

Benefits of coordinated experiments:

Many of the findings of AR4 were directly supported by the multi model archive, which allowed a large number of experts to draw on multiple models and ensemble members for predictions and projections of future climate change as well as for understanding past changes. Without this archive, many findings would have been weaker and model dependent, and, for example, subsequent findings on attributable changes in precipitation would not have been possible. During AR4, probabilistic forecasts of global mean surface temperature change drew on multiple methods. This demonstration of a wide range of techniques arriving at similar or consistent future temperature ranges substantially increased the value of these predictions. Scientific advances in understanding forced climate change as well as adaptation / mitigation decisions will require better understanding and probabilistic predictions of changes in temperature and precipitation on smaller scales and at the tails of the distributions. Tighter predictions of future changes and better understanding of past changes may well arise from starting experiments from initial conditions. Changes in extremes and regional temperatures will benefit from high-resolution simulations, possibly done in timeslice mode. The evolution of temperature means and extremes over the Eastern US, where some temperature extremes have decreased over the recent 50 years is an illustrative example. Temperatures may have been influenced by SSTs (Hoerling et al., 2007), as well as from land-use change or changes in soil moisture. Coordinated experiments accounting for all these processes will therefore hugely benefit future attempts to understand past and predict, probabilistically, future changes.