



## **Low frequency properties of North Atlantic Oscillation station-based indices**

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The North Atlantic oscillation (NAO) is one of the most important teleconnection patterns in the Northern Hemisphere.

A winter NAO index based on standardised sea level pressure differences from December to March between Iceland and Lisbon is commonly used to describe NAO temporal evolution. A longer index is available by selecting Gibraltar as the southern station. Although exhibiting interannual and decadal variability, NAO indices are statistically rather featureless and therefore constitute a possible realisation of many different stochastic processes. Different models such as stationary red noise or long range dependent fractionally integrated noise have been proposed for winter Lisbon index. Characterisation of NAO temporal structure is important to understand the physical processes responsible for the observed variability, in particular whether NAO trend is stochastic or due to deterministic influences such as ocean dynamics.

In this study Lisbon and Gibraltar NAO indices are analysed using the discrete wavelet transform (DWT). A scale-by-scale description of the indices temporal evolution is obtained through a wavelet-based multiresolution analysis. The wavelet spectrum is found to exhibit, for the two indices, a linear pattern and is used to identify and estimate long range dependence. The analysis shows that the low frequency behaviour of winter NAO index depends on the selected southern station. Lisbon winter index is best described by a long range dependent process with a small but significantly different from zero long memory parameter, while Gibraltar index is adequately described by a red noise stationary process.