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Dost Mohammad Kalim[1]
Mohammad Reza Pishvaei[2]
Peyman Mahmoudi[3]

Possible Sunspot Effects on the Precipitation Time Series in Southern Iran (Selected Stations)

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Abstract

In this study, the relationship between annual sunspot number (ASN) and annual precipitation totals (APT) has been investigated over the northern coasts of the Persian Gulf and Oman Sea using two statistical methods: cross-correlation function and contingency tables. Bushehr, Jask and Shiraz stations are alone stations in which long term annual precipitation records more than 100 years exist have in the south half of Iran. Precipitation records of these three stations were collected from three resources of Iran Meteorological Organization, Regional Water Organization of Fars Province and Smithsonian Miscellaneous Collections, respectively. The statistical gaps

1- Centre of Applied Meteorological Researches of Sistan and Baluchestan, Zahedan, Iran.
2- Department of Water Engineering, Faculty of Agriculture, Shiraz University.
3- Ph.D. Student of Climatology, Univ. of Sistan and Baluchistan.

were filled with suitable regression models. Daily international sunspot numbers in 1871-2005 periods were prepared from the National Geophysical Data Center.

Results indicate negative significant cross-correlation coefficients between 3-year lagged ASN and APT over two stations of Bushehr and Jask but nothing is found Whatsoever significant relationship for Shiraz station in none of lags. On the basis of this 3 year lags, for two stations of Jask and Bushehr have been constructed several contingency tables. The chi-square test was used to determine whether there was a dependency between observations. Also Kendal Tau-b coefficient can show the intensity of association between observations. Almost in all cases for Jask (Tau-b=-0.2 averagely), the Chi-square tests Were significant at the 5% level while there Were not a significant relationship for Shiraz and Bushehr but there Were minor cases in Bushehr (tau-b=-0.03 averagely).Inasmuch as a sunspot minimum has occurred in 2007 and 2008, therefore we Would expect that Oman Sea coasts precipitation during 2009-2011 Was higher than normal.

Keywords: Precipitation, Sunspot, Cross-correlation, Contingency tables, South of Iran.