Session: C28 Poster: W66B

Interannual and intraseasonal variability of extreme dry and wet events over South America as simulated by coupled and uncoupled high-resolution global models during Austral Summer.

Maria Custodio[†]; Rosmeri da Rocha
[†] University of Sao Paulo, Brazil
Leading author: maridsc@model.iag.usp.br

The climatic system has its fluctuations determined mainly by the complex fluxes from the ocean and atmosphere. The fluxes transport energy, momentum and tracers within and between system components; they occur in a wide range of spatial and temporal scales. Because of this, according to Shaffrey et al. (2009) the development of high resolution global models is indispensable, to simulate the energy transfer to smaller scales and to capture the non linear interactions between wide ranges of spatial and temporal scales, and between the different components of climatic system. There are strong reasons to increase the resolution of all the atmospheric and oceanic components of coupled climatic models (AGCM) and uncoupled climatic models (GCM). 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 HiGEM (~90 Km) and HadGEM (~135 Km) and HiGAM (~90 Km) and HadGAM (~135 Km), respectively, in capturing the signal of interannual and intraseasonal variability of precipitation over SA. Basically we want discuss the impact of sea temperature in the annual cycle of atmospheric variables. Both versions of model have the same dynamics core and yours periods of analyses were: HiGEM and HadGEM 1979-2008, HiGAM 1978-2002 and 1978-2003. The simulations were compared with precipitation data from Climate Prediction Center - Merged Analysis of Precipitation (CMAP) for the period 1979 to 2007. 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 and droughts were analyzed in six sub-regions of SA. The criterion for selection of extremes was based on the quartiles of rainfall anomalies in the bands of interest. Both HiGEM and HadGEM capture the observed (CMAP) signal of these two oscillations, although with reversed phase in some cases. This highlights the importance of increase the horizontal resolution of the GCMs. The simulation of ENSO in both 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.