Humidity forecast with Multimodel Superensemble and Heat Index

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Abstract

This thesis aims to find an alternative method to forecast the Relative Humidity (RH) through the use of the Multimodel Superensemble. The Multimodel uses five meteorological models as inputs; one of them is a global scale or Global Circulation Model (ECMWF_IFS) and the other four ones are Local Area Models (COSMO_7, COSMO_I7, COSMO_EU, COSMO_I2). It controls the reliability of them on a training period of 145 days in the past and then it develops the forecast. Currently, the relative humidity is a variable that is not modified during the run of the Multimodel, it is equal to itself going from input models to the output of the Multimodel. The goal of this research is to reduce the high RMSE (Root Mean Square Error) of the RH forecast (around 14%) by using two alternative methods: the first one which makes use of the absolute humidity, calculated by the temperature and by RH; the second one which uses the dew point temperature, calculated by the same input variables temperature and RH.

The calculation of these supporting variables occurs before the processing of the forecast made by the Multimodel, and knowing the high stability of it in performing and mixing the inputs, it is expected a reduction in the RMSE in the output of RH.

The two new proven methods have also been applied in the forecast of the Heat Index and the Fog Index; in the first case we had the RMSE reduced of 3.5% (72 h forecast), while in the second case we had marginal and not significant improvements. In the case of the Fog Index, we had the statistic updated and the empirical algorithm calculation strengthened, giving stability and greater reliability to the forecast.