



Rainfall downscaling in mountainous regions

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The assessment of hydrological risk in small watersheds is strictly connected to the knowledge of precipitation fields at space-time resolutions compatible with hydrological modelling. This aim can be achieved coupling meteorological models and downscaling rain procedures.

Results reported in literature have shown the feasibility of homogeneous isotropic cascade models to reproduce the observed variability of oceanic space-time rain fields. However when precipitation occurs over mountainous regions this solution might not be appropriate. Indeed orographic barriers may have an influence on spatial rainfall distribution, whose effect has to be investigated and if necessary included in downscaling models.

The aim of this work is the development of rainfall downscaling procedures that can be applied in mountainous regions. The study was performed both on raw data retrieved by the high temporal resolution rain gage network of the Sardinian Hydrological Survey and on precipitation fields reconstructed on a regular spatial grid. The outcome of the analysis highlighted a spatial heterogeneity which was taken into account by means of a locally defined modulating function. The orographic constraints were thus introduced in a space-time homogeneous and isotropic downscaling model by means of the estimated modulating function. Systematic comparisons between observed and synthetic fields have shown a satisfying skill of the proposed methodology at reproducing rainfall variability also in case of a mountainous terrain.