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A multi-model application on the sub-seasonal forecasting scale

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In this study, a multi-model ensemble is implemented and verified pursuing one of the research priorities of the Subseasonal to Seasonal Prediction Project. Re-forecasts from the CNR-ISAC and the ECMWF IFS monthly prediction systems, each including a control run and four perturbed members, are linearly combined and regressed against the ERA-Interim reanalyses for the winter season. The regression technique is applied on 2-m and 850-hPa temperature, and 500-hPa geopotential height on a 1° x 1° lat-lon grid, for the period ranging from 1990 to 2010. ERA-Interim reanalyses are also used to verify the results through non-probabilistic scores, namely root mean square error (RMSE) and anomaly correlation. Model output statistics techniques are applied to the multi-model ensemble to obtain forecast probabilities of weekly averaged temperature anomalies. The two main methods tested are logistic and non-homogeneous Gaussian regression, although the usage of other algorithms is attempted. Ranked probability skill score and reliability diagram are applied on the two models separately for comparison purposes. Verification results show that the multi-model probabilistic forecasts outperform the single-model counterparts.