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Assessment of extreme precipitation events over Amazon simulated by global climate models from HIGEM family.

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The variations of extreme climatic events had been described and analyzed in the scientific literature. Both extremes of precipitation and temperature until now are not well represented by regional or global climate models. Additionally, it is important to characterize possible changes in extreme events. The only certainty is that the extreme events such as heat waves, floods, droughts, or storms may imply in severe societal and economical impacts, since they cause significant damage to agriculture, ecology and infrastructure, injury, and loss of life. Therefore, in a scenario of global warming it is necessary understanding and explaining extreme events and to know if global models may represent these events. The South America (SA) climate is characterized by different precipitation regimes and its variability has large influences of the large scale phenomena in the interanual (El Niño South Oscilation – ENSO) and intraseasonal (Maden Julian Oscilation – MJO) timescales. Normally, the AGCM and CGM use low horizontal resolution and present difficult in the representation of these low frequency variability phenomena. The goal of this work is to evaluate the performance of coupled and uncoupled versions of the High-Resolution Global Environmental Model, which will be denominated NUGEM (∼60 Km), HiGEM (∼90 km) and HadGEM (∼135 km) and NUGAM (∼60 Km), HiGAM (∼90 Km) and HadGAM (∼135 Km), respectively, in capturing the signal of interannual and intraseasonal variability of precipitation over Amazon. Basically we want discuss the impact of sea surface temperature in the annual cycle of atmospheric variables. The precipitation time-series were filtered on the interanual (period > 365 days) and intraseasonal (30-90 days) timescales using the Fast Fourier Transform (FFT). The occurrence of extreme precipitation events were analyzed in Amazon region. The criterion for selection of extremes was based on the quartiles of rainfall anomalies in the bands of interest. Both coupled and uncoupled models capture the observed signal of the ENSO and MJO oscillations, although with reversed phase in some cases. The austral summer and winter composites of interannual and intraseasonal anomalies showed for wet and dry extreme events the same spatial distribution in models and reanalyses. The interannual variability analysis showed that coupled simulations intensify the impact of the El Niño Southern Oscillation (ENSO) in the Amazon. In the Intraseasonal scale, although the simulations intensify this signal, the coupled models present larger similarities with observations than the atmospheric models for the extremes of precipitation. Note that there are differences between simulated and observed IS anomalies indicating that the models have problems to correctly represent the intensity of low frequency phenomena in this scale. The simulation of ENSO in GCMs can be attributed to their high resolution, mainly in the oceanic component, which contributes to the better solution of the small scale vortices in the ocean. This implies in improvements in the forecasting of sea surface temperature (SST) and as consequence in the ability of atmosphere to respond to this feature.