EMS Annual Meeting Abstracts
Vol. 8, EMS2011-631, 2011
11th EMS / 10th ECAM

Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Estimating the climate variables in the 21 century over the Danube middle and lower basin simulated by EGMAM

C. Mares (1), I. Mares (1), M. Mihailescu (2), H. Hübener (3), U. Cubasch (4), and P. Stanciu (1)

(1) National Institute of Hydrology and Water Management, Bucharest, Romania (constantin.mares@hidro.ro), (2) Agricultural University, Bucharest, Romania, (3) Hessian Centre on Climate Change, Wiesbaden, Germany , (4) Free University, Berlin, Germany

In this study we analyse changes in some climate variables simulated by EGMAM, variables which are good predictors for the Danube discharge in springtime, when extreme hydrological events are very important.
Climate variables are daily spring values of the pressure at sea level (30N - 65N, 0 - 40E) of precipitation and extreme temperatures from 10 stations located in the middle and lower Danube basin.
The EGMAM is achieved by Free University of Berlin and is a fully coupled AOGCM with middle atmosphere. The data simulated by model was achieved under ENSEMBLES project (SRES-A1B emission scenario) and was downloaded from the web-site: (http://cera-www.dkrz.de/CERA).
For the bias correction of the simulated data was considered the reference period 1958-1999, using observational data from ERA-40 for the pressure and ECA&D project for precipitation and temperatures. The simulation errors (bias) were calculated by 3 methods: the quantiles method using cumulative distribution functions, the method of differences in mean based on daily multiannual averages and a combined method. For the 21-st century two periods of 42 years were chosen: 2009-2050 and 2051- 2092. .
For the pressure field was tested the anthropogenic signal in the two intervals in the 21st century. Thus, after the AR modelling (both observational and simulated data) a Z test was applied to obtain the areas with significant anthropogenic signal. The nucleus center with significant anthropogenic signal is located in the northern Black Sea, and the signal is more intense and spread to Western Europe in the second half of the 21st century in comparison with the first half of the century. Therefore changes in the atmospheric indices (vorticity, pressure averages, North - South gradients and West - East gradients) selected as predictors for the Danube discharge are more significant for the 2051 - 2092 compared to the first interval.
For precipitation a downscaling procedure is achieved by means of a nonhomogeneous hidden Markov model (NHMM), with predictors of pressure field. The values simulated by NHMM were then fitted by GEV and GP distributions.
At the results obtained by this modelling is added the results obtained by computing the extreme climate indices (CEI) for the period 2000 - 2099 compared with 1900 -1999 period.
The results lead to the conclusion that in average a light increase of the extreme climate events occurrence in springtime is expected especially in the second part of the 21-st century in comparison with the 20-th century with some differentiation between the two Danube basins.