

# **The South American Monsoon System and the Southern Hemisphere SST anomalies**

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The purpose of this work is to present an observational and a numerical climatological study about the influence of different SST forcings from equatorial and austral oceanic regions on the low frequency variability of the South American monsoon system.

This work is organized in three parts. Initially a case study of the drought observed in Brazil during the 2000/2001 austral summer is presented. The numerical results suggested the contribution of the Equatorial and South Pacific for these observed drought conditions. In the second part, a climatological study discussed the main atmospheric and oceanic patterns associated with the low frequency variability precipitation mode responsible for the modulation of the South American monsoon through a statistical analysis using Rotated Empirical Orthogonal Functions (REOF). As a complementary statistical study, the low frequency variability SST modes related to the South American monsoon were obtained via REOF in different oceanic basins. Modes were found over the South Atlantic, South Pacific, Equatorial Pacific and South Indian, suggesting the importance of the subtropical SST forcings. In the last part, three SST variability modes were used as forcings in numerical experiments with the Community Climate Model 3.6 atmospheric general circulation model in order to provide a dynamical support for some of the statistical results found. The selected SST modes are located near to southeastern Africa, eastern Australia and over the Indonesia region. The numerical results showed the influence of the positive SST anomalies in the South Indian on drought conditions over tropical Brazil through the wave propagation via the Subpolar Jet wave guide. In another experiment, the positive SST anomalies observed over the Indonesia presented some influence for the generation of drought conditions over Tropical Brazil through the propagation of an anomalous PSA-like wave pattern. However, the experiment forced with positive SST anomalies near to eastern Australia seems to have little influence on the configuration of drought conditions over the subtropical South America and enhanced precipitation over Eastern Brazil.