

PATTERNS OF SEA SURFACE TEMPERATURE ANOMALIES OVER NORTH ATLANTIC OCEAN AND CONVECTION OVER SOUTH AMERICA - OBSERVATIONAL ANALYSIS

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1. Introduction

In contrast to the sea surface temperature (SST) over the South Atlantic Ocean (Robertson e Mechoso 2000, Chaves e Nobre 2004 and Chaves e Ambrizzi 2005), the influence of the SST over the North Atlantic Ocean in the summer convection over the South America (AS) does not have received attention from the research community. In this study was evaluated the association between the SST over the North Atlantic Ocean (Equador-40°N; hereafter referred as NA) and the summer convection over the SA through statistical methods as Principal Components Analysis (PCA). The observational analysis used SST dataset from COADS and Outgoing Longwave Radiation (OLR) from CDC/NOAA. Patterns of SST anomalies over the NA were determined through PCA to December-January-February (DJF) from 1979 to 2001. Association of these patterns with summertime convection over the SA was determined by linear correlation between the time series of these patterns and OLR anomalies over this continent. Coupled modes between North Atlantic SST anomalies and South America OLR anomalies (40°S-20°N to 90°W-20°W) are determined by SVD.

2. Results

The spatial pattern associated with the first anomalies SST mode shows one monopolo pattern over the NA (Fig. 1a). The second pattern shows an out-of-phase relationship between SST anomalies over the tropical and subtropical regions (Fig. 1b). The third pattern shows three action centers over the NA, SST anomalies with same signal over equatorial and subtropical regions and different signal over intermediate region (Fig. 1c). They explain 28.4, 16.3 and 9.4% of the variance, respectively. The first and third patterns show greater interannual variability and the second pattern interdecadal variability (not showed), thus only the first and third modes were considered hereafter. The first mode does not show correlation significant with summertime convection over the South America (Fig. 2a). Only the third mode has influence over summertime convection on the SA. This third pattern shows correlation significant with summertime convection only over the northernmost part of this continent (Fig. 2b). The convection in this region is associated with positive SST anomalies over equatorial and subtropical region and negative SST over the tropical part of the NA. The field of SST anomalies associated with the first coupled mode between North Atlantic SST anomalies and South America OLR anomalies corresponds to the third mode of variability of the North Atlantic SST anomalies. Thus, apparently, third mode of the North Atlantic SST anomalies has greater influence over the South America convection in DJF than the two first modes.

3. Conclusions

The results of the observational analysis showed that the SST over the NA (Equator e 40°N) has influence only in the summer convection over the northernmost part of the SA, with warm SST anomalies there associated with the convection over this continental region. Thus, apparently, the SST

over the NA was not important for the predictability of the summer convection over most of the SA, included the South Atlantic Convergence Zone, to DJF from 1979 to 2001. Results presented here were based on statistical methods with dataset from DJF 1979 to 2001. In order to evaluate the dependence of these results, they must be compared with models experiments and others observational data.

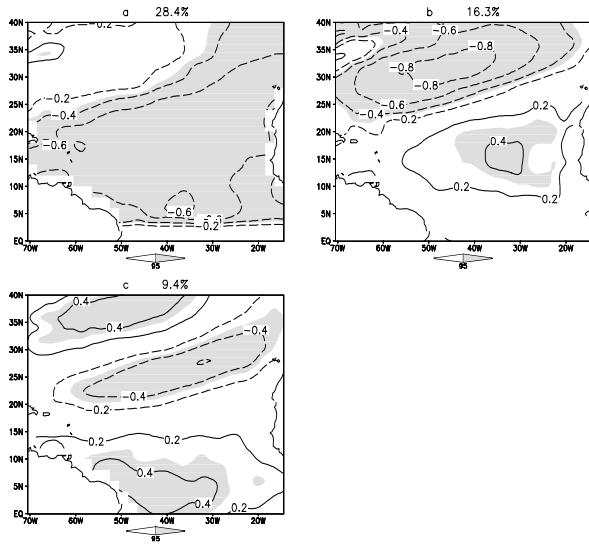


Fig. 1 - First (a), second (b) and third (c) modes of the SST anomalies over the North Atlantic Ocean to DJF from 1979 to 2001.

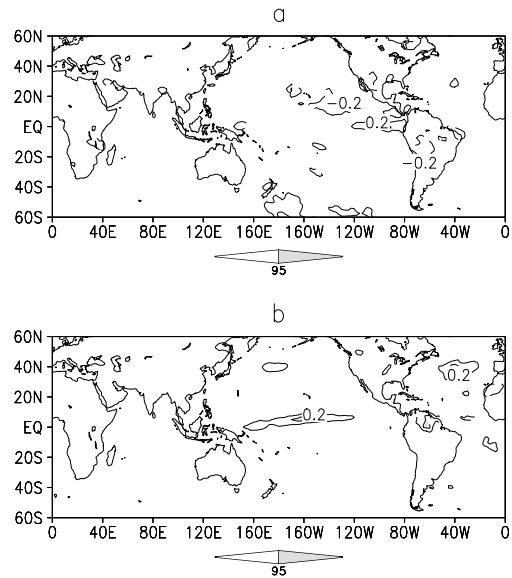


Fig. 2 - Correlation field between time series of expansion coefficients of the first and third EOF and OLR anomaly at that grid point between 60S and 60N from 1979 to 2001. The shaded areas represent statistical significance at the 95% confidence level.

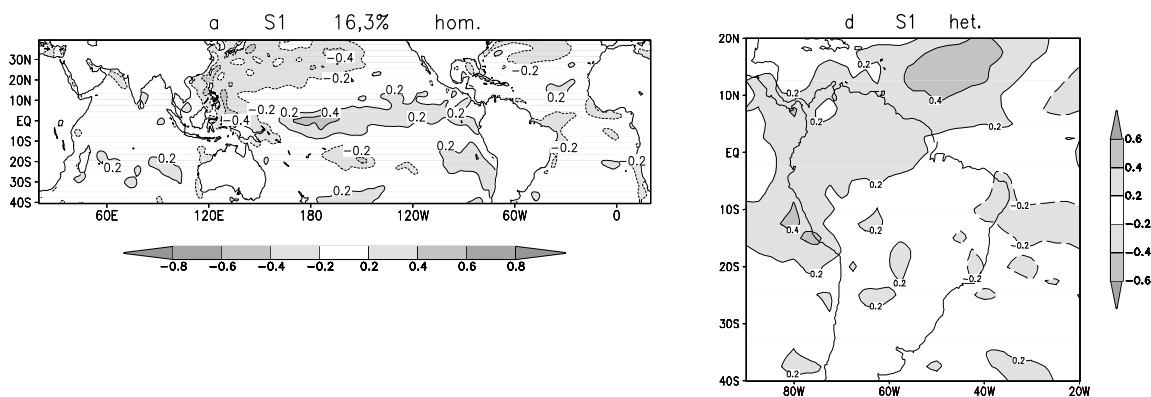


Fig. 3 - Spatial pattern of the first SVD coupled mode of North Atlantic SST anomalies and OLR over South America and adjacent regions from DJF 1979 to 2001. The shaded areas represent statistical significance at the 95% confidence level.

4.References

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