P2B.6 **STATISTICAL STUDIES OF SINGLE-DOPPLER DATASETS FROM SEVERAL TROPICAL CONVECTIVE REGIONS AND SEASONS**

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ABSTRACT

In this study, the radar manifestations of climatological differences seen in ISCCP cloud data are sought in the set of available samples from few-week single-Doppler data sets in special field programs, including TOGA COARE, JASMINE, KWAJEX, SCSMEX, TEPPS, EPIC, and TRMM-LBA. Divergence profiles are calculated using VAD analysis when radar echoes are sufficiently plentiful, and vertical motion and latent heating profiles are also derived. These profiles, together with the reflectivity histograms (CFAD), will be compared for the different tropical convective regions and seasons.

DATASETS AND METHODOLOGY

In this study, substantial amount of single Doppler radar data from many field experiments (Table 1) have been processed to obtain simultaneous profiles of radar reflectivity histogram, divergence, vertical motion and latent heating. A coarse cylindrical coordinate system centered on the radar position is used to collect hourly histograms of the radar reflectivity and the Doppler radial velocity. The spatial bins are 24 azimuth bins (15^o each), 12 range bins (8 km each from 8km to 96 km), and 36 height bins (0.5 km each from 0.5 km to 18 km). Vertical motion and latent heating profiles are calculated in pressure coordinate, following the traditional method for calculating the sounding array mass and heat budgets (e.g. Zhang and Lin 1997). There are hundreds to thousands of hours of radar data for each experiment.

RESULTS

Fig. 1a shows the ZCFAD diagram for one hour of reflectivity data within the 48 km range circle of MIT radar during TOGA COARE. The precipitation is dominated by strong convective cells with 37 dBZ at 2 km. The mean Z_e profile (Fig. 1b) increase monotonically with decreasing height, indicating deposition/condensation throughout the troposphere. The divergence profile (Fig. 1c) is a typical convective profile (Mapes and Houze 1995), with convergence in the lower troposphere and divergence in the upper troposphere. Correspondingly, the latent heating profile (Fig. 1d) is warming throughout the troposphere with a peak around 600 mb.

Table 1. Single-Doppler data sets used in this study

Project	Radar	Time period
COARE	MIT	Nov 05 1992-Dec 13 1992
		Dec 19 1992-Jan 22 1993
		Jan 29 1993-Feb 26 1993
	TOGA	Dec 10 1992-Jan 10 1993
		Jan 22 1993-Feb 19 1993
TEPPS	NOAA	Jul 28 1997-Aug 23 1997
SCSMEX	TOGA	May 04 1998-Jun 25 1998
LBA	TOGA	Jan 06 1999-Feb 28 1999
JASMINE	NOAA	Apr 29 1999-May 31 1999
EPIC	NOAA	Sep 09 2001-Oct 01 2001
KWAJEX	TRMM	Jul 01 1999-Dec 31 1999

Fig. 1e shows ZCFAD for another hour. There is a strong bright band at 4.5 km, and no apparent high-dBZ convective cells at 2 km. This is a typical stratiform region ZCFAD. The mean Z_e profile (Fig. 1f) shows a strong peak at the bright band level, indicating deposition/condensation above and evaporation below. The divergence profile (Fig. 1g) is a typical stratiform profile , with convergence in the middle troposphere and divergence in the upper and lower tropospheres. Correspondingly, the latent heating profile (Fig. 1h) has warming in the upper troposphere and cooling in the lower troposphere.

Fig. 1i shows ZCFAD for a third hour. There are both high-dBZ convective cells at 2 km and a bright band at 4.5 km. The mean Z_e, divergence and latent heating profiles (Fig. 1j-l) are all combination of the convective (Fig. 1b-d) and stratiform (Fig. 1f-h) profiles.

We'll compare the ZCFAD diagrams, together with profiles of mean Z_e, divergence and latent heating, for the different tropical convective regions and seasons.

REFERENCES

Mapes, B. E., and R. A. Houze, 1995: Diabatic divergence profiles in western Pacific mesoscale convective systems. *J. Atmos. Sci.*, **52**, 1807-1828.

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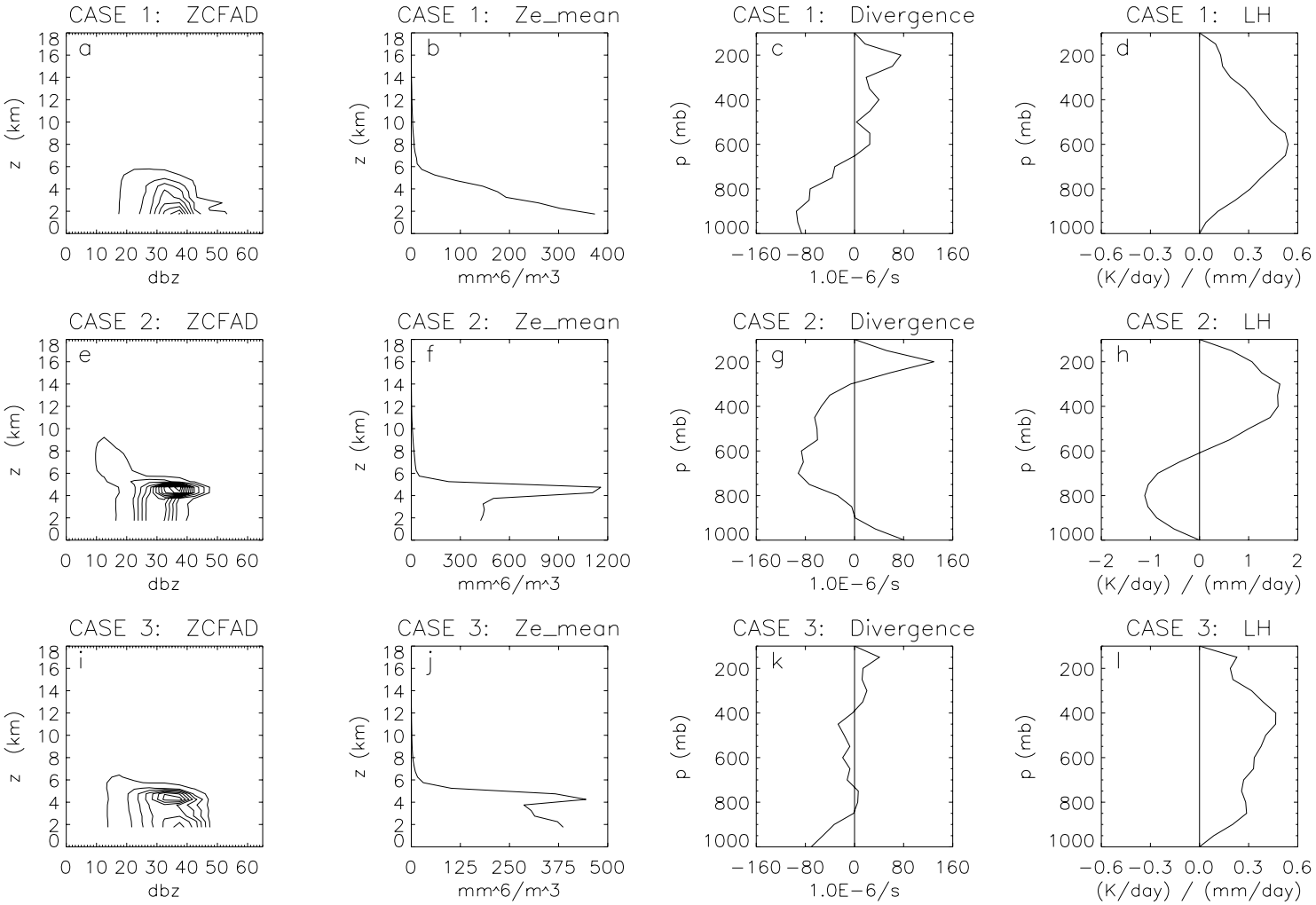

Figure 1: ZCFAD (a), mean Z_e (b), divergence (c), and latent heating (d) for one hour of MIT radar data during TOGA COARE. Panels e-h is same as panels a-d except for another hour, and panels i-l for a third hour.