



In-depth characterization of the interannual changes in the renewable energy resources of the Iberian Peninsula associated to variations in the NAO mode

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The Iberian Peninsula has been classified as a major climate change 'hot-spot', which strongly claims for adaptative and mitigation strategies. On the other hand, both Iberian countries are strongly dependent on vast amounts of imported energy (oil, gas and coal) to fulfill their energetic demand. Thus there is a financial but also an environmental need to replace these costly and pollutant sources by a more sustainable use of their own renewable resources. Hence, large investments have been allocated to promote the construction of renewable energy power plants, particularly hydroelectric power plants, wind farms and solar plants.

The success of these projects requires a thorough evaluation of the resources. However, it is commonly based on in-field measurements containing only a few years of data and leaving out many areas. This hampers the correct assessment of the natural climate variability of the resources. In order to overcome this limitation, we use a high-resolution climate simulation to perform an in-depth characterization of the interannual variability of the wind, hydroelectric and solar resources in Iberia focusing on the influence of the North Atlantic Oscillation (NAO), as this mode accounts for the largest amount of the climate variability in Iberia.

The results, confirmed by real production data, reveal the main role of the NAO on determining wind speed and direction, precipitation and solar radiation in Iberia, and the marked spatial and monthly dependence of the NAO-impacts. The largest signals appear over western, central and southern areas, being more prominent in the late winter months. In general, negative NAO phases enhance the wind (about 10-20% at the near-surface level and up to 60% at 100-m altitude) and precipitation (over 100%) resources, while diminishes the solar resource (10-20%). These findings should help to improve the predictability and long-term planification of the resources.