

**Regional patterns of climate change: Dynamics and observations**

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Global mean temperature is a convenient measure to monitor the state of global warming but mitigation-adaptation applications require climate change information on regional scales. The rise of surface temperature has been and will likely be variable in space. Precipitation change is even more variable, positive in some regions and negative in others. The paper highlights recent progress in studies of global warming dynamics that address such fundamental questions as what determines patterns of regional rainfall change, and how ocean-atmospheric circulations and modes of variability might change. In future climate projections by models, sea surface temperature (SST) increase features robust patterns in space, determined by ocean and atmosphere interaction of various kinds. Most importantly, these patterns of SST increase determine rainfall change in the tropics; rainfall increases where the SST warming exceeds the tropical mean. This warmer-get-wetter idea is consistent with satellite observations that the SST threshold for tropical convection has risen by 0.3C for the past three decades. Tropical Atlantic climate change is presented as an example to illustrate the importance of ocean-atmosphere feedback for regional climate change (including both the mean state and modes of interannual variability). Issues in modeling and detecting regional climate change will be discussed.