Session: B7 Oral presentation

Relating model performance to credibility of projections

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Recent coordinated efforts, in which numerous general circulation climate models have been run for a common set of experiments, have produced large datasets of projections of future climate for various scenarios. Those multi-model ensembles sample initial condition, parameter as well as structural uncertainties in the model design, and they have prompted a variety of approaches to quantifying uncertainty in future regional climate change. International climate change assessments rely heavily on these models and often provide model ranges as uncertainties and equal-weighted averages as best-guess results. In principal, one might expect that the credibility of projections could be improved and uncertainties could be reduced if models were selected or weighted based on some criteria of model performance, e.g. the representation of the present day mean climate and variability. In practice, however, finding such relevant model performance metrics is difficult. No general all-purpose metric has been found that unambiguously identifies a 'good' model. Probabilistic projections based on Bayesian methods that determine weights for each model strongly depend on the assumptions made for the likelihood, i.e. the metric chosen to separate 'good' from 'bad' models. Methods that are based on correlations of metrics and projections across models may be biased because of the small sample of models, and by the fact that models share components and parameterizations. Agreement or correlations may in some cases reflect a shared level of process representation or calibration to particular datasets. Metrics that quantify how realistically important processes are represented in a model provide an alternative approach. This presentation provides an overview of recent advances and remaining difficulties in relating model performance to credibility of projections, and discusses possible implications for the climate model development process as well as for international climate change assessments based on multi model ensembles.