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No consensus on consensus: The challenge of finding a universal approach to measuring and mapping ensemble consistency in GCM projections

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Communicating information about multi-model ensemble consistency in long-term climate projections is crucial to the successful understanding, interpretation and appropriate application of information from climate models about future climate and its uncertainties. However, mapping the consistency of model projections in such a way that this information is communicated clearly remains a challenge that several recently published papers have sought to address in the run up to the IPCC AR5. We highlight that three remaining issues have not been fully addressed by the literature to date. [1] While additional information about regions where projected changes in rainfall are not 'statistically significant' can provide useful information for policy, the spatial scale at which changes are assessed has a substantial impact on the signal-to-noise ratio, and thus the detectability of changes. We demonstrate that by spatially smoothing the model projections we can provide more information about the nature of the signal for larger regions of the world. [2] Combining information about magnitude, consistency and statistical significance of projected changes in a single map can cause reduced legibility. We demonstrate the difficulty in finding a 'universal' method suitable for a wide range of audiences [3] We highlight that regions where projected changes in average rainfall are not statistically significant, changes in variability may still cause significant impacts. We stress the need to communicate this effectively in order to avoid mis-leading users. Finally, we note that changes to the messages regarding the consistency of climate projections that are likely to appear in IPCC AR5 are due largely to changes in the methods of assessing consistency since IPCC AR4 rather than any discernable differences between the CMIP3 and CMIP5 ensembles.