Abstract: Challenges for long term climate change projections

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As the climate change modeling community moves into the era of mitigation scenarios for long term climate change projections, a number of challenges remain for the credibility of such long term simulations. The IPCC AR4 showed that there was a consistent response of the future mean base state change for the tropical Pacific Ocean (to a more El Nino-like state), but there was no agreement for even the sign of the projected future amplitude of El Nino events. This suggests a number of challenges. First, El Nino shows considerable decadal and centennial timescale variability, and the processes that contribute to this inherent low frequency variability must be better understood to put the limited sample of 100 year projections into context. Second, El Nino events themselves must be better simulated, and recent model improvements have shown that this is possible in the new generation of models currently being developed. The AR4 also identified carbon cycle feedback as being one of the major contributors to uncertainty on the upper end of the projected temperature ranges. Coordinated experiments are now being formulated to better quantify the size and nature of the carbon cycle feedback in the new generation of earth system models. Finally, changes in weather and climate extremes are of interest on a variety of timescales including the long term, and improvements in model resolution may be required to better represent precipitation extremes in the climate model projections.