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Past-performance-based model selection using a "mosaic" of models

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We present a method of selecting climate models based on agreement with 20th Century surface temperature and precipitation observations using 17 of the IPCC AR4 models and 22 continental regions. Improvements in accuracy of the 20 and 10-year mean anomalies can be achieved in most regions by selecting models sub-regionally, using different models for individual 5°x5° grid points in a "mosaic" approach. Ensembles selected in this way systematically outperform ensembles selected on the regional scale, as well as usually outperforming the average of all available models. There is evidence of the benefit of using multi-model ensembles rather than individual models. This method may therefore be useful in improving the reliability of decadal and multi-decadal climate predictions, on both regional and sub-regional scales.