*Forecasting the weather
- ensemble techniques
in probabilistic weather prediction*

Quality assurance of surface wind observations for eastern Canada

E. E. Lucio-Eceiza (1), J. F. González-Rouco (1), J. Navarro (2), H. Beltrami (3), P. A. Jiménez (1,2), E. García-Bustamante (4), and A. Hidalgo (5)

(1) Universidad Complutense de Madrid, Astrofísica y Ciencias de la Atmósfera, Spain (eelucio@fis.ucm.es), (2) Dpto. Energías Renovables. CIEMAT. Madrid, Spain, (3) Department of Earth Sciences, St. Francis Xavier University, Antigonish, Nova Scotia, Canada, (4) Universität Giessen, Department of Geography, Germany, (5) GLOBAL Forecasters, S.L., Madrid, Spain

In recent years, there has been an increasing demand in high-quality wind observations for a wide range of applications (wind energy resources evaluation, pollutants transport and dispersion, insurance companies assessments...). Those observations are subjected to different types of measurement errors that can be roughly classified into three groups: random, systematic and rough errors. Random errors are unavoidable and inherent to the very nature of the measurements as instrumental responses to various physical phenomena. Systematic errors are produced by instrumental scale shifts and drifts or by some more or less persistent factor that is not taken into account (changes in the sensor, recalibrations or location displacements) . Rough errors are associated with sensor malfunction or errors arising during data processing, transmission, reception or storage. It is essential to develop procedures that allow to identify, and correct if possible, the errors of the observations, in order to improve the quality of the data sets and reach solid conclusions in the studies.

This work involves the quality assurance process of wind speed and direction recorded over a wide area over eastern Canada (including the provinces of Quebec, Prince Edward Island, New Brunswick, Nova Scotia, and Newfoundland and Labrador), a subset of the adjacent maritime areas and a set of the north-eastern U.S. (Maine, New Hampshire, Massachusetts, New York and Vermont). The data set consists of 539 stations, it spans the period 1940-2009 and has been compiled from three different sources: a set of 345 land sites obtained from Environment Canada (1940-2009), a subset of 40 buoys distributed over the East Coast and the Canadian Great Lakes (1988-2008) provided by the Department of Fisheries and Oceans, and a subset of 154 land sites combining both eastern Canada and North east of the U.S. provided by the National Center of Atmospheric Research (1975-2007).

The data have been compiled and subsequently a set of quality assurance techniques have been applied to explore the detection and potential suppression of errors within measurements. These techniques involve, among others, detection of manipulation errors, limit checks to avoid unrealistic records and temporal consistency checks to suppress abnormally low/high variations. There are other issues specifically related to the heterogeneous nature of this data set such as unit-conversion or changes in recording times.

Ensuring the quality of wind observations is essential for the later analysis that will focus in exploring the wind field behaviour at the regional scale, with a special interest over the area of Nova Scotia. The wind behaviour will be examined attending to the specific features of the regional topography and to the influence of changes in the large scale atmospheric circulation. Subsequent steps will involve a simulation of the wind field with high spatial resolution using a mesoscale model (WRF) and its validation with the observational data set presented herein.