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Calibrated Ensemble Forecasts using Quantile Regression Forests and Ensemble Model Output Statistics.

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Ensembles used for probabilistic weather forecasting tend to be biased and underdispersive. This presentation proposes a statistical method for postprocessing ensembles based on Quantile Regression Forests (QRF), a generalization of random forests for quantile regression. This method does not fit a parametric probability density function like in Ensemble Model Output Statistics (EMOS) but provides an estimation of desired quantiles. This is a non-parametric approach which eliminates any assumption on the variable subject to calibration. This method can estimate quantiles using not only members of the ensemble but any predictor available including statistics on other variables for example.
The method is applied to the Météo-France 35-members ensemble forecast (PEARP) for surface temperature and wind-speed for available lead times from 3 up to 54 hours and compared to EMOS. All postprocessed ensembles are much better calibrated than the PEARP raw ensemble and experiments on real data also show that QRF performs better than EMOS, and can bring a real gain for forecasters compared to EMOS. QRF provides sharp and reliable probabilistic forecasts. At last, classical scoring rules to verify predictive forecasts are completed by the introduction of entropy as a general measure of reliability.