

# Spectral and wavelet analysis of the Atlantic North Circulation: a case study

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## Abstract

Wavelet analysis has been used for numerous studies with atmospheric data and is becoming a common tool for analysing one-dimensional time series, as it is useful in determining the dominant modes within a time series, especially in studying the displacement characteristics of a moving oscillating structure. This property allows the analysis of its temporal evolution and the detection of short duration events, even in large time series.

Due to the significant influence of the North Atlantic ridge (usually associated to the Azores high) in Iberian Peninsula winter climate, a better understanding of the physical mechanisms that contribute to its development and maintenance is highly relevant. Aiming to isolate common periodicities, three target areas were initially chosen to this case study (two over North America at both tropospheric and stratospheric levels and one over the North Atlantic at tropospheric levels). These areas were chosen taking into account previous results, where some dynamical precursors of strong and persistent North Atlantic ridges were already identified at specific locations over North America and the North Atlantic. The analyses is focused in daily mean atmospheric fields at different isobaric levels and for selected winters, with highly contrasting dynamical conditions over the North Atlantic. Therefore, two different approaches are undertaken. Firstly, a power spectral analysis allows a preliminary insight in order to identify common significant oscillations, which might be considered a manifestation of a dynamical connection at the different target areas. Secondly, a wavelet analysis significantly enhances this case study.

## Keywords

North Atlantic ridge, Wavelet analysis, Power spectral analysis.

## References

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