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Improved gridded wind forecasts with statistical post-processing of numerical models with functional and/or block regressions

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Numerical weather forecasts' errors are routinely improved through statistical post-processing by several national weather services. These statistical post-processing methods build a regression function called model output statistics (MOS) between observations and forecasts based on an archive of past forecasts and corresponding observations. Since observations are usually available only for meteorological stations, the improved forecasts are generally available only at the locatiosn of those meterological stations. This may prove insufficient for forecasters or forecast users, who increasingly ask gridded improved forecasts.

We present our work in building improved forecasts on the grid of a model for wind in the boundary layer. First we introduce our method to build a new analysis of wind measurements which is used as gridded pseudo-observations. We show how this new analysis performs better than existing ones. Then we build and compare several regression methods based on scalar or functional statistics. In order to reduce the computational burden and improve the quality of the regression each regression function is built by pooling together data from small geographical domains. We study the impact of the domain size on the quality of the final forecast. The performance of the best improved forecast is studied.