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The potential predictability of near surface temperature in seasonal forecasts

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Seasonal forecasts are probabilistic in nature and hence require verification techniques based on probabilistic skill measures. Here a multi-category skill score is used to estimate the potential predictability of seasonal near surface temperature forecasts. The latter is chosen since it is often used in climate risk management applications. Probabilistic predictions used are from the operational ECMWF seasonal forecast system 2. The region of interest is globally and over the full set of available hindcasts. The skill score used is the debiased ranked probability skill score (RPSSd, Mueller et al. 2005), that is insensitive to the ensemble size and makes use of the full probability density distribution.

First the seasonal predictability is evaluated using a forecast approach (FA). In this approach the reference forecast is based on ERA40 observations and operational analyses data. The skill dependence is discussed in detail for different lead times, seasons, location and averaging approaches. For Europe the results suggest higher skill for spring forecasts and the southern part.

Second the potential predictability is investigated applying a perfect model approach (PMA). Here the reference forecast is based on all single predicted ensemble members of the model climate, and each single ensemble member is once treated as an observation. Under the assumption that the climate system is fully represented by the model physics, the PMA provides an upper limit of the forecasting capabilities. The potential predictability dependence is again discussed in detail as for the FA approach. It is shown that regions of high potential predictability can be related to the physical background of seasonal prediction and that our results compare well with other measures. For Europe the actually achieved skill is close to the limits of the model predictability. Finally special interest is given to situations, where the difference between these two

measures (FA and PMA) is particularly small or large.

Mueller W. A., C. Appenzeller, F. J. Doblas-Reyes, M. A. Liniger, 2005: A Modified Ranked Probability Skill Score to Evaluate Probabilistic Ensemble Forecasts with Small Ensemble Sizes, Journal of Climate, in press.