Geophysical Research Abstracts
Vol. 19, EGU2017-17240, 2017
EGU General Assembly 2017

Reanalysis Intercomparison on a Surface Wind Statistical Downscaling Exercise over Northeastern North America.

Etor E. Lucio-Eceiza (1), J. Fidel González-Rouco (1), Jorge Navarro (2), Elena García-Bustamante (2), Hugo Beltrami (3), and Cristina Rojas-Labanda (1)

(1) Dpto. Astrofísica y Ciencias de la Atmósfera,Instituto de Geociencias (UCM-CSIC), Universidad Complutense de Madrid. Spain (eelucio@fis.ucm.es), (2) Dpto. Energías Renovables. CIEMAT. Madrid, Spain, (3) Climate & Atmospheric Sciences Institute, St. Francis Xavier University. Antigonish, Nova Scotia. Canada

The area of North Eastern North America is located in a privileged position for the study of the wind behaviour as it lies within the track of many of the extratropical cyclones that travel that half of the continent. During the winter season the cyclonic activity and wind intensity are higher in the region, offering a great opportunity to analyse the relationships of the surface wind field with various large-scale configurations.

The analysis of the wind behaviour is conducted via a statistical downscaling method based on Canonical Correlation Analysis (CCA). This methodology exploits the relationships among the main modes of circulation over the North Atlantic and Pacific Sectors and the behaviour of an observational surface wind database. For this exercise, various predictor variables have been selected (surface wind, SLP, geopotential height at 850 and 500 hPa, and thermal thickness between these two levels), obtained by all the global reanalysis products available to date. Our predictand field consists of an observational surface wind dataset with 525 sites distributed over North Eastern North America that span over a period of about 60 years (1953-2010). These data have been previously subjected to an exhaustive quality control process.

A sensitivity analysis of the methodology to different parameter configurations has been carried out, such as reanalysis product, window size, predictor variables, number of retained EOF and CCA modes, and cross-validation subset (to test the robustness of the method). An evaluation of the predictive skill of the wind estimations has also been conducted. Overall, the methodology offers a good representation of the wind variability, which is very consistent between all the reanalysis products. The wind directly obtained from the reanalyses offer a better temporal correlation but a larger range, and in many cases, worst representation of the local variability.

The long observational period has also permitted the study of intra to multidecadal variability as the statistical relationship obtained by this method also allows for the reconstruction of the regional wind behaviour back to the mid 19th century. For this task we have used two 20th century reanalysis products as well as two additional instrumental sea level pressure datasets.