# MODEL INTERCOMPARISON DURING SALLJEX


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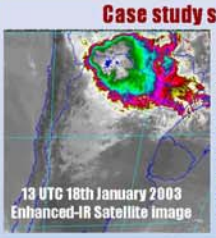
The South American Low Level Jet Experiment (SALLJEX) provided a unique framework to assess model performance over the region. A coordinated experiment was designed in order to assess the degree of dispersion between forecasts provided by different regional and global models, generated with identical initial and boundary conditions and very similar domain and horizontal resolution. The emphasis has been placed in the analysis of low level circulation and precipitation.

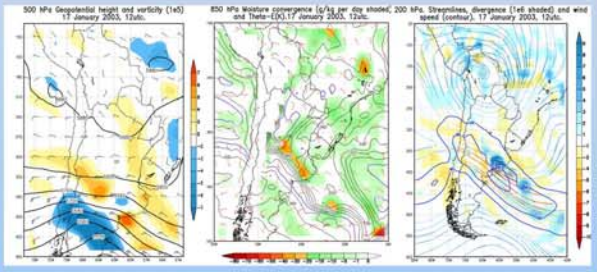
## Case study selection and description



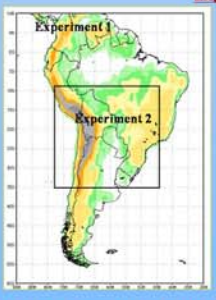

The 17-18 January 2003 MCS was not predicted by most of the operational model during SALLJEX

***Why models did not forecast the MCS?***

- Boundary data (i.e.global model providing wrong forcing)?
- Initial data quality?
- Model parameterization limitations?
- The system was unpredictable?




## Experiment description




**BOUNDARIES:**

**The experiments were run with identical initial conditions and the boundaries were provided by the analysis (instead of using any global model forecast), starting at 00 UTC, January 17 2003**

**DOMAIN AND RESOLUTION:**

- **Experiment 1: This is the low resolution experiment. Horizontal resolution is around 80 Km in both directions. Vertical resolution is around 30 levels. The suggested domain covers South America, from 60°S to 10°N and from 90°W to 30°W.**
- **Experiment 2: This is the high resolution experiment. Horizontal resolution is around 20 Km in both directions. Vertical resolution is around 30 levels. The suggested domain for this experiment covers SALLJEX region, from 35°S to 10°S and from 75°W to 45°W.**

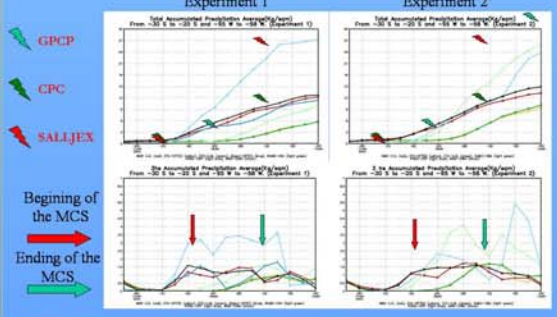
**STARTING TIME AND FORECAST LENGTH:**

**Both experiments started at 00 UTC 17th January 2003. The total forecast length was 48 hours.**

**Models that participate in the intercomparison experiment:**

- MM5 model at the Univ. of Chile: Rene Garreaud.
- ETA model at the Univ. of Maryland: Hugo Berbery.
- Global model at CPTEC/INPE: Dirceu Herdies.
- MM5 model at CIMA (CONICET - UBA ): Claudio Menendez.
- RAMS model at Univ. of Buenos Aires: Matilde Nicolini.
- ETA model at CPTEC/INPE: Marcelo Seluchi.
- RAMS model at Univ. of São Paulo: Pedro Silva Dias.

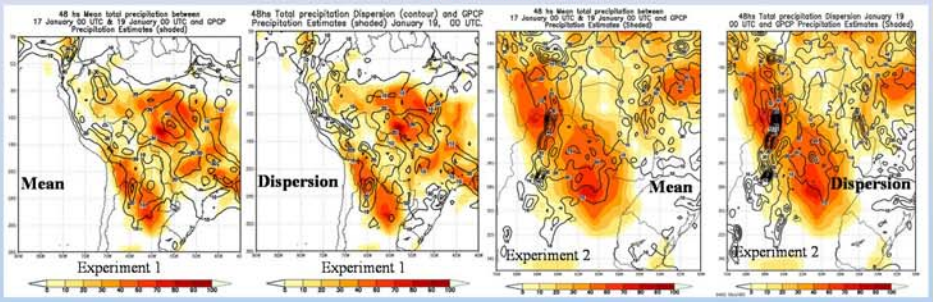
## Model Parametrization Limitations:



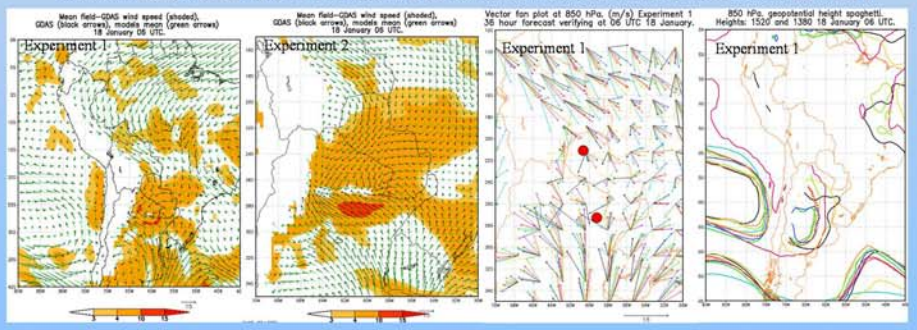

- Instability is reasonably well reproduced by all the models
- Moisture convergence is not so coherent between runs, and some models may have been affected by underprediction of this quantity
- To correctly simulate nocturnal convection, the convective parameterizations should correctly handle nocturnal inversion

With additional data, parameterization performance can be better assessed. Particularly, the role of the diurnal cycle upon different fields may be analyzed and parameterizations adjusted consequently

## Experiment Results

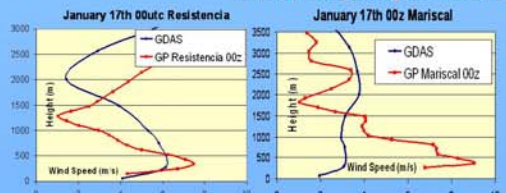



Highest resolution models predict large amounts of precipitation, but most do not adequately reflect the precipitation associated with the MCS. Dispersion between members lies within the magnitude of the mean forecasted precipitation over the MCS region in experiment 2.

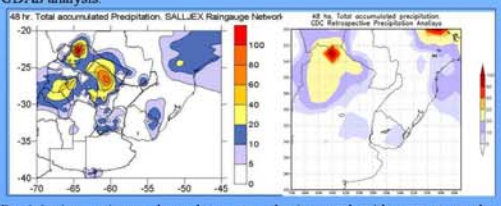



36-Hr Forecast verifying at 06 UTC 18th January 2003. At this time the MCS has reached it maximum intensity. Large differences became evident between the mean forecasted wind and the GDAS analysis. There are also differences between members of the super-ensemble.

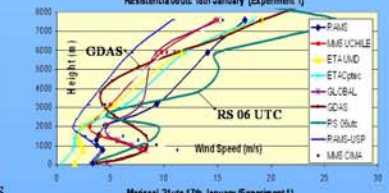
## Initial Data Quality and Forecast Verification:

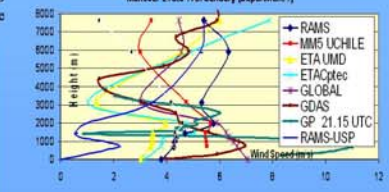



**Initial data quality**: discrepancies between SALLJEX data and GDAS analysis. The observed vertical wind shears were poorly represented by the GDAS analysis.



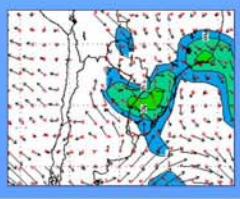

Precipitation estimates have been strongly inproved with respect to the operational precipitation analysis over the region, with the incorporation of the SALLJEX raingauge network data.




30 hr-forecasts versus radionsonde data and GDAS analysis. The availability of extra observational data does not only show the uncertainty in the initial condition but also contributes with another "truth" in forecast verification

## Was the system unpredictable?



- The precipitation associated with the MCS was accurately forecasted by model runs started at 12 UTC 16 th January 2003, (i.e., 36-hr forecasts did much better than 24-hr forecasts) including low resolution global forecast.
- Preliminary results of the application of the Breeding Vectors technique to this particular case (performed by Eugenia Kalnay, Istvan Szunjogh and Juan Ruiz) shows that at low levels, instabilities associated with the synoptic scale flow are stronger near the cold front. Other instabilities growth are under analysis.

This figure shows the structure of one of the bred vectors over the SALLJEX region for the 850 hPa. wind. Bred vector amplitude (shaded). 12 UTC 18 th January 2003.