P2.9 TYPICAL FEATURES OF THE SOUTH AMERICA MONSOON SYSTEM, AND RELATIONS WITH THE LOW LEVEL JET AND SOUTH ATLANTIC CONVERGENCE ZONE IN A CLIMATE AGCM SIMULATION

Iracema FA Cavalcanti
José Antonio Marengo
Centro de Previsão de Tempo e Estudos Climáticos
Instituto Nacional de Pesquisas Espaciais
Cachoeira Paulista, SP, Brazil

1. Introduction

The South America monsoon has been analysed in recent years, and the common features associated with the seasonal variability observed in climate studies have been documented, as Zhou and Lau (1998). The low level jet has been analysed in several studies compiled in the extended abstracts of the Conference on South American low level jet (VAMOS/CLIVAR/WCRP).

As many aspects of the monsoon system and lljet are related to the conditions of precipitation over southern and south Brazil, it is important to analyse the hability of models in simulating these aspects. The seasonal variability of precipitation and atmospheric fields in a climate simulation using the CPTEC/COLA AGCM were discussed in Cavalcanti et al (2202). In the present study, results of that simulation (1982-1991) are analysed in order to show the typical features of the South America monsoon system simulated by the model.

2.Data and method

Monthly results in an ensemble form and daily results considering individual members from the climate simulation of 10 years using the CPTEC/COLA AGCM are analysed for the summer season (DJF). The monsoon features and LLJ are discussed analysing the precipitation, wind flow at low and high levels and characteristics of the meridional wind.

3. Results

The climatological precipitation and wind field at low and high levels of the summer season (DJF) are shown in Fig. 1 a,b,c. The features are typical of this season and differ completely of those in the winter. The Bolivian High and the Upper Atlantic Trough is well represented by the model, as well as the position of the Atlantic subtropical High which affects the direction of the trade winds over the northeast brazilian coast.

Extreme cases of precipitation anomalies over South America in the summer season are related to the behaviour of the main characteristics of the monsoon. An opposite relation occur between southeastern and southern Brazil during these extreme cases. The extreme cases occur in ENSO episodes, suggesting a large scale influence on the South America Monsoon system. Fig.2a and 3a show the precipitation anomaly in DJF 82/83, and DJF 88/89 over South America simulated by the model. The anomalies are associated with the direction of the low level flow from the Atlantic and Amazonia region, toward south, in the case of dry southeast and wet south (Fig.2c), and toward southeast, in the case of dry south and wet southeast (Fig.3c). The differences are also seen at high levels and they are related to the behaviour of the Bolivian High, which does not occur in 82/83 (Fig.2b), and it is intense and distorced in 88/89 (Fig.3b). The low level flow behaviour, in the two different cases, and the precipitation anomalies suggest the opposite relation between the South Atlantic Convergence Zone (SACZ) and the Low Level Jet (LLJ) to the east of Andes. Analysing the timeseries of meridional wind averaged over the area 65^0W-60^0W; 15^0S-20^0S, in January 1983 and 1989 it was seen that in 1983, during 28 days the simulated meridional wind had a northerly component, while in 1989 this component occurred in 19 days. The meridional wind vertical structure of the day with the strongest northerly component of 1983 and 1989, (Fig.4 a,b) , shows the presence of the LLJ between 65^0W and 60^0W, in 1983, and the lack of structure in 1989.

4. Conclusion

The main features of the South America Monsoon system are simulated by the CPTEC/COLA AGCM in a climate ensemble simulation. Extreme cases of precipitation over South America associated with the opposite relation between the SACZ and the LLJ are well simulated. The overestimation of the SACZ by the model is also consistent with a reduced number of LLJ cases in the summer, when compared to the reanalyses results.

References

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Zhou, Z; Lau, K.M., 1998. Does a monsoon climate exist over South America? *J.Climate*, 11, 1020-1040.

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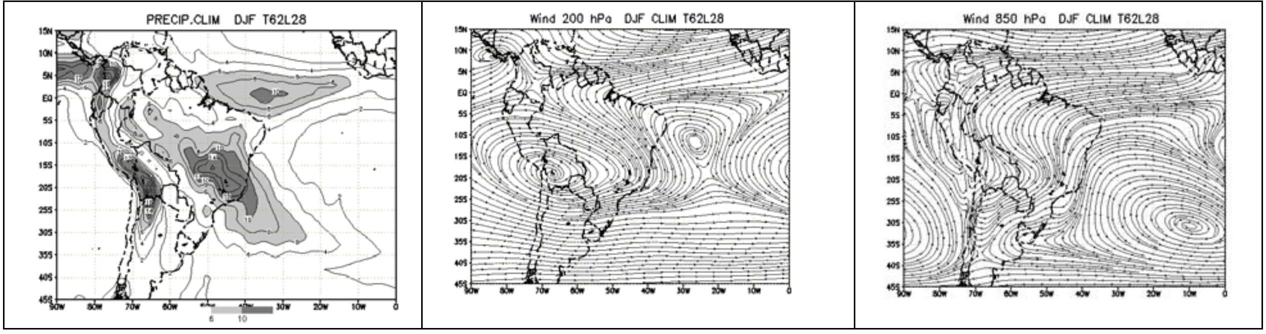
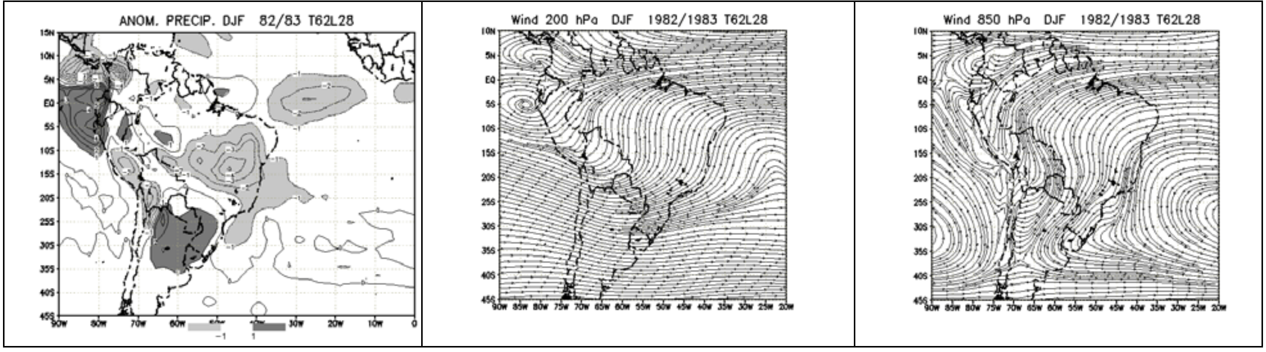
Corresponding author address: Iracema F. A. Cavalcanti, CPTEC/INPE, Cachoeira Paulista, SP, Brazil; e-mail: iracema@cptec.inpe.br.


(a) PRECIP.CLIM DJF T62L28

(b) Wind 200 hPa DJF CLIM T62L28

(c) Wind 850 hPa DJF CLIM T62L28

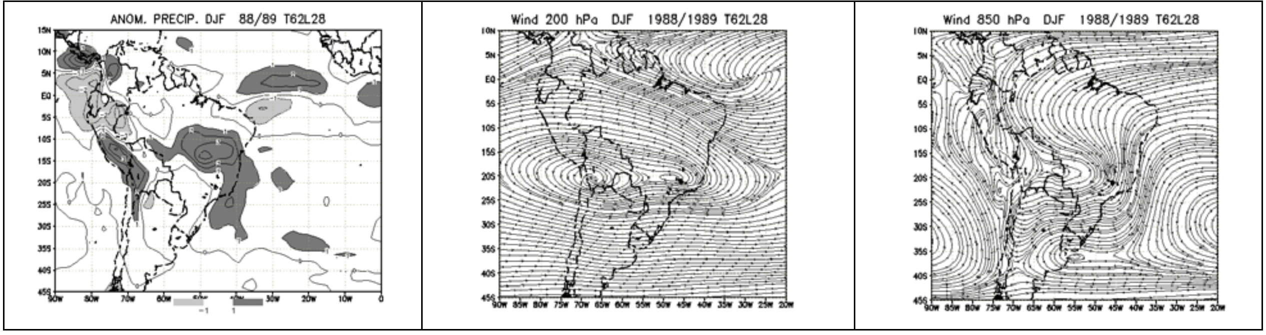
Fig.1. DJF Climatological Model simulation (a) Precipitation, (b) Wind flow at 200 hPa, (c) Wind flow at 850hPa.


(a) ANOM. PRECIP. DJF 82/83 T62L28

(b) Wind 200 hPa DJF 1982/1983 T62L28

(c) Wind 850 hPa DJF 1982/1983 T62L28

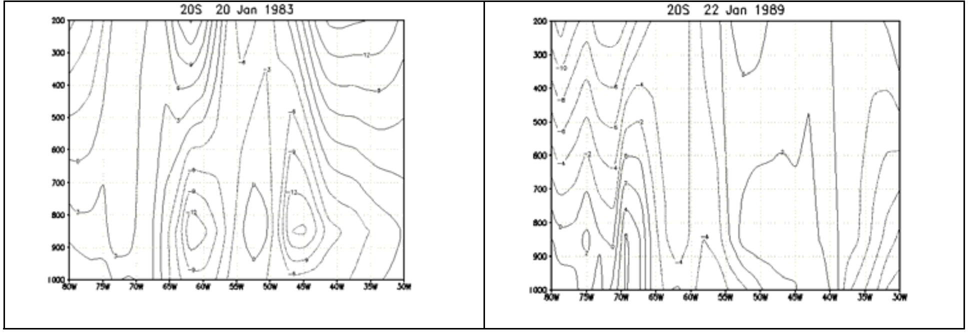
Fig.2- DJF 1982/1983 Model simulation (a) Precipitation anomaly, (b) Wind flow at 200 hPa, (c) Wind flow at 850 hPa.


(a) ANOM. PRECIP. DJF 88/89 T62L28

(b) Wind 200 hPa DJF 1988/1989 T62L28

(c) Wind 850 hPa DJF 1988/1989 T62L28

Fig.3- DJF 1988/1989. Model simulation (a) Precipitation anomaly, (b) Wind flow at 200 hPa, (c) Wind flow at 850 hPa.


(a) 20S 20 Jan 1983

(b) 20S 22 Jan 1989

Fig.5. Vertical structure of meridional wind at 20^0S. (a) 20 Jan 1983, (b) 22 Jan 1989.