



## **Climate Projections for South America -discussion of mechanisms**

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While temperature is projected to increase, in the future, in the whole South America, with the highest values in central-north areas, precipitation projections show increases or reductions in specific regions. The mechanisms of these changes need to be understood in face of climate change scenarios and possible modifications in the regional meteorological systems behavior. Large areas of South America have a monsoon regime, which shows precipitation differences from winter to summer. Several systems, such as the South Atlantic Convergence Zone (SACZ), the Bolivian High and others, are part of this continental seasonal variability. Tropical areas close to the equator are influenced by the seasonality of the Intertropical Convergence Zone (ITCZ). Other areas at higher latitudes have an extratropical regime, affected by transient synoptic systems, being more uniform during the year. Teleconnections, as ENSO, the Pacific South America (PSA) and the Southern Annular Mode (SAM) affect the variability of the regional systems and precipitation. Ensemble projections of precipitation analyzed in CMIP5 models for the analyzed period of AR5 [(2081-2100)-(1986-2005)] and regional models [(2071-2100)-(1961-1990)] show changes in several areas of South America. Increased precipitation over Southeastern, Northwestern and extreme Southwestern South America, as well as reduced precipitation in Amazonia, Northeast Brazil and Central Chile are projected under scenarios 4.5 and 8.5 by the majority of CMIP5, and regional models downscaled from scenario A1B from CMIP3. The role of changes in SST and in atmospheric circulation in the future projections, which affect the variability of the main systems over South America is discussed. Although there is medium confidence in PSA, SACZ and ITCZ changes, possible changes in the PSA pattern, including the wavetrain centers of action position and intensity, SACZ position and intensity, SAM phase variability and subtropical highs position and intensity can be linked to the projected precipitation changes. Changes in the ITCZ and in the Atlantic and Pacific SST are also investigated to explain projected precipitation changes of South America near the equator.