Seamless precipitation prediction skill comparison between two global models

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The prediction of precipitation by two ocean–atmosphere ensemble systems is compared with observations and each other over a broad range of time-scales. The systems are the 2015 version of the Australian Bureau of Meteorology's Predictive Ocean–Atmosphere Model for Australia (POAMA) with a T47 atmosphere, and the 2011 version of the European Centre for Medium-range Weather Forecasts' (ECMWF) monthly system with a variable atmospheric resolution of T639 to T319. To facilitate the comparison across a seamless range of time-scales, verification against observations is performed using data averaged over time windows equal in length to the forecast lead time, from 1 day to 4 weeks. In addition to this 'actual' skill, potential skill is computed by taking one ensemble member as truth and computing how well the other members forecast that member.

Overall, ECMWF shows higher actual skill than POAMA across all time-scales and in both the Tropics and extratropics, as expected given its greater sophistication. ECMWF is particularly more skilful than POAMA in the Tropics for the shorter leads. Consistent between the two systems, however, is that as lead time and averaging window are simultaneously increased the near-equatorial skill remains approximately constant,whereas it drops in all other latitude bands. As a result, both systems show much higher skill in the Tropics than extratropics for the 1 week time-scale and beyond, with that skill concentrated over the equatorial Pacific.

Although potential skill in both systems is almost everywhere higher than their actual skill, there remains a strong similarity in the spatial patterns of potential and actual skill for the longer time-scales. Within-model comparisons of potential and actual skill show largest differences for POAMA in the Tropics at short lead times, and largest differences for ECMWF in the Southern Hemisphere high latitudes (50–70◦S). The implications of these findings are discussed.