



Statistical Corrections of HIRLAM and HARMONIE Forecasts for Greenland

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Numerical Weather Prediction (NWP) for northern regions, and especially, in the Arctic is very complex due to multiple factors. Complexity of physical processes and interactions is not so well studied compared to other geographical regions and first of all, because of limited observational network. Model verification results show that forecasts have larger errors compared to other regions of the world. As a possible solution, statistical corrections to forecasts can be applied. Such corrections can be based on analysis of long-term time-series of meteorological observations and forecasts. The developed method is based on using forecasted meteorological parameters (2m air, dew point, and surface temperatures as well as 10m wind speed) and observations covering only a pre-historical period (ranging from 3 to 30 days). The singular value decomposition method is applied for faster calculations. Then, further improvement/adjustment of forecasts is based on generated statistics of forecasted meteorological parameters.

For Greenland, DMI operationally runs two NWP models - HIRLAM (High Resolution Limited Area Model) and HARMONIE (Hirlam Aladin Regional/Meso-scale Operational NWP In Europe). The 1st model (HIRLAM-K05, at 5 km horizontal resolution; runs at 00, 06, 12, and 18 UTC) is run over the entire territory of Greenland. The 2nd model (HARMONIE-GLB, at 2.5 km horizontal resolution; runs at 03, 09, 15, and 21 UTC) is run over the southern (most populated) part of Greenland. The operationalized procedure for statistical correction of the air temperature and wind speed forecasts has been implemented for both models outputs covering forecast lengths up to 48 hours.

The procedure includes extraction of observational and model forecast data, assigning data to forecast lengths, calculation of statistical correction to selected meteorological parameters, evaluation of model performance (before vs. after correction applied) for current and previous days with decision-making on using corrections by each of synoptical stations, interpolation, visualisation of corrections and final fields, and storage/backup.

Results of verifications for Greenland synoptical stations for both (HIRLAM and HARMONIE) models outputs are presented and evaluated, as well as steps based on application of non-parametric statistics towards correction of cloud cover, wind direction and precipitation for NWP operational forecasts are discussed.