



Ministério da
Ciência e Tecnologia



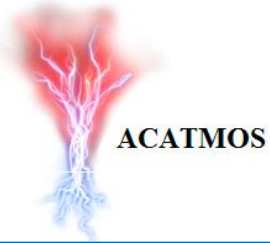
Synoptic Characterization of Sprite Producing Convective Systems Observed in 2012 During the “CHUVA SUL” Campaign

Anchayhua, R.; Azambuja, R.; São Sabbas, F.; Morais, A.

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Introduction



- For over 100 years, unexplained luminous phenomena above thunderstorms have been reported in the literature;
- Filmed in 1989 when testing a camera Xybion ISS-255 low-light television (LLTV) [Franz et al. 1990];
- Transient Luminous Events (ELTs) is a generic term adopted to refer optical transient phenomena associated with lightning [São Sabbas et al. 2010];

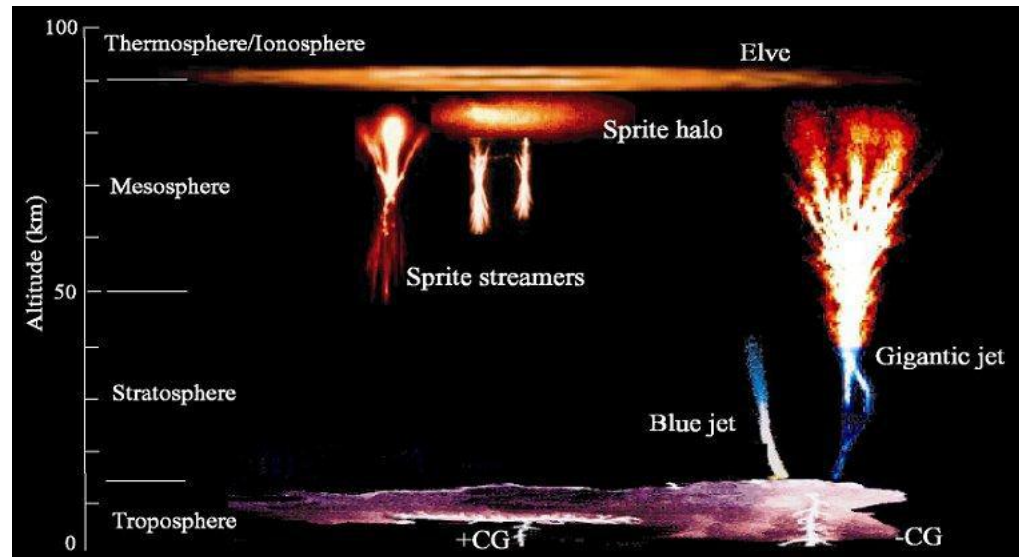


Figure – Main Transient Luminous Events.

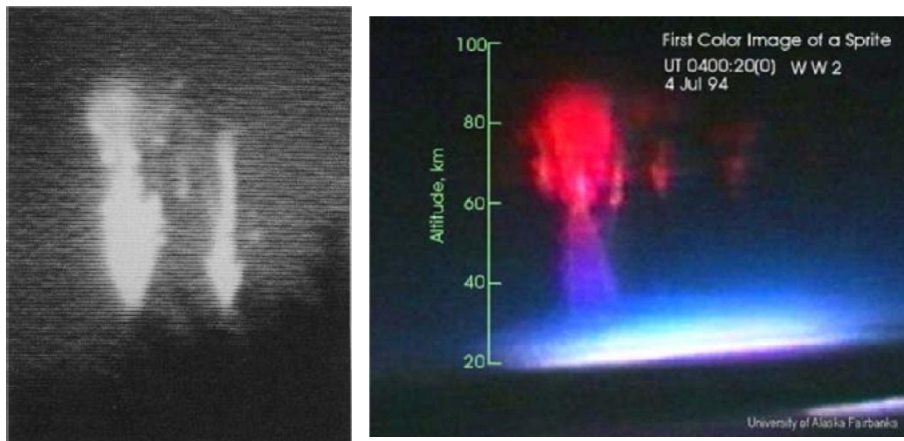
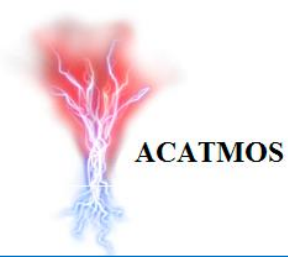


Figure - Image of the first observation of sprites and one of the first color images.[Franz, 1990; Sentman, 1995]

- *Most* sprite are generated by lightning NS+ that occur preferentially in regions of stratiform CS;
- Stratiform precipitation is produced by the dissipation of convective cells immersed in CS [Houze, 2004];



Data and Observations



Data

- Observation time of the sprites
- NCEP/NCAR reanalysis

Observations

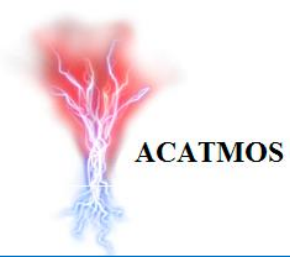
Observation site located near Fraiburgo, SC;

19/November/2012

- Observation period: 02:00 – 05:43 UTC
- Sprites: 03:56 – 05:25 UTC

11/December/2012

- Observation period: 23:30 – 03:56
- Sprite: 01:24 UTC



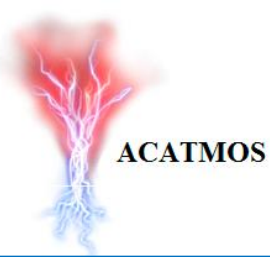
Observation site



Anti-Granizo Fraiburgo (SC)
18-19 NOV e 10-11 DEZ 2012
Location: 26S e 50W



Examples of Sprites on 19 Nov 2012



ACATMOS

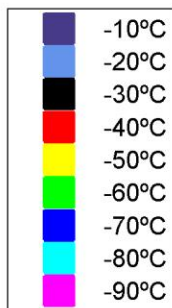
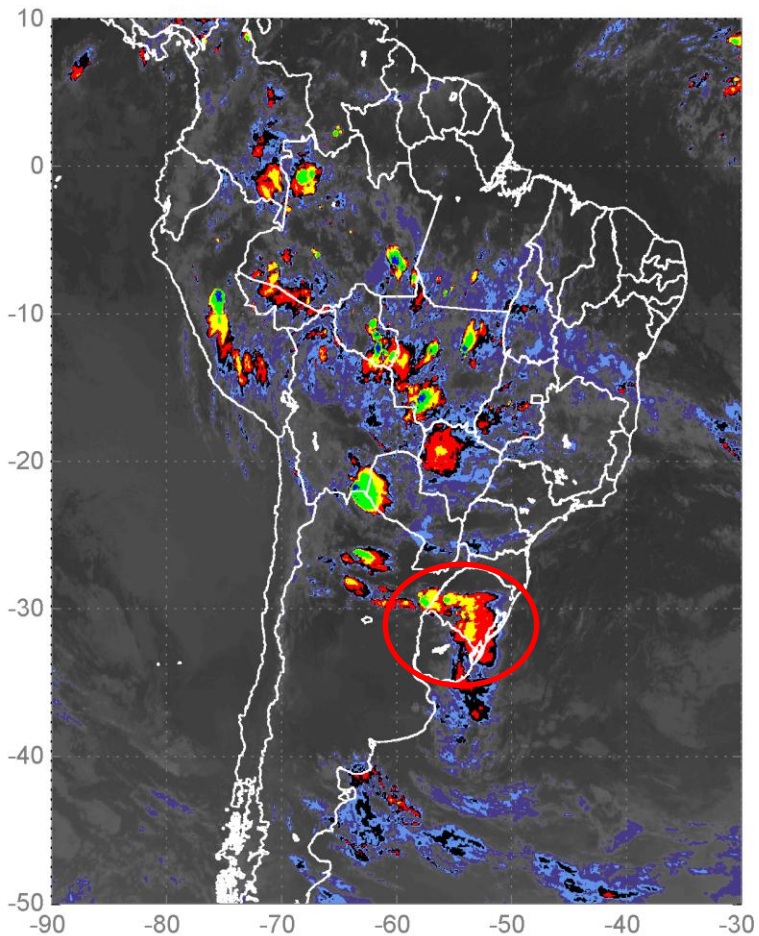
Data/Observations



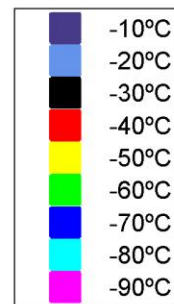
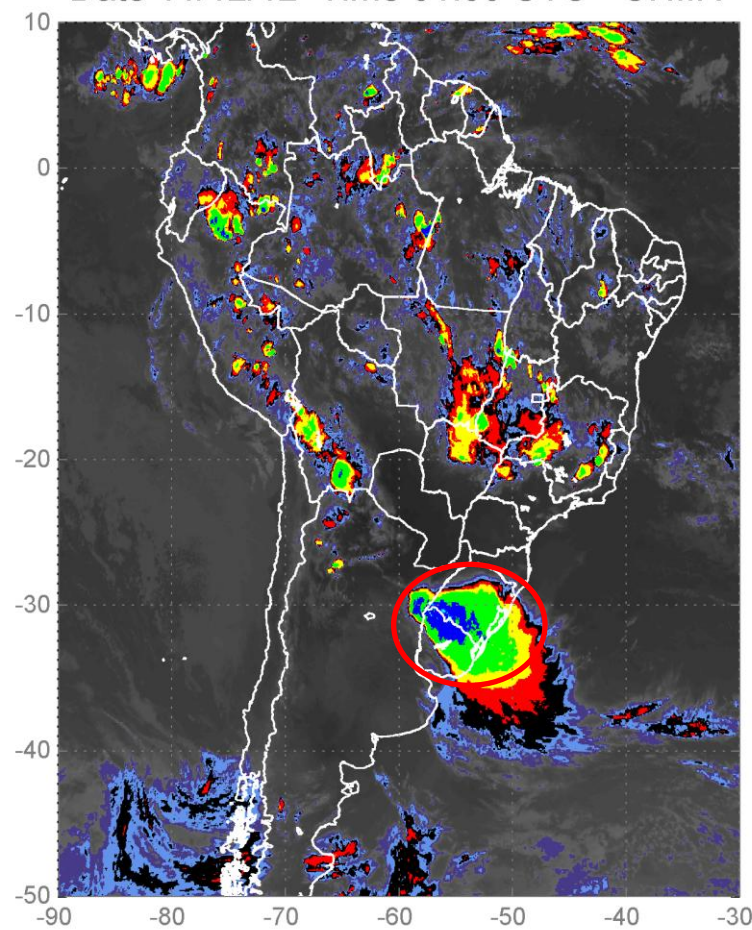
19th November

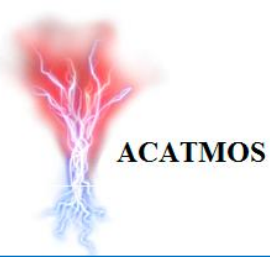
11th December

Date 19/11/12 Time 04:30 UTC - CH:IR



Date 11/12/12 Time 01:30 UTC - CH:IR





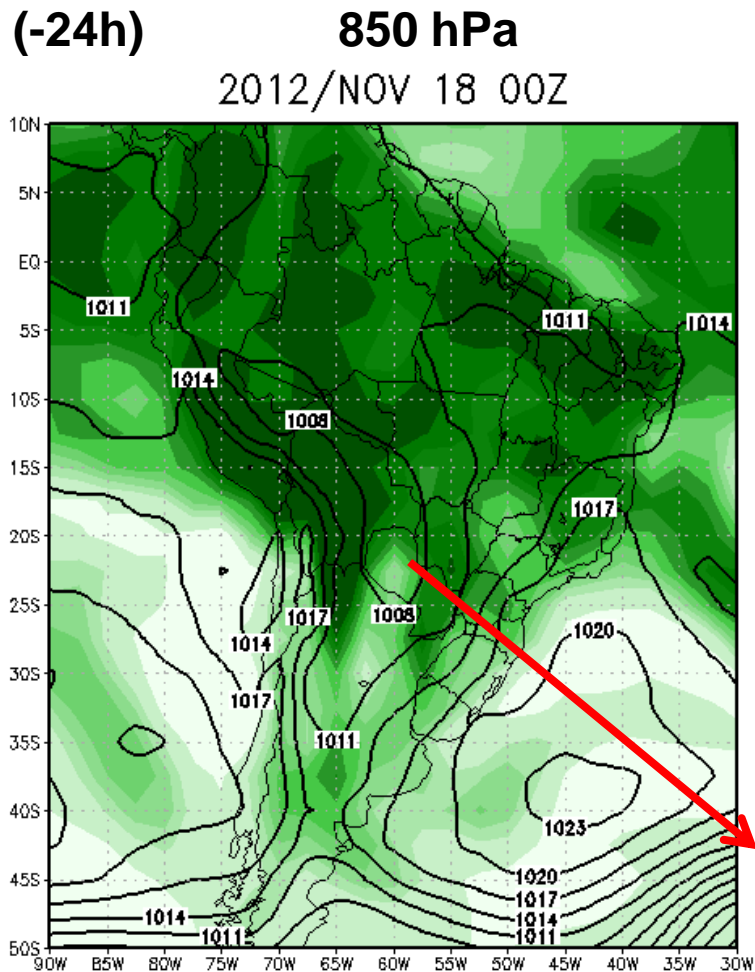
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Results

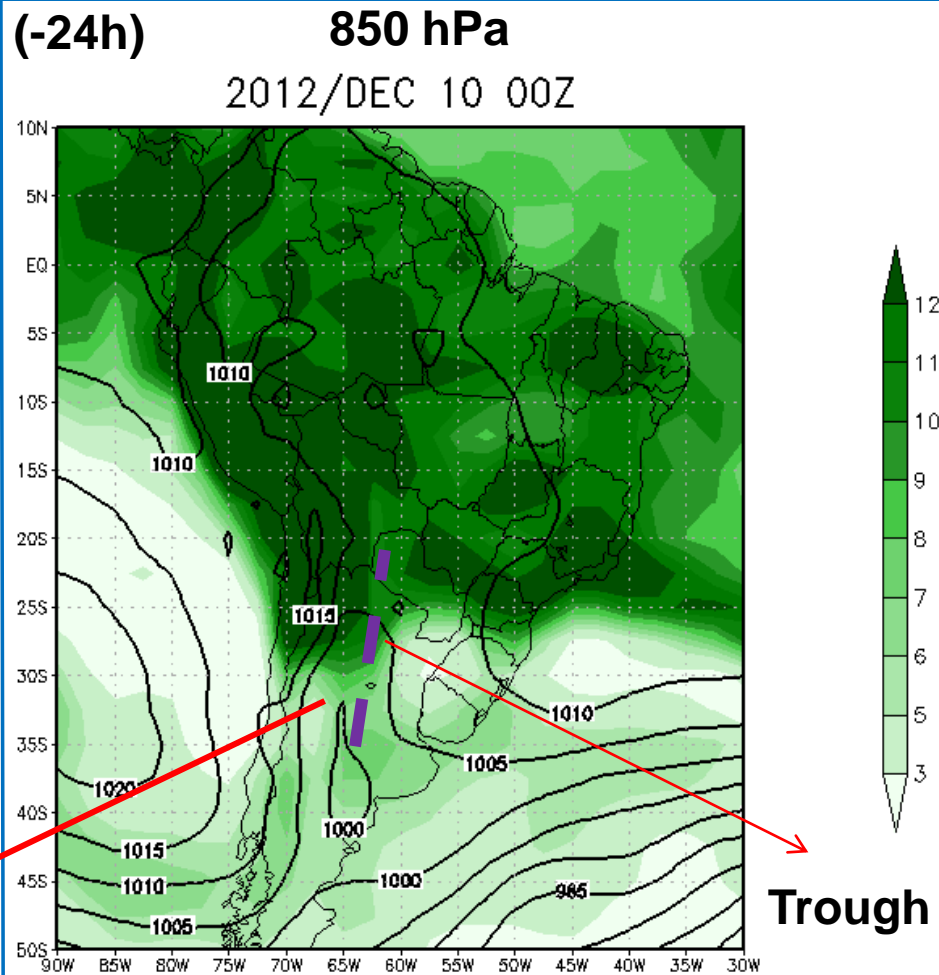


19th November

11th December

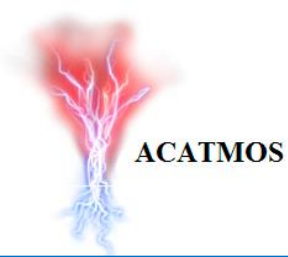


Chaco Low



Trough

24 h before the MCS there was already the Chaco Low favoring advection of warm moist air from the Amazon to higher latitudes.



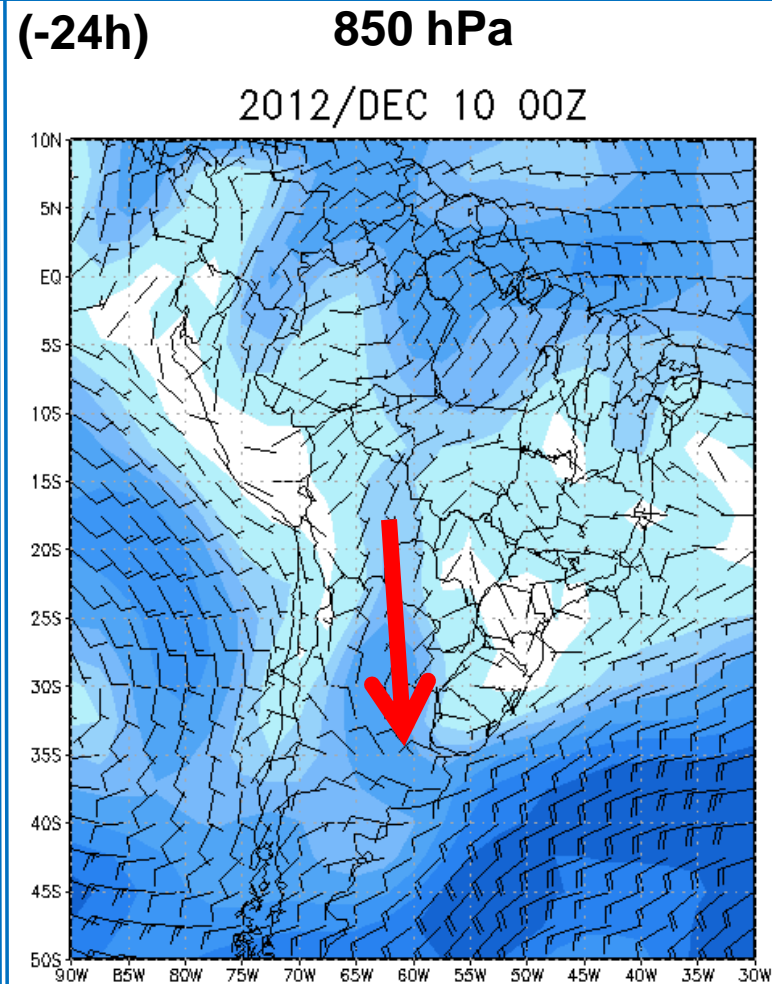
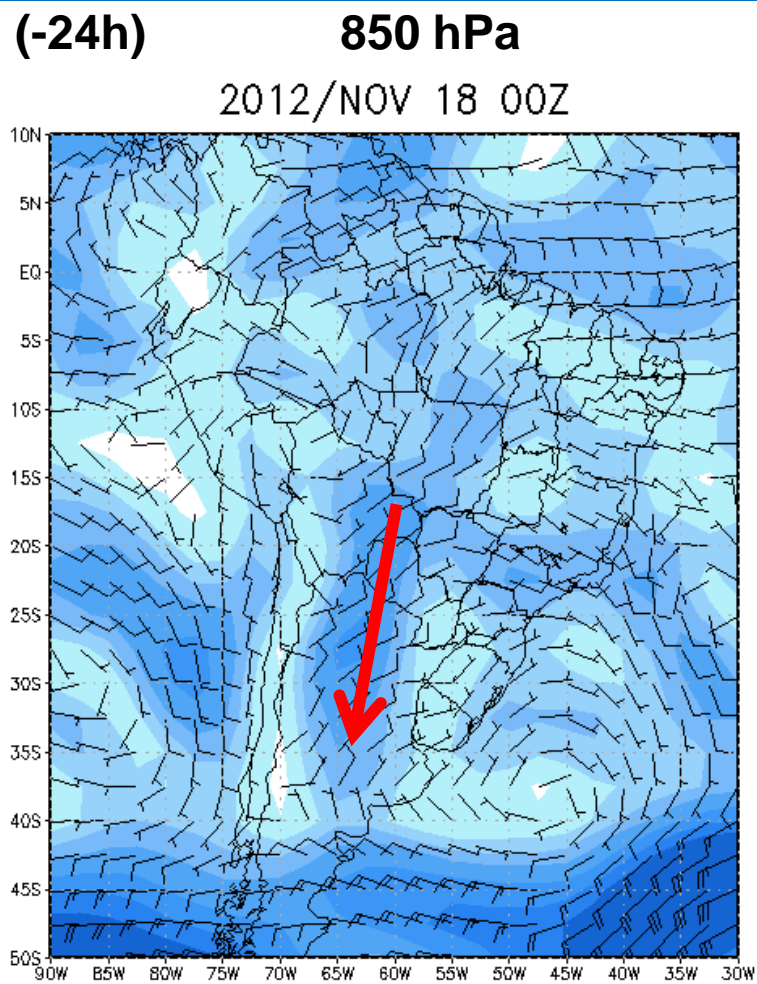
ACATMOS

Results

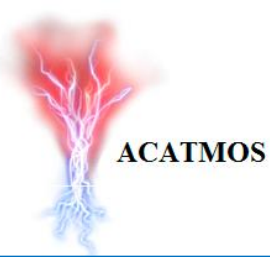


19th November

11th December



24h before MCS the winds are from the Amazon region to Central Argentina and South Atlantic Ocean.



ACATMOS

Results

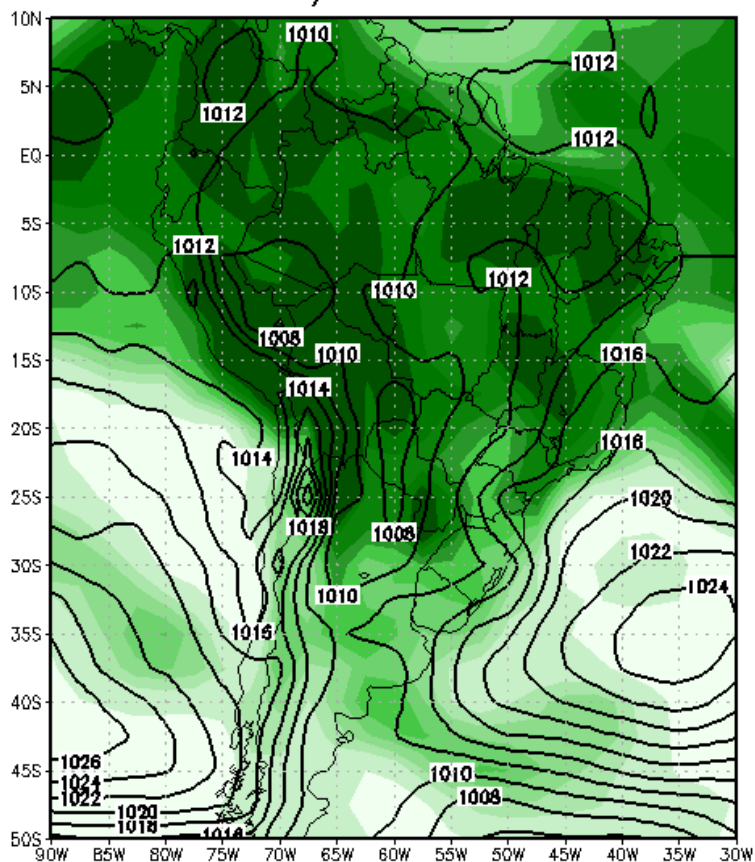


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11th December

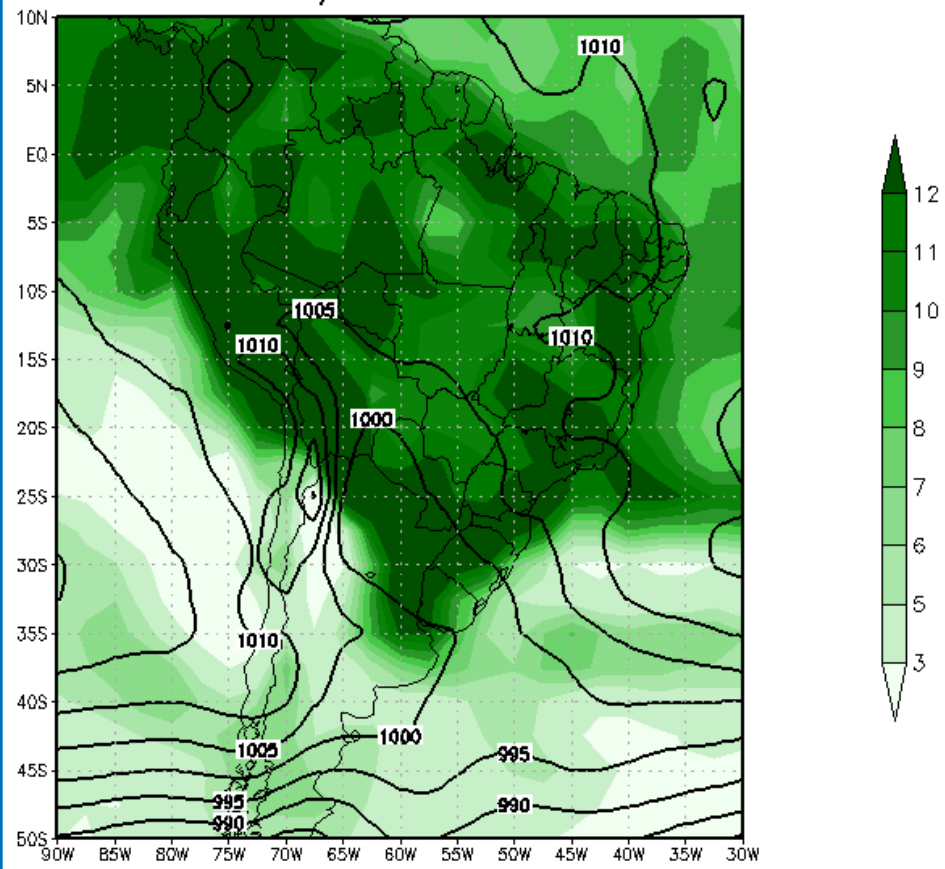
850 hPa

2012/NOV 19 00Z

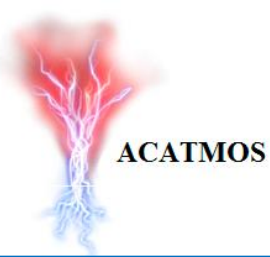


850 hPa

2012/DEC 11 00Z



Pressure at sea level and humidity at 850 hPa.



ACATMOS

Results

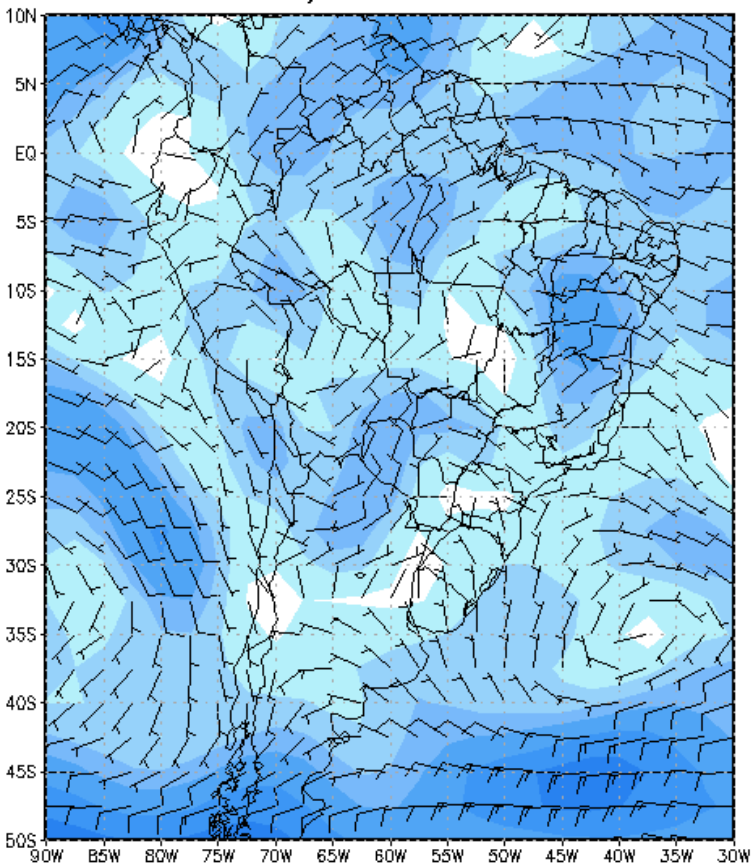


19th November

11th December

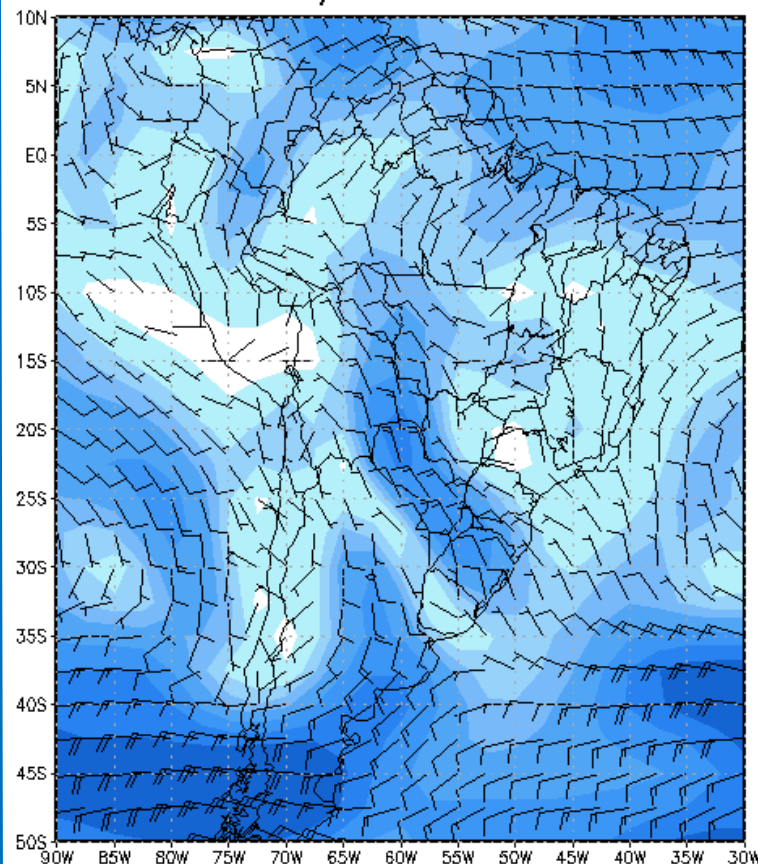
850 hPa

2012/NOV 19 00Z

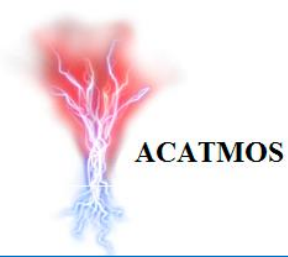


850 hPa

2012/DEC 11 00Z



Direction and wind intensity during sprite occurrence.



ACATMOS

Results



19th November

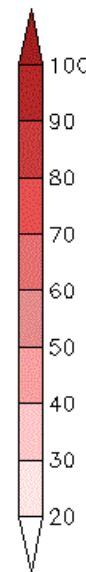
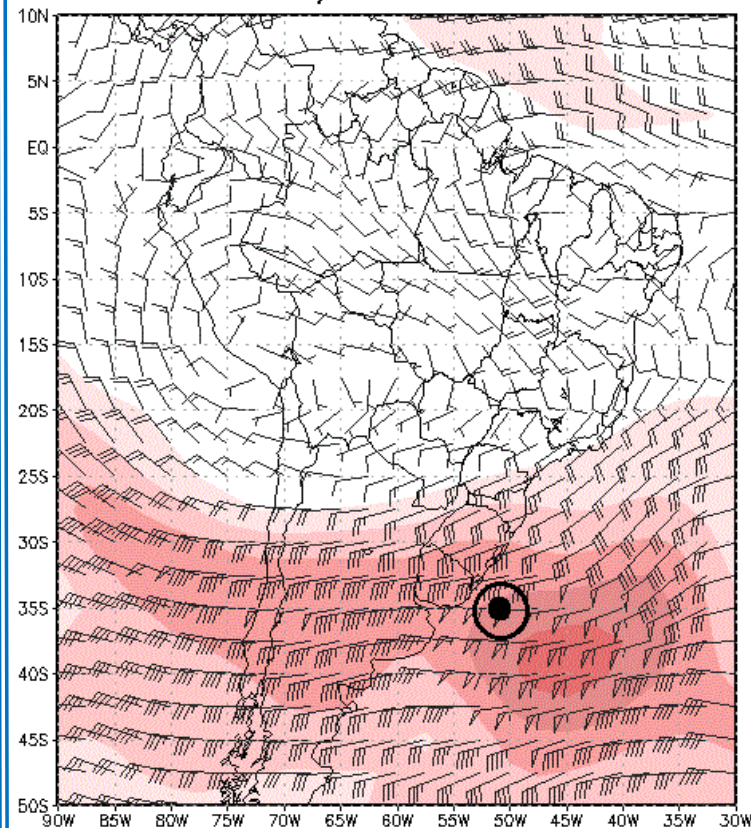
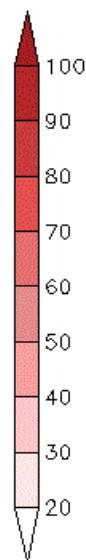
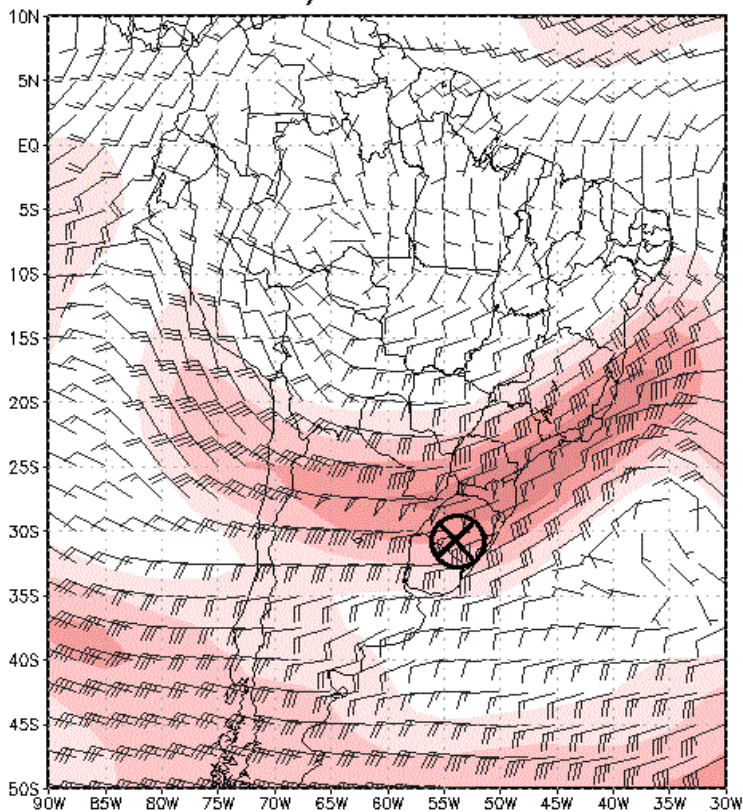
11th December

250 hPa

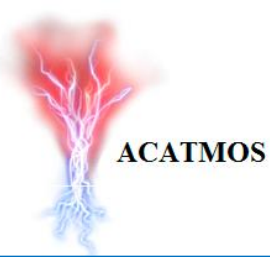
250 hPa

2012/NOV 19 00Z

2012/DEC 11 00Z



November: MCS is at polar entrance of the high level jet, which does not favor convection.
December: MCS is at equatorial entrance of the high level jet, which favors MCs intensification.



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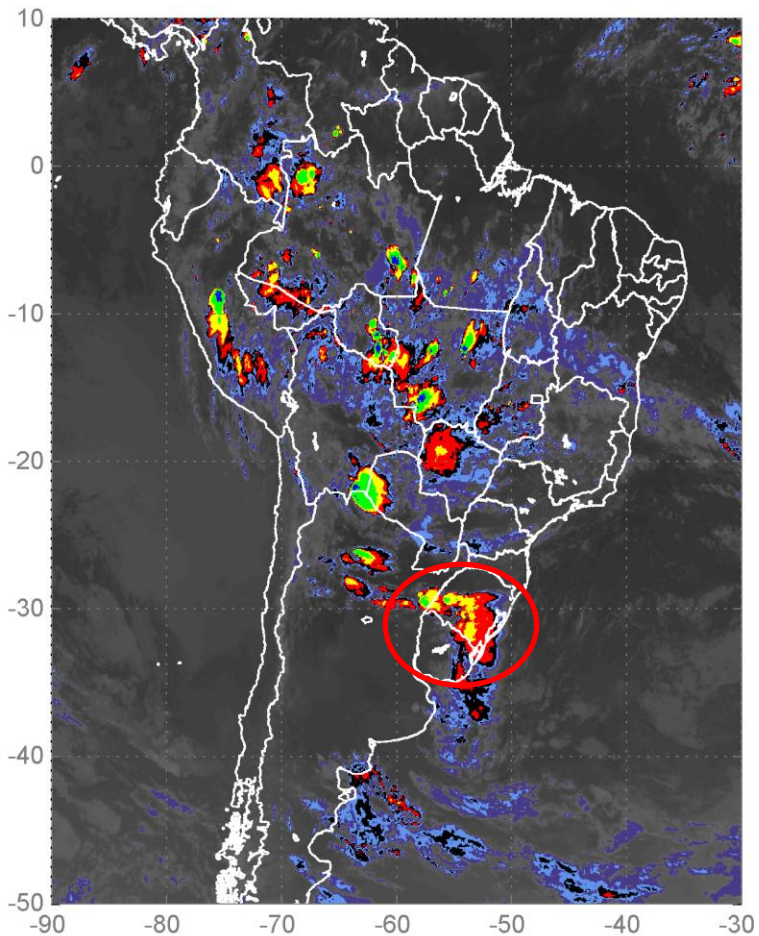
Data/Observations



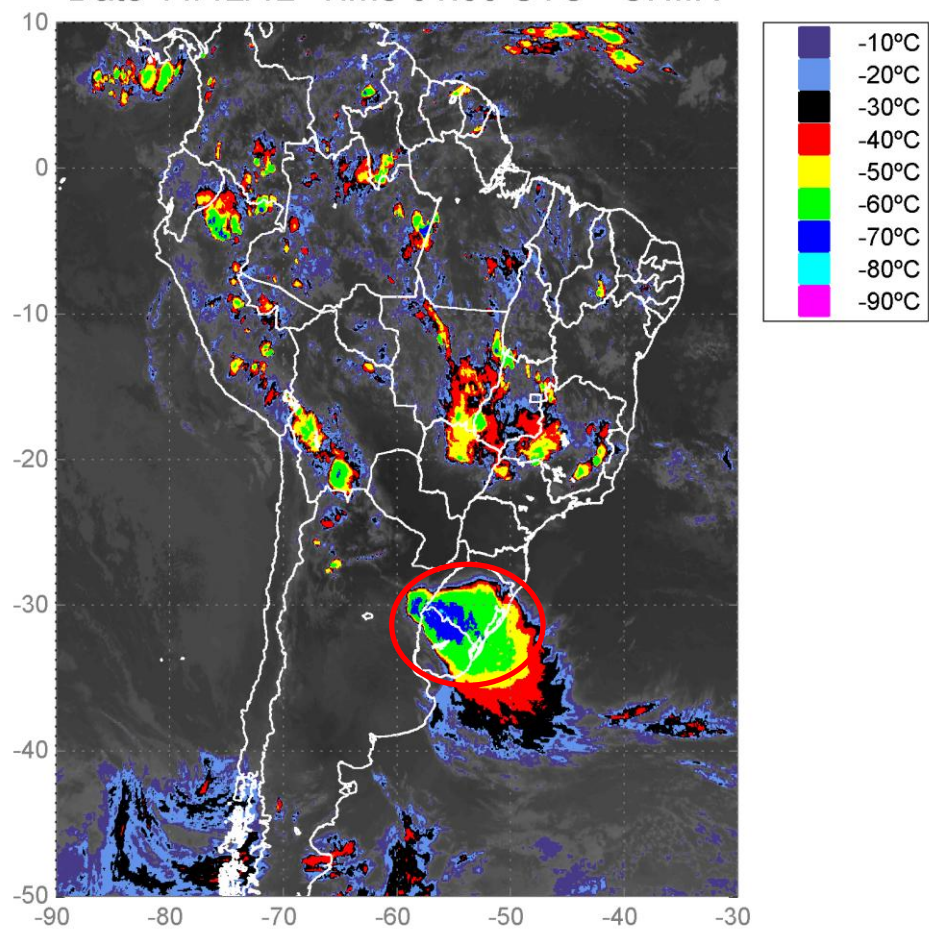
19th November

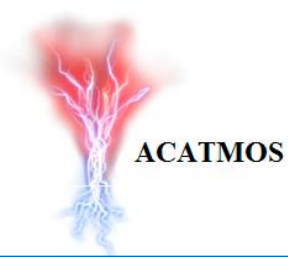
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Conclusion



19th November

11th December

- There was a warm moist flow from the amazon Region to Higher latitude region;
- Chaco Low favors advection;
- The passage of frontal systems organize the low level flow, favoring MCS formation;
- The intensity of the system (size and cloud top temperatures) seem to be associated with the position of the high level jet;
- The MCS was located at the polar entrance of the jet, which does not favor large development;
- The system formed above a "Trough".

- There was a warm moist flow from the amazon Region to Higher latitude region;
- Chaco Low favors advection;
- The passage of frontal systems organize the low level flow, favoring MCS formation;
- The intensity of the system (size and cloud top temperatures) seem to be associated with the position of the high level jet;
- The MCS was located at the equatorial entrance of the jet, which favors intensification;
- System formed in a frontal zone of a Cold Front.

19th November

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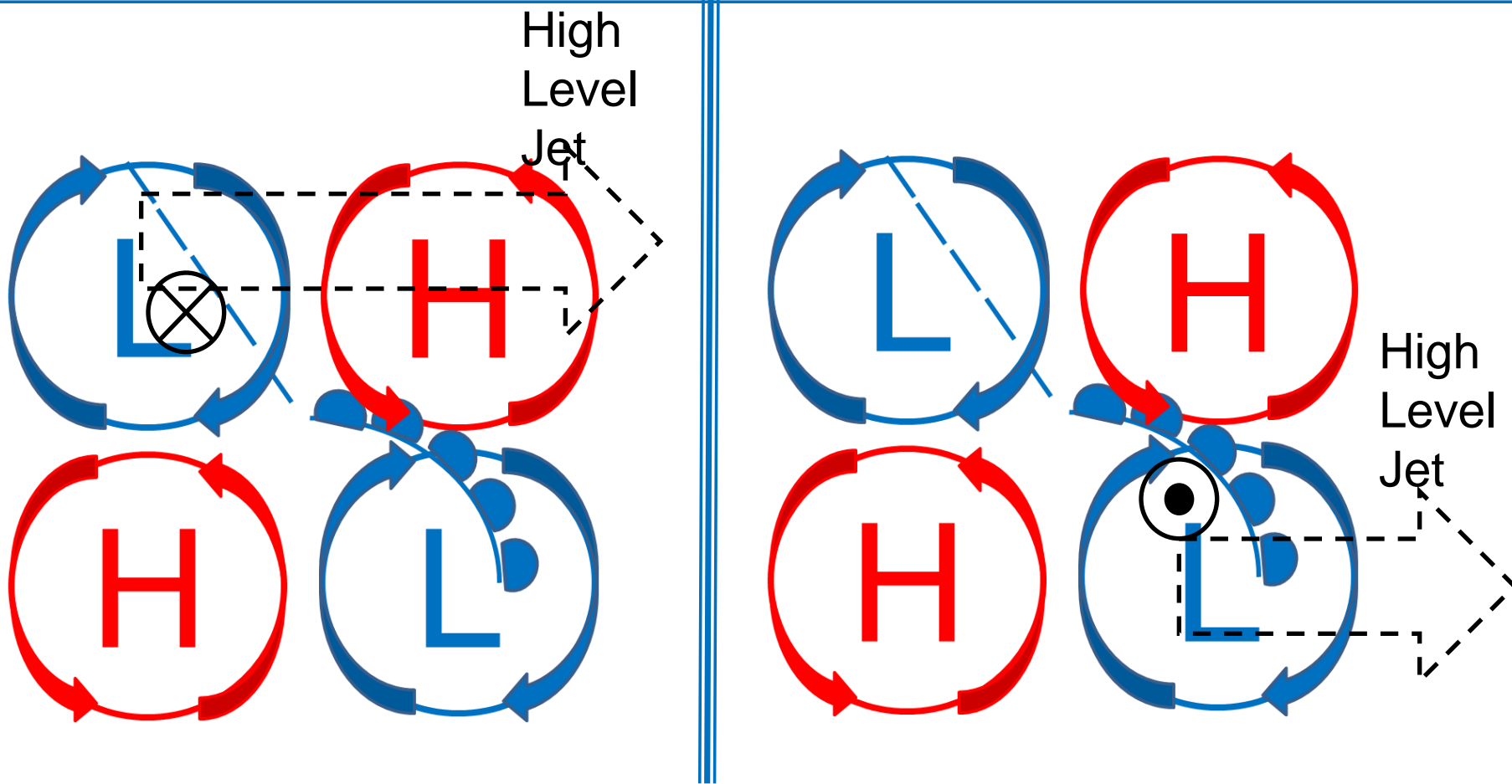


Figura – Esquema do posicionamento dos SCM em relação ao fluxo e superfície e o jato em altos níveis.



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