



## Surface Wind Observational Database in North Eastern North America: Quality Control Procedure and Climatological Variability

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This work summarizes the design and application of a Quality Control (QC) procedure for an observational surface wind database located in North Eastern North America. It also presents some insights of the long-term climatological variability over the region.

The database consists of 527 sites (487 land stations and 40 buoys) with varying resolutions of hourly, 3 hourly and 6 hourly data, compiled from three different source institutions. The records span from 1940 to 2010 and cover an approximate spatial extension of  $2.2 \times 10^6$  km<sup>2</sup>. The QC process is composed of different phases focused either on problems related with the providing source institutions or measurement errors. Due to the size of the data set, a great effort has been made on the automation of the procedures. A number of problems are associated with data management and data conventions: unification of measurement units and recording times due to the variety of institutional sources; detection of erroneous data sequence duplications within a station or among different ones; and detection of errors related with physically unrealistic data measurements. From the other hand there is a variety of treated instrumental errors: problems related with low variability, placing particular emphasis on the detection of unrealistic low wind speed records with the help of regional references; high variability related erroneous records; wind speed biases on week to monthly timescales and homogenization of wind direction records. As a result, around 1.7% of wind speed records and 0.4% of wind direction records have been deleted, making a combined total of 1.9% of removed records. Around 2.4% of wind direction data have been also corrected.

The already quality controlled database allows for subsequent climatological analyses. The intra and inter decadal variability of the monthly surface wind field in such a vast and orographically complex region as the North Eastern North America is explored. Several decades of quality observations allow for the calibration of a statistical down-scaling method based on Canonical Correlation Analysis. The method relates the main large-scale atmospheric circulation modes over the North Atlantic with the regional wind field. The relations are centered over the extended seasons of summer and winter. These seasons present interesting distinct dynamical features such as the frequent passage of tropical storms and hurricanes during summer and strong mid-latitude winter storms.