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What difference would a 1.5°C vs a 2°C warming target make to precipitation?

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In December 2015, the member states of the United Nations signed the Paris agreement, committing to limit the rise in global temperature above pre-industrial levels to between 1.5 and 2°C. Precipitation changes are a major impact of climate change, and so understanding how these are likely to differ between a 1.5°C and a 2°C warming scenario is very important. In this study, we examine the precipitation changes at these temperature thresholds in CMIP5 simulations. We compare results for three climate models for the RCP 4.5 scenario: HadGEM2-ES, CCSM4 and CanESM2. There are expected to be opposite precipitation changes in some regions under global warming in keeping with the 'wet gets wetter, dry gets drier' paradigm. These patterns may also shift seasonally, following the seasonal cycle of precipitation, particularly in the tropics. Therefore, both global and regional, and annual and seasonal data are analysed to provide a comprehensive insight into the differences in precipitation changes. Finally, the time of emergence of precipitation trends at a regional and gridpoint scale is determined, and analysed within the context of a 1.5°C vs a 2°C scenario. Time of emergence is a valuable metric as it describes when a particular change becomes significant with respect to natural variability, and therefore when said change will begin to affect local ecosystems and human societies. The smaller the scale over which time of emergence is calculated the more relevant it is for local impacts. However, for precipitation, natural variability at gridpoint level is very high and signals may not emerge before the end of the century. Therefore, emergence of regional average precipitation is also analysed.