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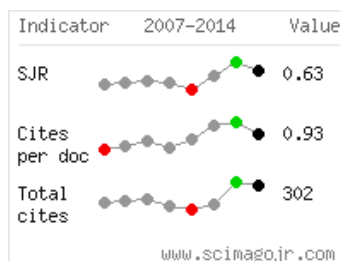
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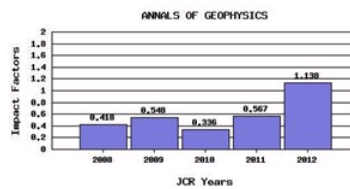
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Influence of Indian Ocean high pressure on streamflow variability over southwestern Australia 🇦🇺

Saqib Ur Rehman

Abstract

The seasonal and interannual variability of the southwestern Australia streamflow was examined based on re-analysis dataset from the National Centers for Environmental Prediction / National Center for Atmospheric Research, plus monthly streamflow data from 17 meteorological stations obtained from the Department of Water of the Australian Water Resource Council (1976-2008). Significant findings reveal that since the middle of the last century, the early winter (May-August) streamflow variability over southwestern Australia has been associated with variability in the intensity of the Indian Ocean high pressure (IOHP) system, as well as the zonal movement of the high pressure system across the Indian Ocean. Of note, however, the emphasis in the previous studies has linked the ongoing winter drought in western Australia to changes in sea level pressure, both on a local basis and over larger areas. We introduce objective indices for the area-weighted pressure of the IOHP, and the IOHP area-weighted latitude (IOHLT) and longitude (IOHLN) positions. When the IOHP is shifted to the east, there is less streamflow in the southwestern Australian rivers that are examined in this study. The situation is reversed when the IOHP is shifted to the west, when there is more streamflow in the southwestern Australian rivers. The characteristics of the streamflow pattern are determined for the river catchment areas located around the coastal region over southwestern Australia using principal component analysis. The first principal component taken into consideration describes 84.43% of the total variance. The multiple correlation between the loading of the first principal component scores of the streamflow and the IOHP and IOHLN is 0.54, while the correlation between the southern oscillation index is 0.44. Centers of action indices explain 29% of the streamflow variability, while the southern oscillation index explains only of the 19% streamflow variability. This discovery is of real importance for the definition of the physical mechanism of seasonal (May-August) streamflow variability of southwestern Australian and the IOHP.

Keywords

El Niño southern oscillation; Indian Ocean high pressure; Indian Ocean high longitude; Southern oscillation index

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