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Spatial and temporal patterns of remotesensed and field-measured rainfall in southern California

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ABSTRACT

Quantification of spatial and temporal patterns of rainfall is an important step toward developing regional hydrological models. However, traditionally used rain gauge data are sparse and do not always provide adequate spatial representation of rainfall. In this study, we evaluated remote-sensed atmospheric precipitation data as an alternative to rain gauge-measured data. We compared data from the watersheds of southern California during the period of 1996–2003, focusing on the comparison of patterns of spatial, seasonal, and interannual rainfall dynamics. We used Empirical Orthogonal Functions to discern the patterns of precipitation and atmospheric circulation at different time scales, from synoptic to interannual. The correlation between the daily rain gauge-measured and remote-sensed precipitation was poor, likely because satellite data are collected only once (or several times) a day. The resulting patterns are different than the temporal patterns of precipitation accumulated by rain gauges. We concluded that remote-sensed precipitation cannot be used to assess hydrological processes in arid zones like southern California and would not be a recommended surrogate for event-based hydrologic modeling. At the same time, the interannual variabilities of remote-sensed and gauge-measured precipitation were highly correlated and the regional patterns of gauge-measured and remote-sensed precipitation variability were similar. Therefore, remotely sensed precipitation data may be appropriate for use in long-term regional hydrologic or climate modeling. Both data sets showed that precipitation generally decreases from the northern to the southern watersheds. At interannual time-scale, the rainfall is related to the ENSO cycle. At synoptic time-scales, the rainfall patterns in southern California result from atmospheric moisture transport from the southsouthwest.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar19-nezlin_pg220-236.pdf