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Calibration of direct normal irradiance (DNI) forecasts with quantile regression

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Direct normal irradiance (DNI) forecasts from two ensemble models, the global ECMWF-ENS and the limited area multimodel gSREPS, have been calibrated using the quantile regression method, taking DNI as the only input parameter to better understand the inner workings of the method. Forecasts for the southern part of Spain, with lead times up to 72 hours for ECMWF-ENS and 24 hours for gSREPS over a two-year period (from June 2017 to May 2019), have been used.

This study has focused on two particular aspects of the postprocess:

- The effect of quantile regression on the spread of the models. The results show that the spread of ECMWF-ENS greatly increases after the postprocess, which has a positive effect on the accuracy of the model, with an improvement of 20% in the continuous ranked probability score (CRPS) after the calibration. However, this increase is uniform over the whole period, affecting equally to situations with low or high spread, hence the postprocessed forecasts are not able to detect changes in predictability. On the other hand raw gSREPS forecasts behave better during episodes of both low or high predictability. The postprocess does not significantly change the spread and accuracy of gSREPS.
- The influence of the training sample. It has been found that DNI is a variable which can experience periods of low variability, particularly in regions like southern Spain, where long spells of sunny days are common. This has a sizeable impact on the performance of the quantile regression on certain days. Two study cases will be shown to illustrate this problem. Two possible solutions are proposed: use longer training periods (not always possible) or place restrictions on the value of the regression coefficients.