



Using Model Output Statistics for Aerodrome Weather Forecasts

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The AutoTAF system at the Deutscher Wetterdienst (DWD) based on Model Output Statistics (MOS) is in operational use for many years and provides both automated forecast guidance and TAF's (Terminal Aerodrome Forecast) for airports worldwide. Forecasters at the DWD use this system for TAF creation on a regular basis.

The MOS method gives a statistical interpretation of the global model IFS (ECMWF) forecasts at single weather stations. The model forecasts are the independent variables (predictors) and the target quantity is the weather element that is observed and to be forecasted by the MOS (predictand). Also many probabilistic predictands are derived. The technique is based on multiple linear regressions. The best predictors from a pre-defined pool are selected using a screening method and they fit a regression equation by minimizing the forecast error (RMSE).

One of the characteristics of the MOS approach is the use of a wide variety of model variables as predictors which are not observed. In addition the surface observations themselves serve as useful predictors.

The DWD MOS system minimizes the systematic model errors of 00z and 12z IFS runs and gives final forecast by generating a two-member lagged average forecast ensemble (LAF). The member weighting is also based on MOS. The performance depends on preparation of the predictands and predictors besides the model quality. Many new predictors are derived empirically as a combination of available model predictors. This concerns e.g. thunderstorm indices and fog predictors by using diverse non-linear transformations.

An important feature of the DWD system is the use of advection predictors which account for the influence of upstream observations. These can be both observations of nearby stations and remote sensing (precipitation radar, lightning detection) that take effect on short-term forecasts up to several hours.

On the basis of the MOS forecasts a TAF encoding algorithm is added (AutoTAF). The encoding is done according to ICAO/WMO regulations and it operates in consideration of the two conditions:

The loss of information due to the encoding should be minimized and the TAF code must be as short as possible with respect to 9, 24, and 30 hour TAF's.

The MOS guidance and the AutoTAF are designated to serve as a common forecasting system within the MET Alliance that cooperates on further improvement and rationalization of the European meteorological services for aviation. Some results of the MET Alliance TAF verification project are available and will be shown.