



Probabilistic climate predictions for the United Kingdom and the World

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This talk will describe a methodology for producing probabilistic climate prediction for the coming century, conditional upon different emissions scenarios. The prediction method is built upon ensembles of the Hadley Centre HadCM3 model with perturbations to key parameters (perturbed physics ensembles) and uses a Bayesian statistical technique. The technique seeks to “emulate” the parameter space of HadCM3 based on some prior assumptions about parameter ranges, and then down-weights regions of parameter space based on a comparison of modelled historical mean climate and climate change with observations (accounting for observational uncertainties). The effect of structural uncertainties, not sampled by the perturbed physics approach, are further accounted for by incorporating information from the CMIP3 and CFMIP multi-model ensembles in a term which we call the discrepancy. The method seeks to account for the major uncertainties in feedbacks associated with the atmosphere, surface, ocean, sulphur cycle and terrestrial carbon cycle in a systematic way, as well as incorporating uncertainties from the statistical components of the method. The resulting probability distribution functions for future climate change provide a benchmark whereby sensitivities to methodological assumptions may be tested. The method is currently being implemented, together with a combined dynamical-statistical downscaling approach, to produce probabilistic predictions for the UK at 25km resolution.