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Skill in the trend and internal variability in a multi-model decadal prediction ensemble

Geert Jan van Oldenborgh (1), Frncisco Doblas Reyes (2), Bert Wouters (1), and Wilco Hazeleger (1)
(1) KNMI, KS/MK, De Bilt, Netherlands (oldenborgh@knmi.nl, +31 30 2202570), (2) IC3, Barcelona, Spain

Decadal climate predictions have skill due predictable components in boundary conditions (mainly greenhouse gases) and initial conditions (mainly the ocean). We investigated the skill of temperature and precipitation hindcasts from four ENSEMBLES models. Regional variations in skill with and without trend point to separate effects of the boundary forcing and the ocean initial state.

In temperature most skill comes from the boundary forcing. Global warming patterns are predicted well by the ENSEMBLES decadal runs (IFS, ARPEGE, ECHAM5, HadGEM2). The trend of the global mean temperature is represented well in the hindcasts, but variations around the trend show very little skill as volcanic eruptions after the analysis date were not included.

The models have good skill in hindcasts of North Atlantic SST beyond the trend. The skill patterns in temperature and precipitation after taking the trend into account overlap with AMO teleconnections. Hence we conclude that the ocean initial state contributes significantly to skill in these regions. The same may hold for the decadal ENSO region, although the signal is less clear.