



What do CMIP5 projections tell us about future rainfall changes over tropical land?

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There is consensus on likely global-scale future changes of the hydrological cycle under climate change, but little agreement among climate model projections of how and where rainfall will change over tropical land at the regional scales relevant to impacts. This disagreement is largely due to the diversity of climate model responses of the atmospheric circulation to warming, with different models predicting current tropical wet and dry regions to shift in different ways. Here we show that despite uncertainty in the location of future rainfall shifts, such shifts do occur in all models over the 21st century, and so climate models robustly project large rainfall changes for a considerable proportion of tropical land. The area affected by large changes under a business-as-usual emissions scenario is likely to be much greater than during even the most extreme regional wet or dry periods of the 20th century, such as the Sahel drought of the 1970s and 80s. Substantial changes are projected to occur by mid-century – earlier than previously expected - and to intensify in line with global temperature rise. Therefore current climate projections contain more useful information on future regional rainfall changes than has previously been realised. This is particularly important for climate change mitigation policy, where the exact location of anticipated climate impacts may be less vital than the knowledge that such impacts are likely to occur.