Postprocess activities related to precipitation forecast at the National Institute of Meteorology of Spain

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The objective of this work is to show some of the main postprocess activities carried out at the INM, related to predictions of precipitation and snow/rain limit, describing the forecast techniques used and showing the most relevant results of their verifications.

Maybe the "star" product of the postprocess at INM is the precipitation forecast. It is based on an analogical methodology, commonly called the analogs, or, in a more formal way, the Precipitation Analogical Forecast System. This technique has been working with success at INM since 1999. The products are generated automatically, without any forecaster intervention.

The Precipitation Analogical Forecast System is based on the more or less evident fact that similar meteorological configurations bring about also similar phenomena - amounts of precipitation-. This is a probabilistic procedure. In our case it obtains the probability of precipitation higher than some established thresholds. The thresholds are 0, 2, 5, 10 and 20 mm. For a given forecasted synoptic situation, the application searches, in an historical dataset of the ECMWF (European Centre Medium Range Weather Forecast) reanalysis fields, the 30 meteorological situations more similar to the one forecasted, and the corresponding precipitations observed those days are used for obtaining the predicted probabilities. The meteorological fields used in the search of the analogous situations are the 500 and 1000 hPa geopotentials fields and the relative humidity at the 925, 850 and 700 hPa levels. The geopotentials are not directly compared, but through the u and v components of the geostrophic wind, so that it can be considered not only point by point values of the geopotential, but its spatial

distribution as a field.

This analogical methodology was primarily built to be applied to the ECMWF deterministic model. Nevertheless when this technique is applied to all members of the EPS (Ensemble Prediction System) the verification results are better than that obtained when only the deterministic model is used, even since the first day of the prediction range.

One of the inconvenient of this analogical method is, since it used observational data from precipitation stations with only one daily observation, it only supplies predictions for the period 07-07 UTC in a whole. The ratio between the probability obtained by the analogical method and that obtained directly from the ECMWF EPS for the 07-07 UTC period can be represent an effective tool to adjust, in a proportional way, the direct outputs from the EPS for other periods: 0-12, 12-24, 00-06, etc. In this sense some tests are being carried out with apparently good initial results, although these are not still concluding.

Besides, a simple method for estimating the snow/rain limit is carried out considering the geopotential and temperature fields at the 850 hPa and the standard vertical profile of temperature at low levels.

A combination of the precipitation analogical prediction, with the snow/rain limit estimation and a high resolution digital elevation model is being testing, at INM, in order to obtain an improved prediction product of snow probability.