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Surface Wind Speed Patterns from Synoptic Pressure Series employing different soft-computing algorithms

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Two methods for establishing a daily wind-characterizing surface flux classification are introduced and compared in this work. They are based on several geostrophic flow indexes and have been derived from a NCEP/NCAR reanalysis of Mean Sea Level Pressure data (MSLP). In the task of parametrization and design of wind pattern classifiers, several soft-computing tools were developed: an evolutionary algorithm and a greedy-based technique were chosen to tackle the geostrophic flow vs. real wind approaching issue. Both algorithms work by optimizing the borders between clusters in the velocity space of the geostrophic flow (training experiment). Then the cluster configuration is assessed by linking the synoptic geostrophic wind signal with the corresponding real wind data (testing experiment) obtained from measurement towers at six wind farms located in Spain. The results obtained through these approaches were compared with those obtained by a widely reviewed, daily circulation weather types (WT) method, outperforming the later in all the instances considered. The main application of the proposed techniques is the accurate reconstruction of observational wind speed data series, which represents an interesting problem to consider at wind farms specially in periods without wind measurements available.