



Precipitation regime in Athens (Greece) in the past, recent and future climate

D. Founda, C. Giannakopoulos, F. Pierros, E. Kostopoulou, M. Petrakis, and C. Zerefos

National Observatory of Athens, Institute for Environmental Research and Sustainable Development, Palaia Penteli, Athens, Greece (founda@meteo.noa.gr)

Mediterranean area is a hotspot in future climate change as regards precipitation deficits and increased drought risk. Furthermore, reduced soil moisture inherent to water deficits is expected to increase temperature variability through the land surface- atmosphere coupling and thus result to more extreme hot weather.

Athens enjoys a Mediterranean climate with wet mild winters and hot dry summers and belongs to one of the most vulnerable to global warming zones of the Mediterranean basin. The precipitation regime in the area is examined in the context of past, more recent and future climate variability. The historical daily precipitation record of the National Observatory of Athens (NOA) has been selected for the analysis. The record extends back to the mid 19th century shedding light to the characteristics of the precipitation regime in the area during the past and more recent climate in terms not only of precipitation totals but also of precipitation intensity, rare events, number of precipitation days, drought periods, etc. This information is of great significance for the study of climate in the broader southeastern Europe, where long term (pre-1900) data are missing.

As regards annual precipitation totals, it is remarkable that the long-term climatic value (1860 till now), is equal to the corresponding value of the more recent climatic period (1961-1990), indicating no long term trend in annual precipitation totals (but with intermediate periods of positive and negative trends). However, seasonal analysis indicated a slight negative long-term trend in winter precipitation but a significant negative trend in the number of rainy days (daily rainfall amount > 0.1mm) especially after the 70's when a significant air temperature increase started in this area. An increase of the mean precipitation rate but also of the number of extreme precipitation episodes (> 30, 40, 50mm/day) is more evident after the 90's. In this study, we investigate whether similar changes in the precipitation characteristics occurred during a previous period of very abrupt warming at NOA (1910-1930). Future precipitation projections in the studied area were calculated using daily output from an ensemble of three regional climate models (RCM) for the eastern Mediterranean and the Balkan peninsula. These are the RACMO2, REMO and HadRM3 regional climate models developed at KNMI, MPI and Hadley Centre respectively within the framework of the EU ENSEMBLES project (www.ensembles-eu.org). Two 30-year future periods have been employed: 2021-2050 and 2071-2100, to identify changes in the precipitation regime that are likely to occur in the studied area. The control run represents the base period (1961-1990) and was used as reference for comparison with future projections. The comparison of the precipitation statistics derived from long term and more recent observations and future projections confirm the area's increased future risk in rainwater availability.