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Skill of Ensemble Seasonal Probability Forecasts

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In operational forecasting, the computational complexity of large simulation models is, ideally, justified by enhanced performance over simpler models. We will consider probability forecasts and contrast the skill of ENSEMBLES-based seasonal probability forecasts of interest to the finance sector (specifically temperature forecasts for Nino 3.4 and the Atlantic Main Development Region (MDR)). The ENSEMBLES model simulations will be contrasted against forecasts from statistical models based on the observations (climatological distributions) and empirical dynamics based on the observations but conditioned on the current state (dynamical climatology). For some start dates, individual ENSEMBLES models yield significant skill even at a lead-time of 14 months. The nature of this skill is discussed, and chances of application are noted.

Questions surrounding the interpretation of probability forecasts based on these multi-model ensemble simulations are then considered; the distributions considered are formed by kernel dressing the ensemble and blending with the climatology. The sources of apparent (RMS) skill in distributions based on multi-model simulations is discussed, and it is demonstrated that the inclusion of "zero-skill" models in the long range can improve Root-Mean-Square-Error scores, casting some doubt on the common justification for the claim that all models should be included in forming an operational probability forecast. It is argued that the rational response varies with lead time.