

## ANALYSIS OF A SEVERE "COMMA-SHAPED" SQUALL LINE IN SOUTHERN BRAZIL

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## **1. INTRODUCTION**

On 19 October 2014, a squall line with an embedded 'comma-shaped' bow echo (inverted comma in Southern Hemisphere) impacted Southern Brazil, causing material damage due to severe straight-line winds. The damaging-wind path and duration suggest this event was a derecho. Storm morphology was analyzed using a S-band radar in the city of Santiago, Southern Brazil. Synoptic and thermodynamic environments were analyzed through surface stations and sounding data, as well as the CFSR reanalysis fields preceding the event.

## **2. RADAR ANALYSIS**



 $f_{1400} \leftarrow Figure 1$ : Approximated 50-dBZ <sup>200</sup>line in different times (red line, UTC) <sup>900</sup> and maximum wind gusts associated <sub>30°s</sub> -<sup>700</sup><sub>600</sub> with the squall line (kt). 'V' indicates <sub>31°5</sub>  $\frac{400}{300}$  the bookend vortex (see Figure 2). <sup>100</sup><sub>0</sub> Shading indicates orography (m).

<u>Figure 2</u>: 2000-m CAPPI showing the bow-echo formation and the  $\rightarrow$ mesovortex (center of Figure at 03:50 UTC).



- *Figure 3*: GOES-13 IR brightness temperature at 18 October 2014 19 outflow boundary of an older 31°5 convective system, and the red line <sup>27°S</sup> 04:00 UTC shows the location of the studied <sup>285</sup> squall line six hours later.

-40 -30 Temp. Celsius -80 -70 -60 -50

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Precipitable water = 40 mm, MUCAPE = 2100 J/kg, 0-6-km vertical shear = 29.2 (m/s)/km, 0-3-km vertical shear = 15.1 (m/s)/km, 0-1-km average vertical shear = 17.9 (m/s)/km, 0-3-km storm-relative helicity = -167.2 $m^2/s$ , 0-1-km storm-relative helicity = -213.4  $m^2/s$