Recent and potential future evolution of practical predictability across scales

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In this talk we use the data from an operational ensemble prediction system to investigate recent developments in practical predictability across scales. Furthermore, we separate the estimated forecast error data into components representing the two dominant regimes in the atmosphere, the Rossby and inertia-gravity regimes. The latter is used to discuss aspects of tropical predictability.

We define the practical predictability limit of a meteorological field (e.g., meridional wind at 500 hPa) or of a variability mode (e.g., the equatorial Kelvin wave) by the forecast time at which the root mean square (rms) forecast error normalized by its saturation value reaches a prescribed threshold value (e.g., 60%).

The investigative technique fits a parametric function to the curve that describes the growth of the rms error of the forecasts with forecast time for a sample of forecasts. The parametric model describes the functional dependence of the magnitude of the forecast error on the magnitude of the initial error. Thus, it can be used for the estimation of the forecast error reduction that can be achieved by reducing the magnitude of the analysis error by a presumed percentage. Likewise, it can be used for the quantitative attribution of the forecast improvements between the years to analysis or model improvements.

The calculations are carried out for the different spatial scales and the two regimes separately.