MedCLIVAR: Mediterranean Climate Variability Relationship between North Atlantic atmospheric circulation and surface wind and wind power in the northeast of the Iberian Peninsula: uncertainty and long term downscaled variability

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This analysis aims at exploring the coupled variability between the regional surface wind field and wind power production in the northeast of the Iberian Peninsula and the large scale circulation over the North Atlantic. The approach followed herein implies the application of a statistical downscaling technique (Canonical Correlation Analysis) to wind/wind power series (predictands) and predictors taken from available large scale circulation fields. It is shown that the variability of both, the wind field and the wind power production, a non-atmospheric variable, are to a great extent driven by changes in the large scale atmospheric circulation, modulated by the effect of the orography within the region. The methodological uncertainty associated to wind and wind power estimates is evaluated as a part of the cascade of uncertainty that affects the estimation of a climatic variable at the regional scale. Such evaluation is explored from the classical (frequentist) perspective and complemented by a probabilistic approach based on Bayesian notions. In a first step the robustness of the method is explored and subsequently, the specific skill of the different parameters of the model set up is evaluated by applying a Bayesian method, in the attempt of further constraining the uncertainty associated with the wind field estimates. The long term variability is explored by extending wind and wind power estimates, together with the corresponding uncertainties, several centuries backward. This will serve, in addition to the detection of periods with anomalous high/low winds and potential long-term tendencies, to illustrate the importance of interpreting with care estimations based on single model configurations.