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Can Climate Projection Uncertainty be Constrained over Africa Using Contemporary Performance Metrics?

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Projections of climate change over Africa are highly uncertain, with wide disparity amongst models in their magnitude of local rainfall and temperature change, and in some regions even disparity in the sign of rainfall change. One approach towards addressing this uncertainty is to rank models according to their historical climate performance and disregard those with least skill. This approach is systematically evaluated by defining 23 metrics of model skill (many incorporating a number of sub-metrics) and focussing on four vulnerable regions of Africa: the West Sahel, the Central to East Sahel, and the Greater Horn of Africa's two wet seasons. Some discrimination in the performance of 39 CMIP5 models is achieved, though with divergence between individual metrics regarding each model's ranking. Selecting the generally more trustworthy climate models does not reduce projection uncertainty, since these models are typically spread across the full range of projections (except perhaps for Central to East Sahel rainfall). This suggests that the method's underlying assumption is false, this being that the modelled processes that most strongly drive errors and uncertainty in projected change are a subset of the processes whose errors are observed by standard metrics of historical climate. Further research must now develop an expert judgement approach that would discriminate models using an in-depth understanding of the mechanisms that drive the errors and uncertainty in projected changes over Africa.