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Assessing the Snow Advance Index as potential predictor of winter streamflow of the Iberian Peninsula Rivers

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This study examines the ability of the Eurasian snow cover increase during the previous October as potential predictor of winter streamflow in the Iberian Peninsula Rivers. The streamflow data base used has been provided by the Center for Studies and Experimentation of Public Works, CEDEX. Series from gauging stations and reservoirs with less than 10% of missing data (filled by regression with well correlated neighboring stations) have been considered. The homogeneity of these series has been evaluated through the Pettit test and degree of human alteration by the Common Area Index. The application of these criteria led to the selection of 382 streamflow time series homogeneously distributed over the Iberian Peninsula, covering the period 1975-2008. For this streamflow data, winter seasonal values were obtained by averaging the monthly values from January to March. The recently proposed Snow Advance Index (SAI) was employed to monitor the snow cover increase during previous October. The stability of the correlations was the criterion followed to establish if SAI could be considered as potential predictor of winter streamflow at each gauging station. Winter streamflow is predicted using a linear regression model. A leave-one-out cross validation approach was adopted to create calibration and validations subsets. The correlation coefficient (RHO), Root Mean Square Error Skill Score (RMSESS) and the Gerrity Skill Score (GSS) were used to evaluate the forecasting skill.
From the 382 stations evaluated, significant and stable correlations with SAI were found in 238 stations, covering most of the IP (except for the Cantabrian and Mediterranean slopes). Some forecasting skill was found in 223 of them, being this skill moderate (RHO>0.44, RMSESS>10%, GSS>0.2) in 141 of them, and particularly good (RHO>0.5, RMSESS>20%, GSS>0.4) in 23.
This study shows that the SAI of previous October is a reliable predictor of following winter streamflow for the Iberian Peninsula Rivers, providing useful information, which, in turn, helps in better management of water resources.

KEYWORDS
Snow Advance Index, streamflow, forecasting, Iberian Peninsula.

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