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Projected changes in the Asian-Australian monsoon region in 1.5°C and 2.0°C global-warming scenarios

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In light of the Paris Agreement, it is essential to identify regional impacts of half a degree additional global warming for future climate adaptation and mitigation strategies. We investigate the projected effects of 1.5°C and 2.0°C global warming above pre-industrial conditions (1861-1880), relative to present day (2006-2015), over the Asian-Australian monsoon region (AAMR). We use five different models' output from the Half a degree Additional warming, Prognosis and Projected Impacts (HAPPI) project. Models show varied biases for temperature and precipitation for the present day simulations and inter-model variability in projected changes to mean climate and extreme events in 2.0°C and 1.5°C scenarios. But there is high confidence in projected increases to mean and extreme surface temperature intensities over AAMR, as well as more-frequent persistent daily temperature extremes over East Asia, Australia and northern India. Mean annual precipitation increases over East Asia and India in future scenarios, but reduces over Australia under 1.5°C warming. Mean and extreme monsoon precipitation intensities amplify over AAMR, except over Australia at 1.5°C where there is uncertainty in the sign of the change. Persistent daily extreme precipitation events become more frequent over parts of East Asia and India. There is lower confidence in projections of precipitation change than in projections of surface temperature change. These results highlight the benefits of limiting the global-mean temperature change to 1.5°C above pre-industrial, as the severity of the above effects increases with an extra 0.5°C warming.