P2B.12 A RADAR PERSPECTIVE ON THE VARIABILITY OF TROPICAL CONVECTION CHARACTERISTICS OVER THE SOUTHWEST AMAZON AND EAST PACIFIC REGIONS

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1. INTRODUCTION

The understanding of convection, and its temporal and spatial variations at different scales, is of paramount importance to comprehend how the tropics interact with the rest of the globe.

The objective of this study is to provide an analysis of convective characteristics for two tropical regions using radar data. This study focuses on identifying differences in diurnal cycle and wind-regime-dependent variations in convection in the southwest Amazon and east Pacific regions.

2. DATA

This study makes use of radar data collected in two field experiments: TRMM/LBA and EPIC. TRMM/LBA (Tropical Rainfall Measuring Mission/Large Scale Biosphere Atmosphere Experiment in the Amazon) took place in the wet season months of January and February of 1999 in the State of Rondonia, Brazil. The first component EPIC (East Pacific Investigation of Climate Processes in the Coupled Ocean-Atmosphere System) took place in September and October of 2001, between the Equator and 10º N along the 95º-W-meridian. During TRMM/LBA two radars continually collected data, but the present study is based solely in the data collected by the S-pol radar. The radar was located at 11.22º S and 62.00º W. During EPIC, a C-band Doppler radar onboard NOAA research vessel Ronald H. Brown continually collect data. The nominal position of the ship during the first component of EPIC was 10º N, 95º W.

Two distinct wind regimes were observed to occur in each of the two tropical regions examined here. In the southwest Amazon, the low-level zonal wind component switched five times during TRMM/LBA. One of these wind regimes was named easterly and the other westerly. These changes in wind regime have been observed to be associated with the passage of baroclinic waves in the subtropical parts of Brazil and the formation of a synoptic-scale feature known as the South Atlantic Convergence Zone (Rickenbach *et al*., 2002). In the east Pacific warm pool region the two wind regimes ere named northerly and southerly and were observed to associated with the passage of the easterly waves (Petersen *et al*., 2003). Table 1 (2) summarizes the periods found for each wind regime circulation during TRMMLBA (EPIC).

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TABLE 1

Wind Regime	Period
Easterly	01/11/99-01/13/99
Westerly	01/14/99-01/18/99
Easterly	01/19/99-01/28/99
Westerly	01/29/99-02/07/99
Easterly	02/08/99/02/21/99
Westerly	02/22/99-02/28/99

TABLE 2

Wind Regime	Period
Northerly	09/12/01 00:00 - 09/16/01 11:59
Southerly	09/16/01 12:00 - 09/18/01 21:59
Northerly	09/18/01 22:00 - 09/21/01 03:39
Southerly	09/21/01 03:40 - 09/24/01 19:09
Northerly	09/24/01 19:10 - 09/28/01 02:29
Southerly	09/28/01 02:30 - 10/01/01 23:59

3. RESULTS

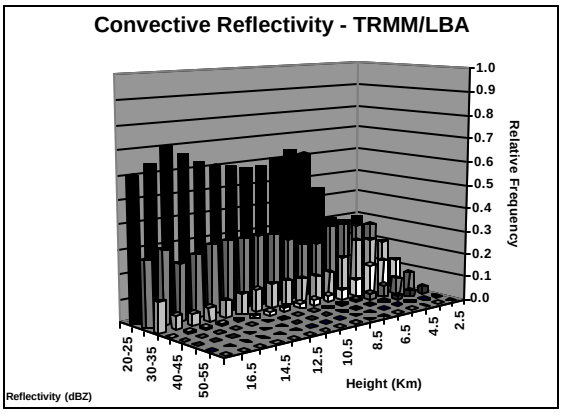

Figure 1 – Vertical reflectivity distribution during TRMM/LBA.

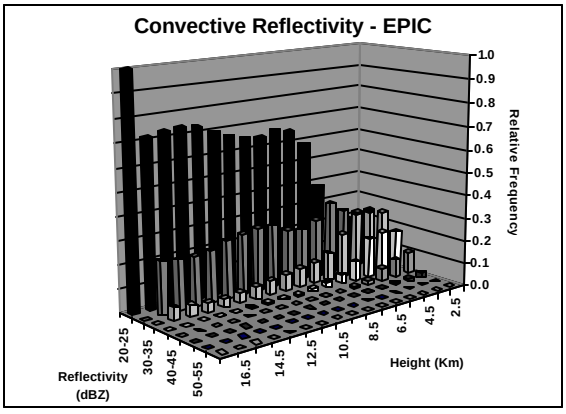

Figure 2 – Vertical reflectivity distribution during EPIC.

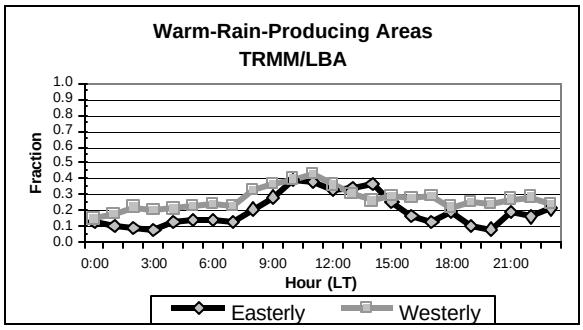

Figure 3 – Warm-rain-producing areas during TRMM/LBA.

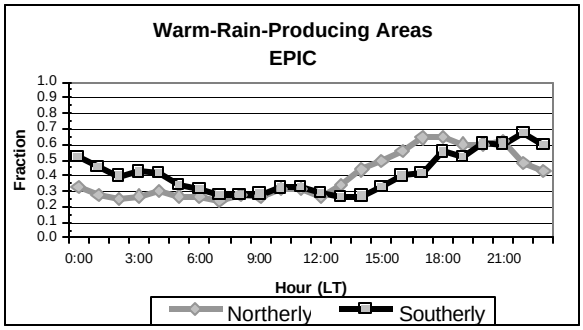

Figure 4 – Warm-rain-producing areas during EPIC.

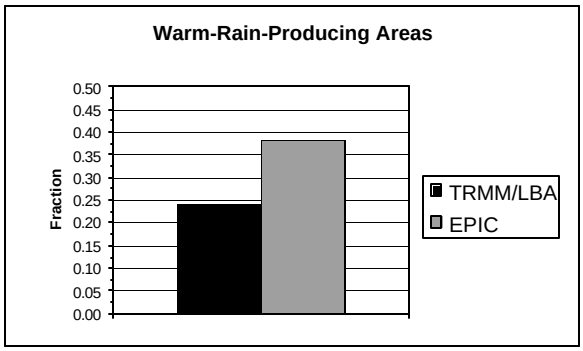

Figure 5 – Warm-rain-producing areas during TRMM/LBA and EPIC.

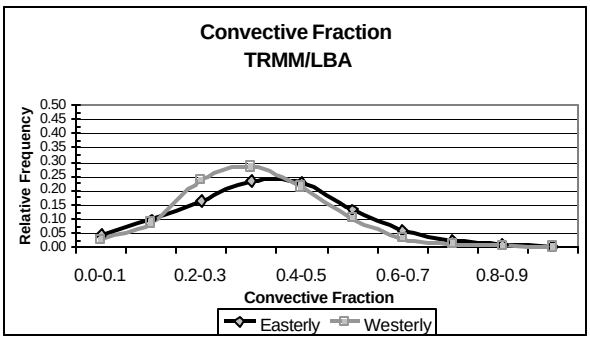

Figure 6 – Convective fraction during TRMM/LBA

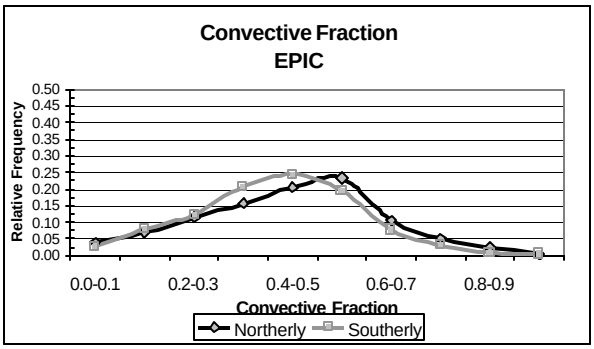

Figure 7 – Convective fraction during EPIC.

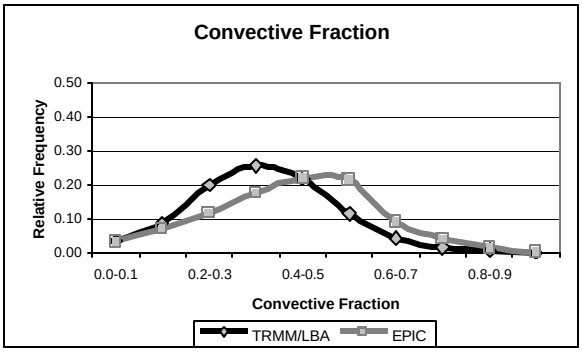

Figure 8 – Convective fraction in TRMM/LBA and EPIC.

4. CONCLUSIONS

Figures 1 and 2 show the vertical distribution of reflectivities during TRMM/LBA and EPIC. Strong reflectivities (i.e. greater than 45 dBZ) are about twice as common in the southwest Amazon than in the east Pacific region. However, below the 5-km (freezing) level, intermediate reflectivities (i.e. between 30 and 45 dBZ) are more common in the east Pacific region.

Figures 3, 4 and 5 show the fraction of precipitating areas associated with warm rain (i.e. echo tops below 5 km). Warm rain areas were observed to be more frequent in the westerly and southerly regimes. Warm rain areas were observed to be 14% more frequent in the east Pacific region.

Figures 6,7 and 8 show the fraction of precipitating areas associated with convection. Convective fractions were observed to be greater in the easterly and northerly regimes. Greater convective fractions were observed to occur in the east Pacific region.

5. REFERENCES

Petersen, W. A., R. Cifelli, D. J. Boccippio, S. A. Rutledge, and C, Fairall, 2003: Convection and easterly wave structure observed in the eastern Pacific warm-pool during EPIC 2001. *J. Atmos. Sci.*, submitted.

Rickenbach, T. M., R. Nieto Ferreira, J. B. Halverson, D. L. Herdies and M. A. F. Silva Dias, 2002: Modulation of convection in the southwestern Amazon basin by extratropical stationary fronts. *J. Geophys. Res.*, **107**, 10/10292000JD000263.