

THE POSSIBLE MECHANISMS RESPONSIBLE BY EXTREME RAINY EVENTS IN THE NORTHEAST BRAZIL (NEB) SEMIARID INTERIOR ZONE (1977-1997)

MARLEY CAVALCANTE DE LIMA MOSCATI

Instituto Nacional de Pesquisas Espaciais – INPE

Centro de Previsão de Tempo e Estudos Climáticos - CPTEC

Av. dos Astronautas, 1758, Jd Granja, São José dos Campos, SP, 12201-970, BRAZIL

E-mail: marley@cptec.inpe.br

The semiarid region of the Northeast Brazil (NEB) comprises more than half of the NEB total area and experiences one of the greatest variations of annual rainfall (Kousky and Chu, 1978). Recently, Moscati and Gan (2005) based in analysis of the daily time series of the Rainfall Index (RI) and the 850 hPa wind indexes (i.e., Zonal Index (ZI), the Meridional Index (MI) and the u minus v Index (UVI)), calculated for northern (A1: 7°S-10°S and 37°W-44°W) and southern (A2: 10°S-15°S and 40°W-45°W) domains, verified that over 20-yr period (1977-1997) there were 34 episodes of the extreme heavy rain events in the NEB semiarid interior rainy season. An extreme heavy precipitation event was defined as the period when $RI > 7.75 \text{ mm day}^{-1}$ in A1 or $RI > 10.0 \text{ mm day}^{-1}$ in A2, during at least four consecutive days. They also verify that the heavy rain can be substantially modulated by the juxtaposition of two or more simultaneous synoptic scale systems and it depends on the frequency of these systems and their interactions. The kind of interactions more common between the synoptic scale systems were: between Frontal System (FS) and South Atlantic of Convergence Zone (SACZ); between FS and Upper Tropospheric Cyclonic Vortex (UTCV); between FS and Squall Line (SL); among FS, SACZ and Intertropical Convergence Zone (ITCZ); among FS, Bolivian High (BH) and Upper-level Troughs (UT); among FS, SACZ, ITCZ and UTCV, among FS, ITCZ, UTCV and SL. So, the goal of this paper is to study case-by-case for answer what is the relative contribution of each system on rainfall distribution in the NEB semiarid zone and what are the favorable conditions to

the occurrence of their interactions. The database used are the daily mean 850 hPa zonal (u) and meridional (v) components of the wind from the *National Centers for Environment Prediction/National Center for Atmospheric Research* (NCEP/NCAR) *reanalysis* and the gridded daily Precipitation (P) analysis data in Brazil (10⁰S-40⁰S and 30⁰W-80⁰W), produced by the *Climate Prediction Center* (CPC), from 1977 to 1997. Month-to-month information of the synoptic scale systems that predominates over Brazil (monthly mean position of the ITCZ over South Atlantic Ocean, presence of SACZ and UTCV, the equatorward advance of southern FS, evolution of sea breeze and SL over north-northeast coast of Brazil, among others) and the large-scale atmospheric conditions over this region, available in the Bulletin “Climanálise”, from September 1986 to December 1997.

KEY WORDS: Semiarid, Northeast Brazil (NEB), synoptic systems, rainfall.

References

Kousky VE, Chu PS. 1978. Fluctuations in annual rainfall for Northeast Brazil. *Journal of Meteorological Society Japan* **56**(5):457-465.

Moscatti MCL; Gan MA. 2005. Rainfall variability in the rainy season of Semiarid Zone of Northeast Brazil (NEB) and its relation to wind regime. Accepted in *International Journal of Climatology*, on November 2005.

2) 8th International Conference on Southern Hemisphere Meteorology and Oceanography
Data limite para envio de abstracts (máximo de 500 palavras): **15 de outubro de 2005**.

Local: Foz do Iguaçu,

Período: de 24 a 28 de abril de 2006

O tema central da Conferência é "Understanding and Predicting Climate and Water Resources, their Variability and Change in the Southern Hemisphere"

Mais informações, incluindo os tópicos específicos e programas podem ser vistas no site abaixo

<http://tucupi.cptec.inpe.br/8ICSHMO>

Confirmation of Submission

The submission has been completed successfully!

Submission done in 2005-11-01 at 15:38 (Brazilian time).

Your submission identifier is:

<cpotec.inpe.br/adm_conf/2005/11.01.17.38>.

You will be sent a confirmation e-mail containing all the above information and a login/password for future submission.

Thank you for submitting your Abstract to the *8th International Conference on Southern Hemisphere Meteorology and Oceanography*.

8th ICSHMO Administrator

8th International Conference on Southern Hemisphere Meteorology and Oceanography (8ICSHMO)

24-28 April 2006, Foz do Iguaçu, Brazil.

The 8th International Conference on Southern Hemisphere Meteorology and Oceanography will be held 24–28 April 2006 in Foz do Iguaçu, Paraná State, Brazil. Foz do Iguaçu is beautiful natural setting located in the area of the triple border between Brazil, Argentina, and Paraguay, that includes the world-famous Iguaçu Falls. Preliminary conference programs, registration, hotel, and general information will be posted on the AMS Web site (<http://www.ametsoc.org/AMS>) and on the Local Organizing Committee web site (http://www.cptec.inpe.br/SH_Conference/submit.shtml) in mid-July 2005.

Poster as well as oral presentations are solicited on all aspects of the meteorology and oceanography of the Southern Hemisphere. The meeting is organized around the broad theme: "*Understanding and Predicting Climate and Water Resources, their Variability and Change in the Southern Hemisphere*". Particular attention will be given to:

- a)** Monsoon systems and continental rainfall; fundamental processes; climatological, ecological, biogeochemical, and hydrological functioning of the Monsoon regions;
- b)** Role of the SH oceans in climate. Climate – ecosystems – biogeochemistry interactions in the oceans of the SH;
- c)** Addressing gaps in SH observing systems;
- d)** Climate and weather forecasts: the challenge of seasonal, interannual, and interdecadal prediction in the SH;
- e)** Understanding long-term climate variations in the SH;
- f)** Hydrological variability and modeling;
- g)** Climatic and ecological impacts of land cover and land use changes;
- h)** Climate and cryosphere of the Antarctic region;
- i)** Climate change in the SH;
- j)** Inter-ocean exchanges in the SH;
- k)** Human influences on climate;
- l)** Atmospheric chemistry in the SH .

The Program Committee also encourages submissions of recent scientific accomplishments and synthesis for the Southern Hemisphere arising from research coordinated by global programs like WCRP, CLIVAR, GEWEX, IGBP, GCOS, GOOS, GEOSS and by regional programs such as LBA, SALLJ, LPB, etc.

Please submit your abstract electronically via the Web by October, 31st, 2005

(refer to the Conference Web page at ([click here for instructions](#).) Authors of accepted presentations will be notified (via e-mail) by 1st December 2005. A preprint CD-ROM will be prepared and authors of invited and accepted papers will be asked to contribute to this Volume. All extended abstracts are to be submitted electronically and will be available on-line via the Web. Instructions for formatting extended manuscripts for the preprint CD-ROM will be posted on the AMS Website and on the Local Organizing Committee Website. Manuscripts (up to 3MB) must be submitted electronically by February, 1st, 2006 to the Conference Webpage (http://www.cptec.inpe.br/SH_Conference) . A manuscript charge will be collected to defray to cost of the preprint CD-ROM, as well as Web posting of the manuscript and recorded meeting Conference.

For additional information please contact the Program co-chairpersons, Prof. Carolina Vera, (+54-11-47872693; email: carolina@cima.fcen.uba.ar) and Dr.Carlos Nobre (+55-12- 3186 9459, email: nobre@cptec.inpe.br).