

Tropical precipitation shifts in the 20th and 21st Century: The role of interhemispheric gradients in forcings and feedbacks

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In the tropics, there is large uncertainty in projections of precipitation changes in the next century. While in general we expect wet regions to get wetter in a warmer climate, shifts in precipitation can cause large local deviations from this paradigm. We identify a key mechanism and associated model diagnostics that can be used to understand why some models show northward shifts and others show southward shifts of tropical precipitation features in the 20th and 21st century. In particular, models which have stronger radiative forcing and feedbacks in the Northern Hemisphere (NH) tend to have tropical precipitation shift northward. 20C3M simulations in CMIP3 show mostly southward shifts of tropical precipitation due to aerosol cooling of the NH. 21st century simulations show both northward and southward shifts depending on the model, due primarily to differences in cloud feedbacks.