



Multidecadal to Centennial Surface Wind Variability Over Northeastern North America Via Statistical Downscaling: Seasonal Characterization and Methodological Uncertainty

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The region located in North Eastern North America lies within the track of many of the extratropical cyclones that travel that half of the continent. This region offers a privileged position to analyse the relationships between various seasonal large-scale configurations and their effect on the regional surface wind. The present work will be centred on the analysis of the variability at different time scales during two extended seasons, with differentiated circulation patterns and associated winds: winter (NDJFM) and summer (JJASO).

The analysis of the variability is conducted via a statistical downscaling method based on Empirical Orthogonal Functions (EOF) and Canonical Correlation Analysis (CCA). These methodologies exploit the relationships among the main modes of circulation over the North Atlantic and Pacific Sectors and the behaviour of an observational surface wind database. The statistical technique has been implemented with predictor variables (mean sea level pressure, geopotential height at different levels and thermal thickness) provided by all 10 the reanalysis products at global scale available to date. The observational dataset consists of a set of 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, height standardization and wind direction homogenization. A reanalysis intercomparison process has been carried out to analyse the goodness of their representativity both in local and regional scale. The sensitivity of the downscaling methodology to the selection of a systematic sampling of model parameter values has also been explored. Finally, the long observational period has permitted the study of intra to multidecadal variability.

The statistical relationship obtained by this method also allows for the reconstruction of the regional wind behaviour back to the mid 19th century through various 20th century reanalysis and instrumental sea level pressure datasets.