Decadal predictability and forecast skill

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Measures of both climate predictability and forecast skill for temperature are obtained from an ensemble of climate simulations and decadal predictions produced with the Canadian Centre for Climate Modelling and Analysis (CCCma) coupled climate model. Predictability is estimated from the evolution of the forecast ensemble while skill is obtained by comparison with the evolution of observed temperature.

Predictability is characterized in terms of the "potential predictability variance fraction", "potential correlation skill" and "potential mean square skill score", which are shown to be related, and the potential correlation skill is compared to the actual correlation skill for the hindcast period 1961-2010. The contribution to the predictability and skill measures from the initialized internally generated component are compared to the contribution from the externally forced component. The former decreases with forecast range while the latter increases. The geographical pattern of actual skill is broadly similar to that of potential skill for the externally forced component but less so for the internally generation component as quantified by spatial correlation patterns. Differences in potential and actual skill may be suggestive as to where improvements in the forecast system might be sought.