Large-Scale Budget Derived from GoAmazon: Diurnal Cycle and Related Systems

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Introduction

- The large-scale forcing data has been derived using the constrained variational analysis (Zhang and Lin 1997) to support cloud model studies for the GoAmazon 2014/5 experiment, which was conducted to understand the aerosol and cloud life cycles and aerosol-cloud-precipitation interactions in tropical rainforests.
- The large-scale vertical velocity, Q1 and Q2 corresponding to the diurnal cycle and related convective systems are analyzed and presented in this poster.

Data

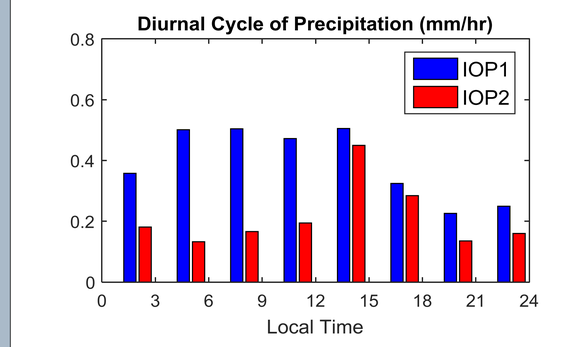
Intensive Operational Periods

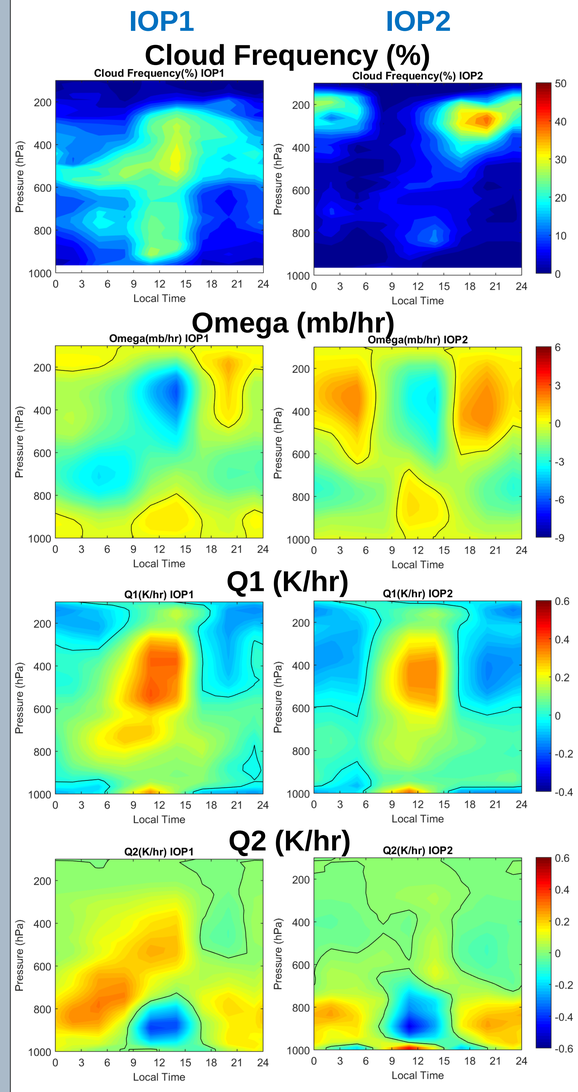
- **IOP1 (Wet Season)**: 15 Feb. – 26 Mar. 2014
- **IOP2 (Dry Season)**: 1 Sep. – 10 Oct. 2014
- Analysis domain is in 110km radius centered at Ponta Pelada airport (location of SIPAM radar).

Data Used

- Precipitation from SIPAM radar at Ponta Pelada
- Surface radiative fluxes, LH, SH and etc. at ARM site
- LH and SH at ATTO and K34 (FLUXNET-BR Ma2)
- TOA radiative fluxes from GOES-13
- ECMWF analysis as background data

Diurnal Cycle





- Morning convection is limited at much lower levels in the dry season (IOP2) than in the wet season (IOP1)
- The large-scale fields are similar in both IOPs for the afternoon convective systems.

Acknowledgement

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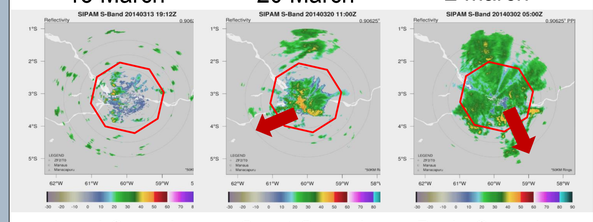
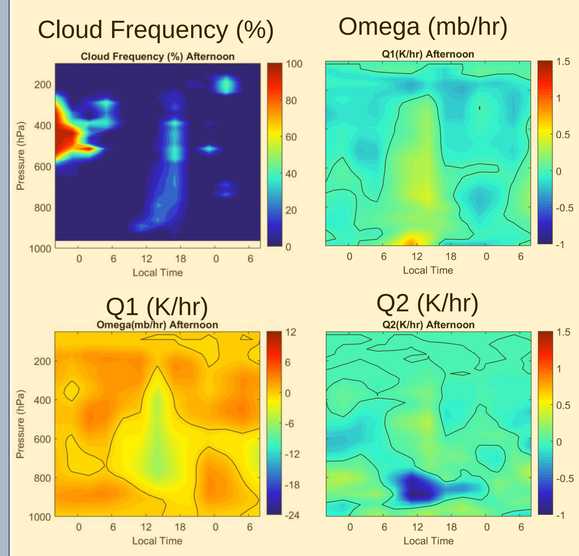
Three Types of Systems

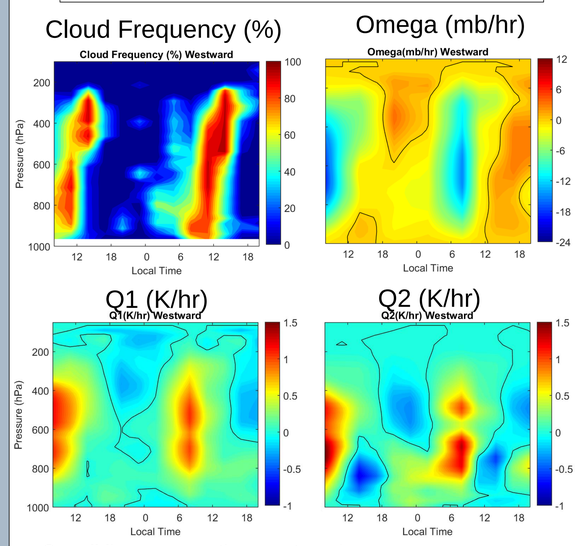


13 March Local Occurring System



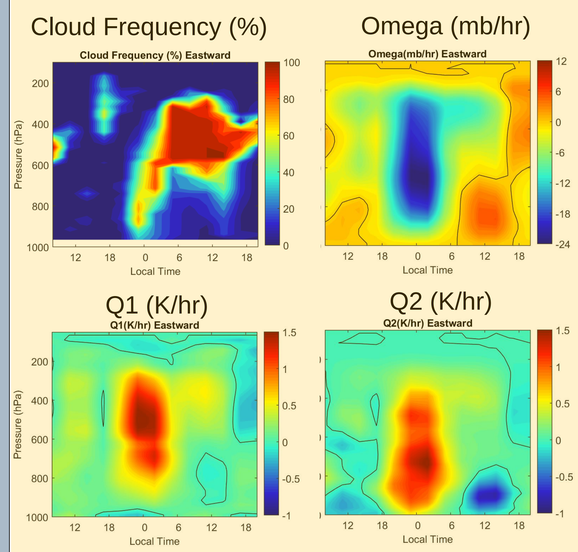
- Relatively weak rising motion, heating and drying
- Low-level heating and moistening corresponding to vertical convergence of eddy fluxes in the boundary layer

20 March Coast Occurring System



- Squall line propagating westward
- Strong and deep convection
- Similar LOS profiles after the passage of squall line

2 March Basin Occurring System



- MCS propagating eastward
- Broad area and long-time existence
- High precipitating stratiforms remain in the afternoon

Statistics of Convective Systems during IOP1 and IOP2

	IOP1		IOP2	
	Morning	Afternoon	Morning	Afternoon
LOS (afternoon scattered convections)	0	19	0	14
COS (westward propagating systems)	7	6	0	3
BOS (eastward propagating systems)	3	3**	2*	0

* the two cases are propagating westward.
** the afternoon BOSs are continued from the morning time.

Summary

- The large-scale budgets show larger seasonal contrast in morning time than in afternoon time.
- Morning convections occur more frequently during the wet season than the dry season, which the frequency of afternoon convective systems are similar in both seasons.
- The three types of convective systems have distinguish large-scale budget features

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