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Upgrades to the REA method for producing probabilistic climate change projections

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ABSTRACT: We present an augmented version of the Reliability Ensemble Averaging (REA) method designed to generate probabilistic climate change information from ensembles of climate model simulations. Compared to the original version, the augmented one includes consideration of multiple variables and statistics in the calculation of the performance-based weights. In addition, the model convergence criterion previously employed is removed. The method is applied to the calculation of changes in mean and variability for temperature and precipitation over different sub-regions of East Asia based on the recently completed CMIP3 multi-model ensemble. Comparison of the new and old REA methods, along with the simple averaging procedure, and the use of different combinations of performance metrics shows that at fine sub-regional scales the choice of weighting is relevant. This is mostly because the models show a substantial spread in performance for the simulation of precipitation statistics, a result that supports the use of model weighting as a useful option to account for wide ranges of quality of models. The REA method, and in particular the upgraded one, provides a simple and flexible framework for assessing the uncertainty related to the aggregation of results from ensembles of models in order to produce climate change information at the regional scale.

KEY WORDS: REA method, Climate change, CMIP3