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High Resolution MOS Forecasts Based on a Low Resolution Model

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MOS (Model Output Statistics) reduces approximately 50% of the error variance of the Direct Model Output forecasts of a numerical model - no matter whether high or low resolution - for standard weather elements like temperatures, wind and cloud cover.

However, MOS forecasts are usually only provided at the very places where the observation locations are situated.

In the presentation, a technology will be outlined which allows MOS forecasts for any location between the observation locations.

Meteo Service has introduced a technology which relies on the interpolation of MOS coefficients (not MOS forecasts).

This technology based on orographic descriptors has already been in use with the German National Weather Service (DWD) since 1996.

These orographic descriptors refer to latitude, longitude, elevation and the difference between the elevation of the smoothed model orography, and the real elevation.

This difference is used in order to distinguish between mountain and valley. In addition, an attribute such as land, sea, coast and mountain summits has been used as binary orographic descriptor.

Nowadays high resolution grid information is available, and more complex orographic descriptors can be used. NOAA/NGDC orographic data is available in a resolution of approximately 0,5 x 0,5 km and allows for the definition of the following orographic descriptors with different spatial smoothing:

- elevation
- slope (= first derivative of elevation)
- valley/hill (= second derivative of elevation).

A difference between the weighted orographic desriptors is used to define the representativeness between interpolation points and observation locations. This representativeness is the norm of a multi-dimensional vector with the number of dimensions being equal to the number of orographic descriptors.

A procedure to search for the most informative set of representative

observation locations for a given interpolation point is applied.

Finally interpolation weights are calculated for the selected observation locations.

Results of the application of the concept of coefficient interpolation outlined above are presented using MOS forecasts for homogeneous, alpine and coastal orography.

The results are convincing in particular, in areas where there is sufficient density of observation locations. Problems remain in areas with lower density of observation locations and complex orography.

Interpolated Direct Model Output in the last resort is to be used in order to achieve complete fields of high resolution MOS forecasts based on a low resolution model.