

# ON THE DYNAMICS OF DAILY EXTREME PRECIPITATION EVENTS IN THE STATE OF SAO PAULO, BRAZIL

C. S. Vera, CIMA/Department of Atmospheric Sciences.  
University of Buenos Aires-CONICET. Buenos Aires,  
Argentina

B. Liebmann, CDC, University of Colorado, Boulder, U.S.A.  
L. M. V. de Carvalho and C. Jones, ICESS, University of California, Santa Barbara, U.S.A.

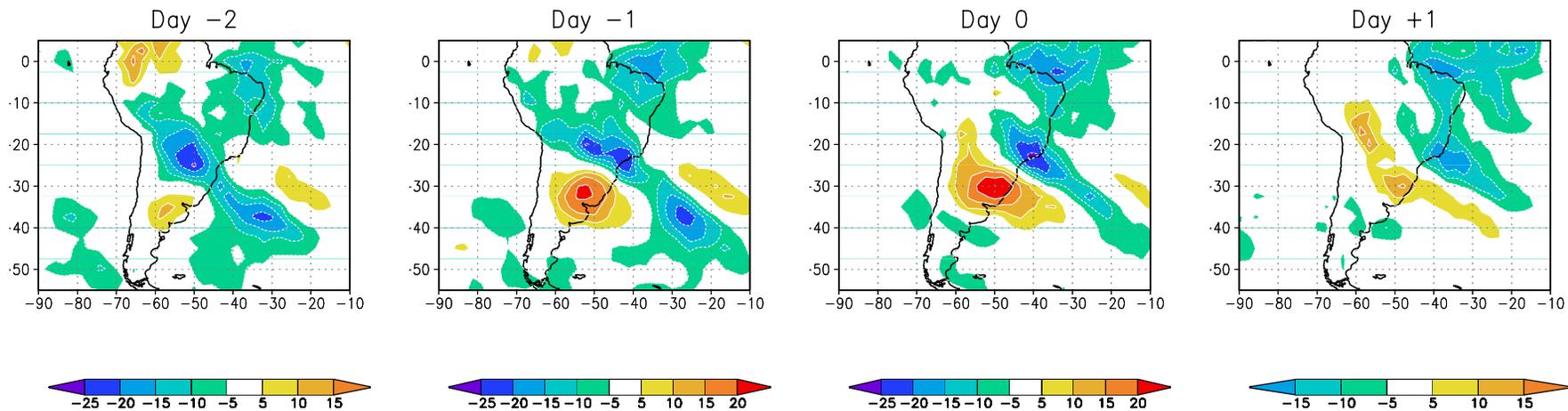
The study exploits data from more than 150 rain gauges throughout the state of São Paulo and the NCEP reanalysis data set to: i) diagnose relationships between daily extreme precipitation events over São Paulo state and the atmospheric circulation features; ii) explore how the preferred atmospheric pattern associated with these events varies with the location of extreme event occurrence within the state; and iii) document physical links between these events and intraseasonal oscillations (IO). For each station an extreme event is defined if more than 16% of its Dec-Feb climatological total precipitation falls in one day. Dates were identified on which at least 2 stations recorded events. Extreme precipitation events in the São Paulo state are accompanied by distinctive circulation features like an upper-level cyclonic anomaly, to the southwest of the precipitation band and a Rossby wavetrain extending from the southeastern Pacific towards South America. Extreme events occur throughout the whole state being more frequent along the coast and over the southern sector. Differences in the evolution of the associated wave train and in the location and intensity of the upper-level cyclone have been found depending on where the extreme event occurs. These changes have a strong influence on moisture flux convergence over the state (see figures 1 and 2). In addition, extreme events may occur during negative, positive and neutral IO episodes, but the largest fraction of these events (for the state as a whole) occur during the negative IO phases.

## **Figure captions:**

**Figure 1:** This figure shows that extreme events at the Sao Paulo coast occur in association with a convective band moving from subtropical regions toward the northeast. The band is well extended from the inner part of the continent into the Atlantic ocean and with relatively high OLR values along the 4-day evolution presented here. Also it is noticeable the intense positive OLR anomalies to the Southwest of the band. On the other hand extreme events in the interior north are accompanied by enhanced convection over the state and surrounding areas that moves very slowly to the east. In this case, regions of OLR positive anomalies are discernible at both sides of the band.

**Figure 2:** vertically integrated moisture fluxes and the corresponding moisture flux convergence field. These are composites of full fields not anomalies and only the convergence values are contoured. So, extreme events over the Sao Paulo coast are accompanied at day -2 by a convergence of moisture fluxes coming from the inner part of the continent, from the tropical Atlantic and also from midlatitude regions with a flux orientation parallel to the coasts. During the next day the contribution from the interior is much less while the convergence of fluxes from midlatitudes moves eastward as the associated cyclonic system does. It is noticeable that extreme events occurrence at the northern portion of the state are mainly associated with moisture fluxes coming from the Amazon region that after contoured the Andes orography, finally converge over southeastern Brazil.

FIGURE 1  
Sao Paulo coast



Sao Paulo interior-north

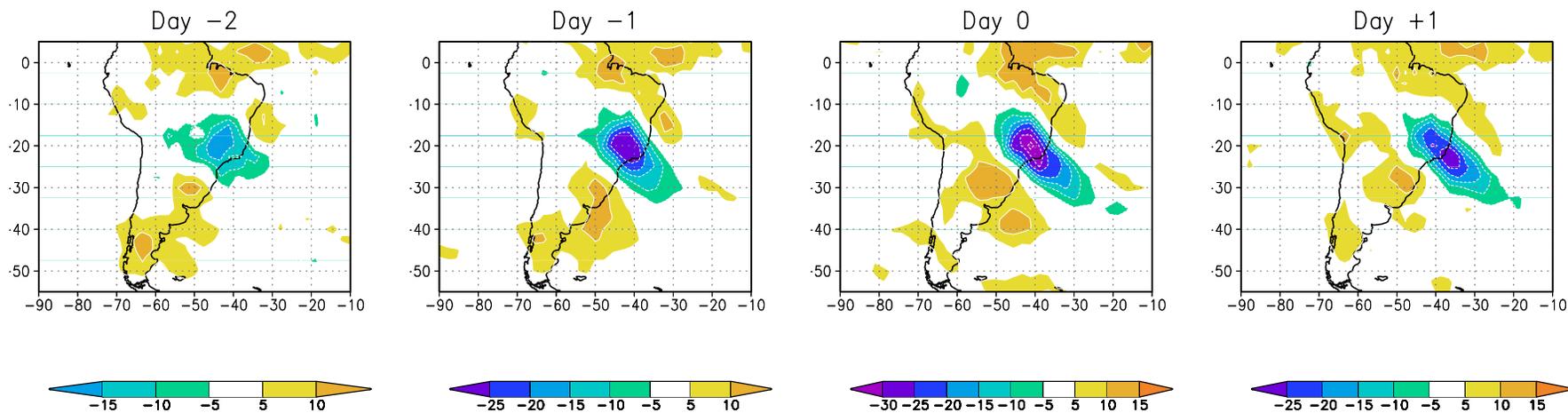
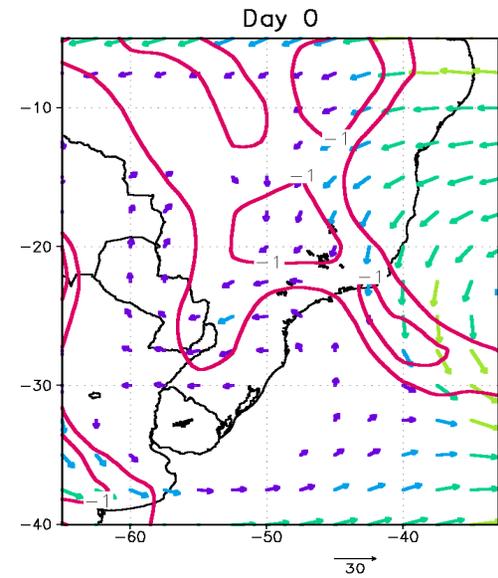
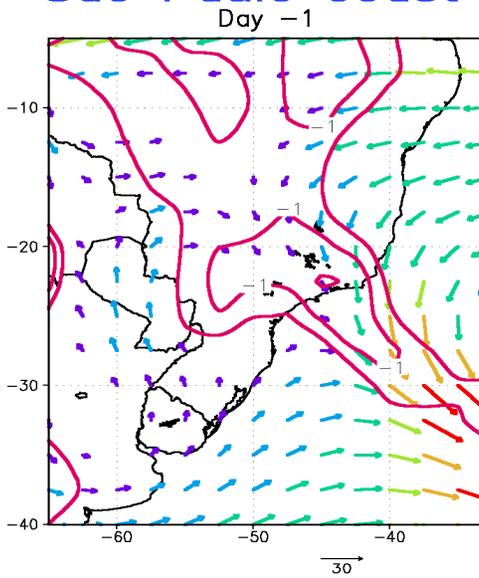
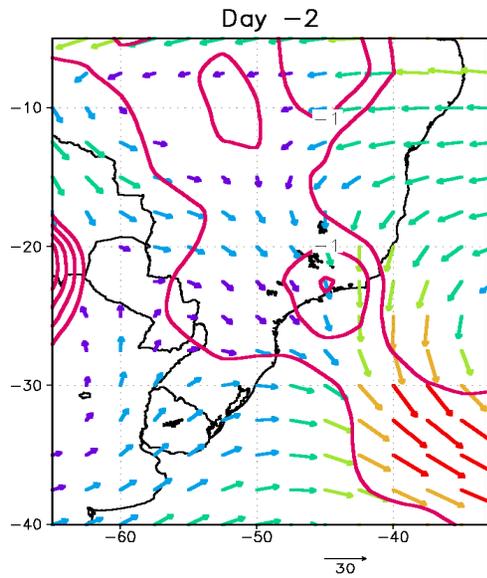


FIGURE 2

Sao Paulo coast



Sao Paulo interior-north

