



## **Wind and wind power predictability at monthly timescales based on their relation with the North Atlantic circulation**

**E. García-Bustamante** (1,2), J.F. González-Rouco (2), P.A. Jiménez (1,2), J. Navarro (1) and J.P. Montávez (3)

(1) Departamento de Energías Renovables. CIEMAT, (2) Departamento de Astrofísica y CC. de la Atmósfera. Universidad Complutense de Madrid, (3) Departamento de Física. Universidad de Murcia.

The evaluation of the surface wind variability involves many interesting aspects from the meteorological and climatological point of view which are worth to be analyzed. Additionally, estimations of possible changes of wind variability at the regional scale entail relevant economic and ecological implications for society, as for instance, the assessment of variations and sustainability in wind energy resources.

In this work the potential predictability of the wind speed and wind energy is evaluated by means of their relationship with the atmospheric circulation over the North Atlantic area. For this aim wind speed and wind power production data from the region of Navarra, Northeast of the Iberian Peninsula, are employed. Wind speed observations span a 14 years period, from 1992 to 2005, and power production values are collected from several wind farms for the years comprised from 1999 to 2003.

This work explores the predictability of the wind speed at monthly timescales and provides an estimation of wind energy variability in the region. The methodology applied involved the use of the Canonical Correlation Analysis and analog approaches in which synoptic fields over the North Atlantic area act as predictors and the observed wind velocity and wind power data as local predictands. The uncertainties involved in the use of both methodological approaches are explored. Results evidence the existence of predictability, not only for the wind speed but also for the wind power

production field in spite of being the latter a non-climatological variable. The results achieved in the estimation of predictability of both variables allow for a reconstruction of the wind speed and wind energy fields within the last century using reanalysis and observational data sources for the region under study. This evaluation of their past and present variability and predictability could have relevant applications in the study of their regional variability over the 21th century and also in the context of climate change scenario simulations.