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Severe Weather Occurrence on the State of Sao Paulo caused by Upper Levels Cyclonic Vortices: A Case Study

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This work presents a case study on Upper Levels Cyclonic Vortices (ULCV) that act on the May 4th 2009 causing major impacts in the metropolitan region of Sao Paulo and in the Vale do Paraiba, Brazil. The interest of this case was the fact that only few papers about ULCV in the subtropical latitudes of South America were published and due to the occurrence of a severe hailstorm on cities of the state of Sao Paulo, used to evaluate the numerical model ETA20 to identify these extreme events. The synoptic analysis fields of wind, vertical velocity (omega) and geopotential height were carried out, also a simple evaluation of the numerical model ETA20 predictions. The results showed that the cyclonic vorticity is slightly increased during the morning until dawn and follows eastwards as a dipole shape with a wide range of trough and the rear edge. The severe weather observed in the most of the State of Sao Paulo was associated with the behavior of the atmosphere in the middle and upper troposphere, specifically with the presence of anomalous cold air at these levels. There were a maximum gradient of zonal and meridional wind and intense upward movements in the eastern cone of the State of Sao Paulo with rainfall and hail mainly in the Vale do Paraiba. The thermodynamic analysis indicated the presence of a very moist mass and unstable air over much of the State of Sao Paulo. The numerical model ETA20 identified the favorable area to the occurrence of storms with 18 hours in advance.

Keywords: ULCV, instability index, weather forecast