Geophysical Research Abstracts
Vol. 16, EGU2014-6390, 2014
EGU General Assembly 2014

Moisture variability in the Danube lower basin: an analysis based on the Palmer drought indices and the solar/geomagnetic activity influence

Ileana Mares (1), Venera Dobrica (1), Crisan Demetrescu (1), and Constantin Mares (2)

(1) Institute of Geodynamics, Romanian Academy, Bucharest, Romania (ileana_mares@geodin.ro), (2) National Institute of Hydrology and Water Management, Bucharest, Romania

For the Danube lower basin, 27 stations relatively evenly distributed in Romania, were considered. Based on average monthly temperatures, the total monthly rainfall and available water capacity (AWC), four indices Palmer PDSI, PHDI, WPLM, and ZIND, were calculated. The four indices Palmer have both common features and differences, but overall help us to analyze the variability of drought or excessive moisture for the area studied. Also, an index easier to estimate was calculated, which depends only on the temperatures and precipitation normalized (TPP).
The analyzes were performed separately for each season from a 61-year period (1931-1998).
For each of the four indices Palmer and for TPP index, decompositions in the empirical orthogonal functions (EOFs) were carried out. For a feature overview of the state of drought or excessive moisture we achieved decompositions in the multivariate EOFs (MEOF) of the four indices Palmer. In all analyzes we used only the first temporal component, namely the principal component (PC1).
Limits of variation of these indices, the change points which separating the dry periods and relatively wet periods and quasi-periodicities were highlighted for each season. We tested the influence of large-scale atmospheric circulation by means of pressure index, which we named Greenland Balkan Oscillation Index (GBOI), similar to the NAO index, but GBOI is more efficient for the studied area. The GBO index has a clear influence on the variation of drought indices in winter, especially for the overall index expressed by PC1-MEOF.
Regarding the influence of other extra atmospheric factors on the occurrence dry periods or excessively wet periods, this influence has been tested considering the Wolf numbers and Kp index.
From testing the influence of geomagnetic activity through the correlative analysis using Kp index, statistically significant results (95%) were obtained only for winter season for PC1-MEOF and PC1-TPP. Also, for winter, power spectra reveal quasi-periodicities of 7-8 years found in the PC1-TPP series also in the Kp.
Regarding solar activity, expressed by the Wolf numbers, its influence is significant only for the spring season, highlighted by a cycle of approximate of 11-year in the principal component (PC1) of the drought estimated by temperatures and precipitation (TPP) in Danube lower basin.
These preliminary results will be completed with new investigations for the entire Danube basin, considering longer time series and a discriminate analysis by taking into consideration the occurrence of the maxima and minima in the solar/ geomagnetic activity.