EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-387-1, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9TH EUROPEAN CONFERENCE ON Applications of Meteorology
High resolution meteorology
- applications and services

Moroccan precipitation in a regional climate change simulation, evaluating a statistical downscaling approach

F. Driouech (1), M. Déqué (2), and E. Sánchez-Gómez (3)

(1) Direction de la Météorologie Nationale/CNRM, Casablanca, Maroc (driouechfatima@yahoo.fr), (2) Météo-France/CNRM, CNRS/GAME, Toulouse, France (michel.déqué@meteo.fr, (3) Cerfacs/CNRS SUC URA1875, Toulouse, France (sanchez@cnrm.meteo.fr)

Morocco is located at the extreme north-west of Africa between 20 and 37° N. According to the aridity index of De Martonne classification, Moroccan climate varies from sub-humid in the north to arid in the south. The country has experienced several drought events which have had marked impacts on socio-economic sectors and national economy (1940-1945, 1980-1985, 1994-1995 . . .). During a dry year, the deficit of rainfall can exceed 60% of the climatological value.

Rainfall amounts registered show a negative trend at national and regional scales. The drought seems to become more persistent over time. At the same time, the total number of wet days shows a negative trend revealing an increase in the annual dry day number. Many regions became more arid (According to the aridity index of De Martonne) between 1961 and 2008: namely Oujda, Taza, Kenitra, Rabat, Meknès.

In order to evaluate climate change impacts on Moroccan winter precipitation, future climate conditions in Morocco under the SRES scenario A1B, are studied by using two 30-year time-slice simulations performed by the variable resolution configuration of the GCM ARPEGE-Climat. The spatial resolution ranges between 50 and 60 km over the country. This high resolution scenarios exhibit for the period 2021-2050 a change in the precipitation distribution and in extreme events. In particular, the precipitation amounts and the occurrence frequency of wet days will decrease in the scenario on all the fourteen stations considered. In terms of extreme events, the maximum dry spell length increases in nearly all the stations and the frequency of high precipitation events is projected to decrease. The evolution of highest percentiles of precipitation distribution does not go, however, in the same sense everywhere.

Assessment of a range of uncertainties due to climate modelling has been done by using present-day and SRES scenario A1B data issued from 10 ENSEMBLES-RCMs. This shows that ARPEGE-Climate results are in the range covered by these RCMs for all the climate indices considered.

In order to validate, in the case of Moroccan winter precipitation, a statistical downscaling approach that uses large scale fields to construct local scenarios of future climate change, the link between north Atlantic weather regimes and Moroccan local precipitation has been investigated, in terms of precipitation average, and the frequencies of occurrence of wet and intense precipitation days. The robustness of the statistical approach considered is evaluated using the outputs of ARPEGE-Climate and also those of the 10 ENSEMBLES-RCMs.