South America Monsoon System and Features Simulated by the Eta Regional Model

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The South America Monsoon System (SAMS) is the main driver of the rainy season in large areas of South America. Its variability affects several regions where droughts or floods have impacts in sectors like agriculture, hydropower and the economy. Therefore, prediction of extremes in SAMS is a highly important task. To increase the confidence in model predictions, it is necessary to verify, first, how is the model climate variability behavior. In this study, climate simulations of Eta regional model are used to analyze its ability of reproducing features of SAMS and extremes in Southeastern Brazil. The Eta model was integrated at resolution of 20 km and with lateral boundary conditions of HadGEM2-ES. The analyses are performed in two periods, first: 1981-2005 and second: 2016-2040. RCP 8.5 is the scenario of the projections. The main mode of precipitation variability in the summer, obtained from EOF1, is similar to the observations, showing the South Atlantic Convergence Zone (SACZ) feature and opposite sign to the south and to northwest. The general configuration of the difference between summer and winter, which shows the monsoon areas, is also similar to the observations, with underestimation in regions of Paraguay and northern Argentina. The wet and dry extremes during summer show the dominant mode of variability pattern, as in the observations. The projections show drier conditions in the second period compared to the first one, in large areas of Brazil, in all seasons, except in the winter (JJA). The reduction of precipitation is great in the summer (DJF) and spring (SON), mainly in central and southeast Brazil, likely related to the SACZ changes. Precipitation changes are discussed based on atmospheric circulation and humidity fluxes of both periods.

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