Precipitation extremes over Amazonia - atmospheric and oceanic associated features observed and simulated by HADGEM2-ES, CPTEC/INPE AGCM and Eta/CPTEC regional model

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Extreme monthly cases of precipitation (positive and negative anomalies) over Amazonia are analyzed to show the atmospheric and oceanic related features and the ability of CPTEC AGCM and HADGEM2-ES in simulating them. Humidity flux variability over the Tropical Atlantic region is analyzed related to the precipitation variability over Amazonia. Besides the Pacific Ocean influence, the Amazonia precipitation is affected by the Tropical Atlantic Ocean, both by the SST and atmospheric flux humidity. Correlations between Atlantic SST and Amazonia precipitation show that there are specific months and areas that are affected by SST anomalies. The extreme cases are obtained from the Standardized Precipitation Index (SPI) applied to monthly data in four areas of Amazonia: northwest, northeast, west and east areas. The period of analysis is 1981 to 2010 to GPCP observed precipitation and CPTEC/INPE AGCM. As this AGCM is the base of the Brazilian Model of Earth System, its behavior on the mechanisms leading to extremes over Amazonia, compared to observations is discussed. Projections of extremes over the region are analyzed with results from CMIP5 HADGEM2-ES during 2073-2099 compared to 1979-2005. The regional Eta CPTEC model is also analyzed in two periods: 1960 to 1990 and 2040 to 2070, with boundary conditions of CMIP3 HADCM3 A1B scenario. The relevance of this analysis is to identify changes in frequency and intensity of extremes in the Amazon region in a higher resolution than the global models.