



Influence of the North Atlantic Oscillation on the streamflows of the Duero basin (Spain): Spatial variability and response times

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The response of streamflows to positive and negative phases of the North Atlantic Oscillation (NAO) on the Duero basin (Spain) was analyzed. The positive and negative phases of the winter NAO for the period 1961-2006 were identified, and the related anomalies of precipitation and river discharge were calculated. Both, the precipitation and river discharges anomalies showed significant differences between the positive and negative NAO phases with negative anomalies (dry conditions) during positive NAO periods, and positive anomalies (wet conditions) during negative NAO periods. Non-linearity was found in the response times of precipitation and river discharges to NAO episodes, with an immediate response for precipitation but a lag and more sustained response for river discharges. Differing patterns were also identified in the response of river discharge to the NAO throughout the Duero basin. The physical characteristics of watersheds (including area, altitude and permeability) explained most of the differences in the timing and magnitude of anomalies in river discharge in response to NAO. The findings highlight the great variability in the hydrological response of rivers to NAO episodes