



## Probabilistic Predictions in Complex Terrain with an Analog Ensemble

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The Analog Ensemble is a technique to generate probabilistic forecasts by searching similar past numerical weather predictions (i.e. analogs) across several variables (i.e. predictors) to the current prediction. The measurements corresponding to the best analogs form the analog ensemble (AnEn) with which the probability distribution of the future state of the atmosphere can be estimated. This study explores the application of AnEn for probabilistic short- or medium-range forecasts in complex terrain over Croatia.

The AnEn is generated with the Aire Limitée Adaptation dynamique Développement InterNational model (ALADIN) run over two nested domains with 8 and 2 km horizontal resolution, respectively. It is tested at several climatologically different locations across Croatia for point-based wind speed predictions at 10 m and 80 m height. Results are verified and compared to the ALADIN model to address the following question: how does AnEn performs at locations in complex terrain over Croatia? The analysis focuses on a group of stations with potentially hazardous weather such as bora wind.

The verification procedure includes several metrics (e.g., Brier skill score, ROC skill score, reliability and dispersion diagrams) to optimize the AnEn configuration and to test the probabilistic prediction performances. Several predictors and the optimal number of AnEn members are examined. Skill of AnEn predictions are compared with forecasts generated via logistic regression (LR). This study shows that the AnEn adapts well to different terrain and height. It provides accurate predictions while reliably quantifying their uncertainty and showing satisfactory spread. The AnEn performance is equal or superior than LR, especially for group of stations that are climatologically prone to strong winds. These results encourage the use of AnEn in an operational environment at meteorological station locations, as well as at wind farms.