EMS Annual Meeting Abstracts
Vol. 13, EMS2016-489, 2016
16th EMS / 11th ECAC

High-resolution climate projections for the Barcelona Metropolitan Area

Vicent Altava-Ortiz (1,2), Antoni Barrera-Escoda (1), Jèssica Amaro (1), Jordi Cunillera (1), Marc Prohom (1), and Abdel Sairouni (1)

(1) Meteorological Service of Catalonia, Barcelona, Spain (valtava@meteo.cat), (2) Catalan Wildfire Prevention Service, Sta Perpètua de la Mogoda, Spain

High-resolution (1 km) climate projections for the period 2006-2100 have been developed in order to assess future climate change impacts for the Barcelona Metropolitan Area (AMB), a densely-populated conurbation located at the north-western Mediterranean basin. Future projections have been calculated using a statistical downscaling method applied to three global climate models (MPI-ESM, GFDL-ESM2G and CanESM2) from the last IPCC Assessment Report (IPCC-AR5), and forced by three RCP emission scenarios (RCP2.6, RCP4.5 and RCP8.5). The downscaling technique is based on the meteorological analogues concept which takes advantage of a high-resolution (1 km) temperature and precipitation database developed from a high-densely weather station network for the period 1970-2014. This technique improves the reproduction of the observed climate patterns in comparison of those obtained from dynamical downscaling methods applied in the study area at lower resolutions. The projected changes are almost linearly dependent with increasing CO_2 concentration, especially for temperature. Concretely, temperature projections point out a clear increase of its annual-mean values (1-4ºC respect to 1971-2000, during this century), but not homogeneously distributed within the year (seasonally, the highest warming is recorded in autumn and spring, while the lowest one is presented in winter and summer). The magnitude of change mainly depends on the distance from the sea, altitude and latitude. Temperature extremes such as tropical nights (minimum temperature >20ºC) or warm days (maximum temperature >30ºC) are expected to increase more than 30-40 days on average during this century. Precipitation projections show a great range of variability with a not so clear trend in annual-mean values. At seasonal scale, it is observed a general decrease for spring and summer, whereas winter and autumn do not present any projected trend. However, it is found a significant increase of high-precipitation events (>50 mm per day) and a decrease of low-precipitation days (<5 mm per day).