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Comparing model ensembles in an event attribution study of 2012 West African rainfall

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In 2012, heavy rainfall resulted in flooding and devastating impacts across West Africa. With many people highly vulnerable to such events in this region, here we investigate whether anthropogenic climate change has influenced such heavy precipitation events. We use a probabilistic event attribution approach to assess the contribution of anthropogenic greenhouse gas emissions, by comparing the probability of such an event occurring in climate model simulations with all known climate forcings to those where natural forcings only are simulated. An ensemble of simulations from 10 models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) is compared to two much larger ensembles of atmosphere-only simulations, from the Met Office model HadGEM3-A and from climateprediction.net (a regional version of HadAM3P). These are used to assess whether the choice of model ensemble influences the attribution statement that can be made. Results show that anthropogenic greenhouse gas emissions have decreased the probability of high precipitation, although the magnitude and confidence intervals of the decrease depend on the model ensemble used. The influences of significant teleconnections are then removed from the CMIP5 ensemble to see how this influences the results and compares with the atmosphere-only ensembles.