Geophysical Research Abstracts, Vol. 8, 04049, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04049

Multi-scale responses of precipitation and temperature to global warming

D. Panagoulia (1), A. Bárdossy (2), G. Lourmas (1)

(1) National Technical University of Athens, School of Civil Engineering, Department of Water Resources-Hydraulic & Maritime Engineering, 5 Heroon Polytechniou, 15780 Athens, Greece, (2) Institute of Hydraulic Engineering, University of Stuttgart, Pfaffenwaldring 61, 70550, Stuttgart, Germany

Global warming might effect precipitation and temperature at different time scales, such as annual, seasonal, monthly, daily, and extremes. In order to cope with all these issues a multi-scale analysis of precipitation and temperature responses to global warming is attempted. Thus, a multivariate stochastic downscaling model is used to generate daily precipitation series based on atmospheric circulation. The daily temperature is modelled using an autoregressive approach conditioned on atmospheric circulation and local daily precipitation. The models use an automated objective classification of the daily 700 hPa anomalies daily based on optimized fuzzy rules. This kind of classification method provides circulation patterns (CPs) suitable for precipitation and temperature downscaling. The models are applied to the Mesochora mountainous catchment in Central Greece using observed precipitation and temperature, using NCEP reanalysis geopotential fields. GCM scenarios of the ECHAM4 model for $1xCO_2$and. $2xCO_2$ cases are used to make climate change predictions due to global warming by using classified GCM geopotential fields. The responses, averaged on nine elevation zones and entire catchment area, are generally characterized by increased future precipitation in scales of annual cycle, month, probability occurrence of daily amount and annual maximum. The responses of daily, mean monthly and maximum/minimum monthly temperatures of the future ($2xCO_2$ case) show a significant increase. Standard diagnostic tests, were applied to confirm the changes.