Simulation of monsoons and their variability in the HadGEM2 model family

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The HadGEM2 family of model configurations includes atmosphere and ocean components, with and without a vertical extension to include a well-resolved stratosphere, and an Earth-System (ES) component which includes dynamic vegetation, ocean biology and atmospheric chemistry. The HadGEM2 physical model includes improvements designed to address specific systematic errors encountered in the previous climate configuration, HadGEM1, including tropical sea surface temperature biases and underestimation of Indian monsoon rainfall. Various configurations from the HadGEM2 family are being used for climate change experiments as part of CMIP5. Here, we compare the present-day monsoon performance in the Asian-Australian and African regions between several HadGEM2 configurations and alongside other models and observations. We show that the HadGEM2 family members are consistent in their improved performance compared with HadGEM1, and we examine the impact of the different functionality between family members, particularly the inclusion of the Earth System components, on the monsoons and their variability.