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The effect of large-scale circulation on precipitation and steamflow in the Gulf of California continental watershed

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The interannual variability of summer and winter rainfall and streamflow in the Gulf of California continental watershed is compared. Varimax-rotated empirical orthogonal function (EOF) analysis is applied to 15 streamflow series, in the period from 1960 to 1990, and two regions are defined: a central region and a southern region. Results show that in both regions, between 1944 and 1999, the long-term rainfall variability is well explained by the long-term streamflow variability in both seasons, the result being statistically significant at the 95% level. We conclude that regional streamflows in that period are climate driven. This conclusion is reinforced when we show that the large-scale circulation (700 hPa heights) explains: (i) wet and dry conditions in both regions; (ii) conditions of wet and dry years with the same signal of El Niño and La Niña events; and (iii) long-term periods in association with the Pacific decadal oscillation (PDO). When the PDO is in its warm phase, summers are likely to be dry with an El Niño event and wet with a La Niña event. In the cool phase of the PDO, summers are influenced by more localized events (i.e. the position of the subtropical continental ridge). In winter, warm and cool phases of the PDO are likely to be associated with wet and dry winters respectively.

Palabras clave: Specialist, interannual variability, EOF analysis, PDO, large-scale circulation, streamflow, precipitation

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