Geophysical Research Abstracts
Vol. 13, EGU2011-8668, 2011
EGU General Assembly 2011

Stochastic rainfall scenarios for hydrological impact studies

Bruno Emanuela (1,2), Portoghese Ivan (1), Guyennon Nicolas (3), Iacobellis Vito (2), and Vurro Michele (1)

(1) National Research Council of Italy (CNR-IRSA), Water Research Institute, Bari, Italy (emanuela.bruno@ba.irsa.cnr.it), (2) Department of Water Engineering and Chemistry of Technical University of Bari (Italy), (3) National Research Council of Italy (CNR-IRSA), Water Research Institute, Brugherio (MI), Italy

A crucial issue in climate change impact assessment is in the accuracy of the atmospheric forcing derived from climate models. In particular for precipitation fields, despite the improvement of dynamical downscaling processes resulting in Regional Circulation Models (RCMs) the bias, well known for the global climate model, inevitably remains. Particularly, larger errors are found in daily precipitation statistics, such as wet-day frequency, precipitation intensity, and quantiles of the frequency distribution. The presence of a bias in downscaled precipitation may produce large bias in the assessment of hydrological processes under climate change condition, so that, RCM outputs need to be further post-processed before they can be used as forcing in impact models.
In this study, a bias analysis of a RCM is performed through a robust and meaningful representation of the precipitation process in terms of dry and wet periods and storm intensity. By exploiting the structure of a stochastic model of the point rainfall process, the RCM output is investigated and then re-scaled. A re-parameterization scheme is proposed to generate local rainfall scenarios. Historical daily time-series from a dense rain-gauge network of a semi-arid river basin (Southern Italy) are used for the RCM bias analysis and re-parameterization.
The result is a stochastic scheme that allows analysis of the rainfall intermittency features at daily scale assessing the capability of climate models to predict daily precipitation in terms of wet and dry alternations and storm intensity. This approach has also immediate application in the development of stochastic weather generators which are recognized as an effective operational tool to downscale climate model output in climate change impact studies.