, according to the Intergovernmental Panel on Climate Change (IPCC).
First, a back cast analysis is carried out to evaluate the most representative within a set of four available GCMs (R30, ECHAM4, NCAR_PCM, HADCM3). Monthly precipitation for the window 1990-2000 from 270 gauging stations (one every 25 km2) in Northern Italy is used and scores from objective indicators are calculated. The SSRC model is locally tuned upon Oglio river for spatial downscaling (approx. 2 km) of daily precipitation from NCAR_PCM, giving more accurate results for the area according to our preliminary findings. We use a 10 years (1990-1999) series of observed daily precipitation data from 25 rain gages. Scale Recursive Estimation coupled with Expectation Maximization algorithm is used for model estimation. Seasonal parameters of the multiplicative cascade are accommodated by statistical distributions conditioned upon climatic forcing, based on regression analysis. Main advantage of the SSRC is to reproduce spatial clustering, intermittency, self-similarity of precipitation fields and their spatial correlation structure, with relatively low computational burden. Downscaling of projected future precipitation scenarios (A2 scenario from NCAR_PCM) is carried out, necessary for water budget pending climate change, and some preliminary conclusions are drawn.