



Downscaling projections of climate change over South America and Central America under RCP4.5 and RCP8.5 emission scenarios

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Downscaling runs of climate change scenarios from three global climate models, HadGEM2-ES, MIROC5, and CanESM2 are carried out using the regional Eta model. The runs are setup at 20-km horizontal resolution, over a domain that encompasses South America, Central America and Caribbean region, for the historical period, from 1961 to 1990, and for the future period, from 2006 to 2100, and under two emission scenarios, RCP4.5 and RCP8.5. The simulations of precipitation and temperature of the historical period are validated against CRU observations and CHIRPS dataset. The seasonal climatology of these variables reasonably reproduced by the simulations. The two-peak annual precipitation is reproduced in some areas of the Central America. The one-peak annual precipitation over the Amazon basin is underestimated in all runs. While the simulations using MIROC5 are generally wetter and cooler than the observations, the simulations using CanESM2 are warmer and drier over South America domain. The Caribbean Low Level Jet, the midsummer drought and the South America Convergence Zone are the two meteorological features reproduced by the simulations and evaluated using observational dataset. At the end of the century, projections suggest warming of about 2 and 4 degrees Celsius, under RCP4.5, and about 4 and 7 degrees Celsius, under RCP8.5, in Central America. In South America, projections start warming in the central part of the continent and move toward the Amazon region, with warming of about 7 degrees Celsius, at the end of the century. Precipitation increase in Southeast South America and reduction in Southeast of Brazil are common precipitation projection features among the downscaling runs.