



Predicting the climate of the coming decade

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There is strong evidence that climate has already changed, and will continue to do so, under human influences. Climate can also vary naturally without any external forcing. The combination of natural variability and anthropogenically-forced changes will very likely affect the frequency, intensity and duration of extreme weather, including storms, droughts, floods and heat waves. As population increases and more people live in vulnerable regions, society is becoming increasingly exposed to severe weather. There is therefore an increasing need for skilful and reliable predictions of regional climate for the coming decade.

To address this need, there is an international effort to develop and evaluate climate predictions that potentially account for both natural variability and externally-forced changes. Here we assess the current levels of skill of decadal climate predictions, and discuss potential future improvements. We focus on assessing the sources of skill and the physical mechanisms through which climate varies, since these are crucial for gaining confidence in forecasts. Both initialised and uninitialised retrospective forecasts covering the period since 1960 are assessed, enabling the impact of initialisation and the externally-forced component of skill to be quantified. We also examine additional climate model experiments to assess the relative impact of observations in different ocean regions, and the relative roles of different external forcing factors including anthropogenic greenhouse gases and aerosols, volcanoes and solar variability.