12B.3 DERIVE LARGE-SCALE FORCING DATA FOR CRM AND SCM BY INTEGRATING DOPPLER RADAR, SOUNDING, TOA AND SURFACE MEASUREMENTS

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ABSTRACT

This study derives the large-scale forcing data for CRMs and SCMs using continuous Doppler radar, sounding, TOA and surface measurements from several recent tropical experiments including TEPPS, EPIC, LBA, JASMINE and KWAJEX. Hourly averaged wind, divergence and vertical motion profiles are derived from Doppler radar. They are combined with sounding, TOA and surface measurements to calculate the heat and moisture budgets using the constrained variational analysis method of Zhang and Lin (1997), which balances the column-integrated mass, heat and moisture budgets. Possible applications of the datasets will be discussed.

DATASETS AND METHODOLOGY

Datasets used are from deployments of research-quality Doppler radars in seven field experiments in the tropics (Table 1). Each deployment was different, but most were roughly 1 month (720 h) in duration, for a total of 7000 hours in our present database. Most deployments sampled various types of convection occurring in different parts of the Indo-Pacific warm pool; the TRMM-LBA experiment in Brazil yielded our only data over land.

A simple new analysis for large single-Doppler radar data sets is presented and illustrated. A cylindrical grid is used, to respect both the physical importance of height and the interpretive importance of range and azimuth. Horizontal and temporal fine structure are sacrificed, as data are binned into histograms in each region of 15o azimuth x 8 km range x 500 m height x 1 hour dimensions. Mean Doppler radial velocity in each region is computed, adjusted automatically using a histogram method for velocity de-aliasing, and fed into a Velocity-Azimuth Display (VAD) analysis which yields profiles of horizontal wind divergence for circles of different radii centered on the radar,along with a mean wind profile.

The mass, heat and moisture budgets are calculated from the radar and sounding data using the constrained variational analysis method by Zhang and Lin (1997).

Table 1: 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

RESULTS

The Q_1 profiles for the EPIC experiment are shown in Fig. . The mean profile has a peak at 400 mb, which is similar to the TOGA COARE profile. The high temporal resolution (hourly) of this data reveals interesting fine structures which need further study. Budgets for other experiments will be calculated. Possible applications of the datasets will be discussed.

REFERENCES

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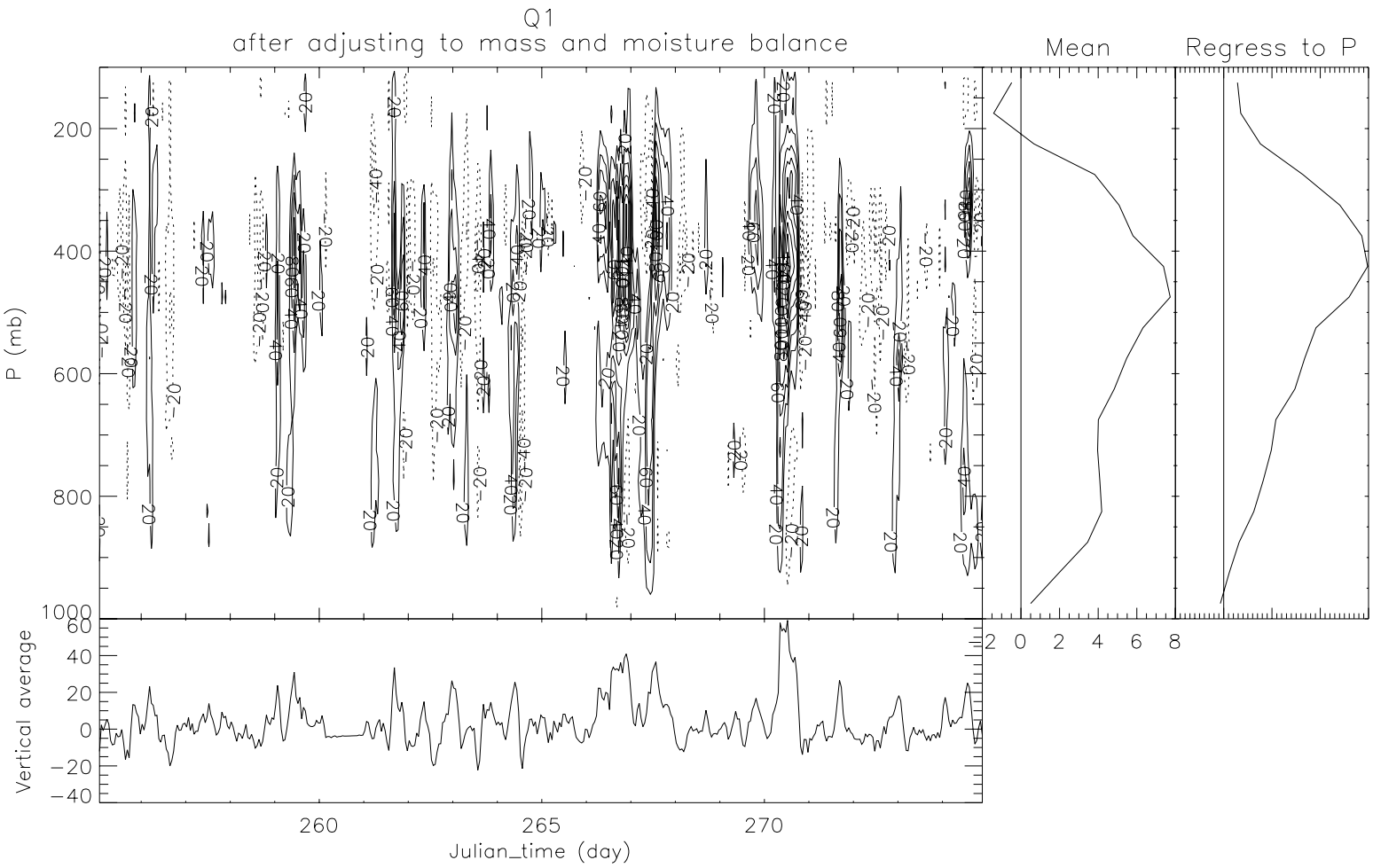

Figure 1: Q_1 profiles for the EPIC experiemnt.