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The interaction between the North Atlantic oscillation and river discharge across the pan-North Atlantic region

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The selection of a North Atlantic oscillation (NAO) index is often not approached with an entirely full qualification, and methods based on sea level pressure at two stations may not be the best way of understanding the NAO, its teleconnections and its impacts. The NAO may be linked to large scale variations in river flow across Europe, north Africa and eastern North America. However, the application of NAO indices to river flow has mainly focussed on local scale applications. Our paper investigates a variety of methods for formulating NAO indices and applies these indices to river discharge time series from both sides of the North Atlantic. Sea-level pressure measurements from gridded data points collated from 20°N-85°N, 90°W-90°E were processed using a variety of methods. Initial data handling issues were addressed including gridded data latitude/longitude bias, interpolation of missing values, and data period length. Secondly, different principal component analysis techniques involving correlation and covariance matrices, and rotation methods were applied to a range of spatial and temporal data groupings. These indices were then correlated to different river discharge measurements. Our results highlight the spatial and temporal complexity of the linkages between the NAO and river discharge.