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An assessment of low flow and drought characteristics in the Barlad River catchment area

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The aim of this study is to assess and to analyze the seasonal and interannual variability of the low flow indices in the Barlad River catchment area. The low flows and droughts have an important role in the river flow regime because they are significantly connected with the basic water resources. This analyse might provide an efficient management of the resources during the hydrological extremes, as well as an assistance in prevention and risk management strategies. The study is based on the use of the software package LFSTAT that enables the standardized calculation of low flow statistics, in order to provide the low flow indices. The times series of daily discharges at the nine hydrometric stations situated in the Barlad River catchment area for the period 1970-2014 have been used for this analysis. Also, the calculation was made for a hydrological year beginning from December 1st to November 30th. A stream-flow deficit analysis was performed using the threshold level method, where the 70th percentile from the duration curve was used as the threshold level. Based on this analysis of the low flow and drought characteristics, an assessment of the stream-flow deficit in the Barlad River Basin was highlighted.

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Solar activity and its influence on the variations of the precipitable water vapor- case study of central Arabian Peninsula

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Water vapor is the most important greenhouse gas. It plays a major role in the dynamics of atmospheric circulation, radiation exchange within the atmosphere and climate variability. In this study, radiosonde data from 1985 to 2014 were used to examine the variaability of the precipitable water vapor (PWV) in central Saudi Arabia in the city of Riyadh (24^0 43 'N; 46^0 40'E, 764 m a. s. l.) over different time scales. The results revealed a clear seasonal cycle of PWV with a maximum during the summer months (June to August) and a minimum during the winter (December to February). This variation follows the mean monthly variation of air temperature. The PWV displays considerable variability at the inter-annual scale. We could not attribute the variations to the air temperature because no relationship was found between the two variables when the inter-annual variations were examined. Study of the annual variations of the PWV showed cyclic variations with a period of approximately 10 to 11 years. The two maximums and minimums were in 1996 and 2007 and 1989 and 2000, respectively. The results showed that the annual PWV values are anti-correlated with solar activity, represented by sunspot number, during solar cycles 22 and 23. The physical mechanism underlying this relationship remains unclear, in which future investigations are recommended.

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