Potential predictability of a Colombian river flow

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In this study the predictability of an important Colombian river (Cauca) has been analysed based on the use of climatic variables as potential predictors. Cauca River is considered one of the most important rivers of Colombia because its basin supports important productive activities related with the agriculture, such as the production of coffee or sugar.

Potential relationships between the Cauca River seasonal streamflow anomalies and different climatic variables such as sea surface temperature (SST), precipitation (Pt), temperature over land (Tm) and soil water (Sw) have been analysed for the period 1949-2009. For this end, moving correlation analysis of 30 years have been carried out for lags from one to four seasons for the global SST, and from one to two seasons for South America Pt, Tm and Sw. Also, the stability of the significant correlations have been also studied, identifying the regions used as potential predictors of streamflow. Finally, in order to establish a prediction scheme based on the previous stable correlations, a Principal Component Analysis (PCA) applied on the potential predictor regions has been carried out in order to obtain a representative time series for each predictor field.

Significant and stable correlations between the seasonal streamflow and the tropical Pacific SST (El Niño region) are found for lags from one to four (one-year) season. Additionally, some regions in the Indian and Atlantic Oceans also show significant and stable correlations at different lags, highlighting the importance that exerts the Atlantic SST on the hydrology of Colombia. Also significant and stable correlations are found with the Pt, Tm and Sw for some regions over South America, at lags of one and two seasons. The prediction of Cauca seasonal streamflow based on this scheme shows an acceptable skill and represents a relative improvement compared with the predictability obtained using the teleconnection indices associated with El Niño.

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