

1. Introduction

Several theoretical and observational studies identified many teleconnection patterns in both hemispheres. Remarkable "twins" patterns are the PNA (Pacific North America) and PSA (Pacific South America). The PSA shows the dominant pattern linking the tropical convection to anomalies at higher latitudes in the Southern Hemisphere. Mo and Higgins (1998) associated the PSA with two low-frequency wave number 3 modes. The position of the wavetrains triggered by the tropical convection have an influence on the atmospheric circulation over South America. Grimm and Silva Dias (1995), using a barotropic model showed that a global "chain" of teleconnections could exist. This possible "chain" links the SPCZ to SACZ, as well as show an influence of SACZ on Atlantic and Eurasian patterns, with possible connection back to the Western Pacific. Therefore it is suitable to analyze the interaction between the Tropical Pacific convection and anomalies over South America.

2. Data

Outgoing longwave radiation (OLR) data from National Oceanic and Atmospheric Administration (NOAA) polar-orbiting satellites was used to distinguish areas of deep tropical convection. NCEP reanalysis data of zonal and meridional wind components at 250 hPa and geopotential at 500 hPa were used to analyze the atmospheric circulation.

3. Methodology

Daily anomalies of OLR, wind and geopotential were submitted to a Lanczos filtering to isolate the low frequency in a band between 10 and 90 days. Filtered OLR spatial averages of areas in the tropical region were calculated to identify areas of enhanced convection. In the present study only one of these regions are analyzed, which is the western sector of Indonesia: 100°E-123°E/7.5°S-3°N. Two periods were selected, with positive and negative anomalies above 30 W.m^{-2} , which represent periods of convection below and above the average conditions.

Composites of OLR and atmospheric circulation anomalies of both periods show persistent patterns of tropical-extratropical interactions.

4. Results

The OLR configuration of the extreme negative case (convection above normal over western Indonesia) persisted for 5 days. Composites of OLR, wind field and geopotential anomalies of this period are shown in Fig. 1. Positive anomalies occur over Central Pacific, to the east of the anomalous convection over Indonesia, and also over South America and south of North America. Negative anomalies in a band NW/SE over West South Pacific indicate the SPCZ displaced westward. In the wind anomaly field two anticyclonic circulations occur around the equator over the Indian Ocean. Wavetrains from these two anticyclones are identified in both hemispheres, extending eastward to South America and to North America. In the geopotential anomaly field, only the mid and high latitude part of the wavetrain are identified in both hemispheres.

The extreme case of positive OLR anomaly over western Indonesia showed anomalies over South America which persisted for 2 days, (Fig.2). In this case, negative anomalies occur over West Pacific and over southeastern South America. Anomalies over South Pacific indicate the SPCZ displaced eastward. The two anticyclonic circulation anomalies around the equator associated with tropical convection are located over Central Pacific and induce wavetrains poleward and eastward. Over South America opposite OLR anomalies are associated with opposite circulation anomalies. The wavetrain identified in the geopotential anomaly field is different from the other case. When the tropical anomalous convection was located over western Indonesia and Indian Ocean, the wavetrain extended around the Southern Hemisphere. On the other hand, when the anomalous convection is over West Pacific, the wavetrain extends only from the Pacific to the Atlantic Ocean.

3. References

Kingtse C. Mo & R. Wayne Higgins, 1998, The Pacific-South American Modes and Tropical Convection during the Southern Hemisphere Winter. *Mon. Wea. Rev.*, 126, 1581-1596.

Alice M. Grimm & Pedro L. Silva Dias, 1995, Analysis of Tropical-Extratropical Interactions with Influence Functions of a Barotropic Model. *J. Atmos. Sci.*, 52(20), 3538-3555.

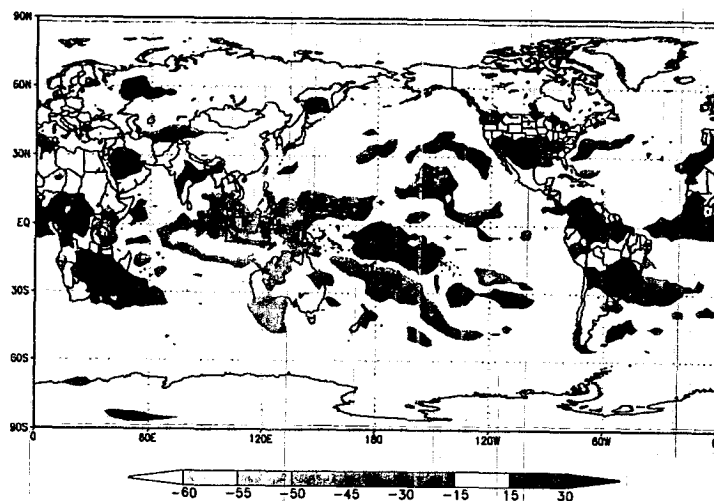


Fig 1 - Negative OLR filtered anomalies (a) and anomaly wind (b) field associated.

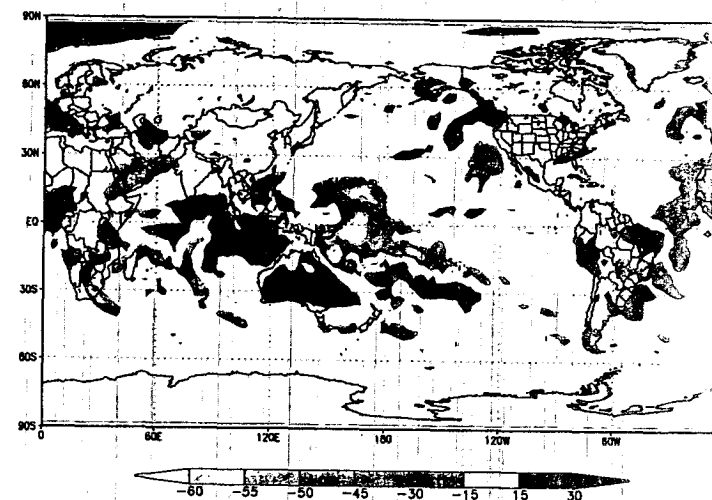


Fig 2 - Positive OLR filtered anomalies (a) and anomaly wind (b) field associated.