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ROLE OF THE BASIC STATE ON THE INTRASEASONAL VARIABILITY IN THE SOUTH ATLANTIC CONVERGENCE ZONE.

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1 - INTRODUCTION

South Atlantic Convergence Zone (SACZ) is an important atmospheric system in southeastern Brazilian region during summer. SACZ role can be considered, on local precipitation regime. Observational studies indicated that summer precipitation by several days seems to be SACZ behavior. From dynamic point of view, SACZ induces atmospheric circulations as a response to latent heat source. One of the most important local circulation aspects inside SACZ is compensatory subsidence over polar side. Therefore, SACZ position, spatial distribution, time duration and intensity are very important information to medium and short range numerical weather prediction.

From teleconnections point of view, convective activity on central and west Equatorial Pacific are connected with SACZ. Observational and numerical analyses indicate that changes in SACZ trough may be related to wave train from Equatorial Pacific in intraseasonal time scale. These characteristics suggest Madden Julian Oscillation (MJO) influence in SACZ region. Main objective is verify remote influence of atmospheric disturbances on intraseasonal time scale in SACZ region.

2 - METHODOLOGY

Were used spectral shallow water model, with representative basic state of active period of Madden and Julian oscillation. In this case, were considered well registered SACZ event in February-1988 (Silva Dias et al, 1988). Basic state model is composed by 05-29 February time average of wind zonal component and geopotencial height, both in 200 hPa. This period were chosen by presenting an evident intrasazonal signal in subtropical region, with periods in 30-70 days detected by band-pass filter in outgoing longwave radiation (OLR) anomalies. The model is integrated by 60 days, forced by mass source calculated from OLR anomalies in convective regions, previously selected. Two distinct situations are evaluated: influence over ZCAS of atmospheric waves excited by convection in central and west regions of Equatorial Pacific and b) global wave propagation, excited by ZCAS region convection. Presented Figures are geopotential height anomalies. The dotted line represents ridge and continuous line, trough. The inversion of isolines standard is due to forcing definition from OLR anomalies. Observed that convective region presents negative OLR anomalies.

3 - RESULTS

Figure 1, presents OLR anomalies time average, using 30-70 days pass-band filter. The mass source

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is calculated from OLR field identified by square in SACZ. Figure 2, presents stationary model response due SACZ region forcing. In South Hemisphere (SH), a wave train propagates from SACZ through approximately 40°S latitude belt. Observe a bifurcation wave train trajectory in Indian Ocean. The north branch curves to Australia and south branch to eastward. This described trajectory is observed through subtropical waveguide, identified by Hoskins & Ambrizzi (1993). Some studies show that SACZ has a different behavior on oceanic and continental parts (Carvalho et al., 2002). Figures 3 and 4, presented forced simulations by SACZ distinct sectors. Northern part is called continental SACZ and southern part is called oceanic SACZ. The SH atmospheric response due to oceanic SACZ forcing (Figure 3) indicates similar results of previous simulation (Figure 2). In continental SACZ case (Figure 4), SH wavetrain is also represented, although less intense and presents inverted phase in Indian Ocean sector (Figures 2 and 4). In relation to NH, a detailed aspect is North-South dipole pattern reinforcement located at eastern Atlantic Ocean and a new wavy structure cross Europe and Asia (Figure 4). Patterns above are similar to East Atlantic and Eurasian teleconection patterns, respectively (Blackmon et al., 1984). Therefore, continental SACZ can be responsible to NH atmospheric disturbances. The Interhemispheric teleconnections is a subject that theoretically supported (Grimm & Silva Dias 1995; Hoskins & Ambrizzi, 1993). The most actived part of East Pacific convection is located near Indonesia. The convective region importance about atmospheric disturbances is presented in Figure 5. Were verified a wavetrain via mid latitudes, locating SACZ region trough. Testing SPCZ convection region (Figure 6), is possible verify that a wave train impose a more intense trough in SACZ region.

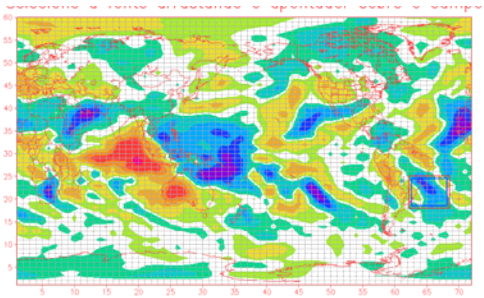

Figure 1

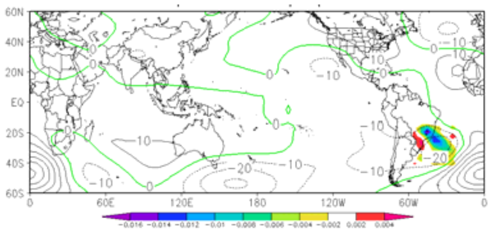

Figure 2

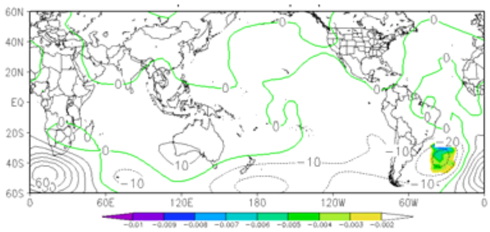

Figure 3

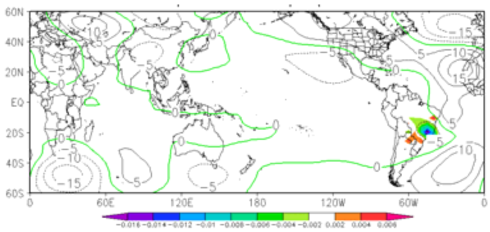

Figure 4

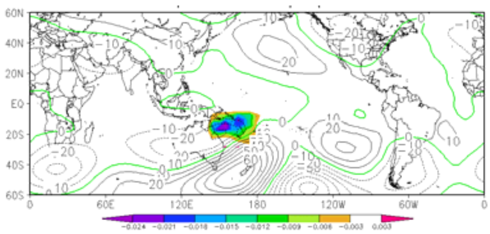

Figure 5

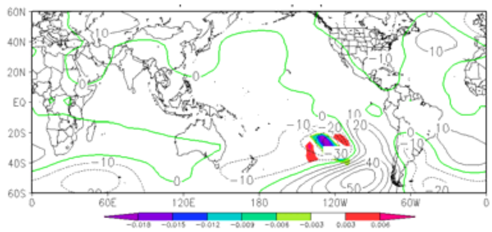

Figure 6

4 - CONCLUSIONS

The described simple simulation presents great correspondence teleconnection patterns observed in references. Its possible observes a differentiated SACZ importance in continental and oceanic parts in wavetrain propagation. In relation to SPCZ/SACZ interaction, observed that convective activity in East Pacific is able to establish a trough in SACZ region. Therefore this trough is intensified in ZCPS presence (Figures 5 and 6). The results above described are in agreement with references. However, wavetrain trajectories are strongly dependents of 200hPa basic state characteristics. This aspect evidences a necessity of a detailed study about wavetrain propagation in intraseasonal time scale.

5 - REFERENCES

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