

Extreme low flow characteristics of Colorado River: A diagnostic study for an application to water resources management

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Abstract. Annual and seasonal low flow timing and magnitude is important to ensure meeting the conflicting needs of domestic, industrial and agricultural sectors while maintaining the minimum water flow levels to sustain the ecological demand, as recognized by the USGS and US-EPA. Low flow has received limited research attention primarily due to its complex linkage with multiple drivers including climatic and physiographic factors those are also harder to generalize and quantify. As a result it has been highly difficult to predict the low flows in a given river basin especially for those located in the arid region. On the other hand, for the sake of regional water management during driest times of a season or year, if we can identify the mechanisms linked with low flow dynamics in a given region, we'll be able to predict this important variable that helps improving the water management frameworks. In this study we take an attempt to first detect the synoptic and large-scale ocean-atmospheric drivers associated with low flow variation for the undisturbed stream gauges located in the upper Colorado River basin. We present both heterogeneity and homogeneity of those linkages and discuss their distinct characteristics. A detection study is also carried out to identify the monotonic and periodic trends of low flow indices to capture non-stationarity. Overall, this study has potential to contribute to an efficient water distribution decision support framework for the water managers as well as help reducing the cross boundary water conflicts that is a predominant and common problem during low river flows.