

HRLAMENS

A pilot project on ensemble prediction through very high resolution limited area models

First International CHUVA Workshop
8 – 10 May 2013
IAG-USP, São Paulo, Brazil

Cunningham, Christopher; Saulo, Celeste; Anabor, Wagner; Camponogara, Gláuber; Chaboureau, Jean-Pierre; Faus da Silva Dias, Maria Assunção; Ferreira, Márcio; Freitas, Saulo; García Skabar, Yanina; Machado, Luiz; Matsudo, Cynthia; Nascimento, Ernani; Nicolini, Matilde; Pulido, Manuel; Rodrigues, Joyce; Ruiz, Juan; Salio, Paola; Santos, Daniel; Saucedo, Marcos; Stockler, Rafael; Vendasco, Eder

MOTIVATION

Related to activities of a RDP targeting HIW
over La Plata Basin

Chaos is inherent to weather forecast no
matter the scale

The scales involved in high impact weather
are much finer than the current Global
EPS

Similar initiatives in North America (SREF)
and Europe (SREPS)

Liaison with CHUVA project

OBJECTIVES

- 1) To assemble a "system" of ensemble prediction using very high resolution LAM
- 2) Assessing the forecasts skill
- 3) Learning from the experience



Dados anteriores

Santiago

Canguçu

Descargas Elétricas

Satélite

Modelo BRAMS

Modelo HRLAMENS

Precipitação Acum. 6h

Inicialização - Modelo

BRAMS/CPTEC-EPS

Inicialização

2012-11-30 12

Previsão

2012-12-01 06

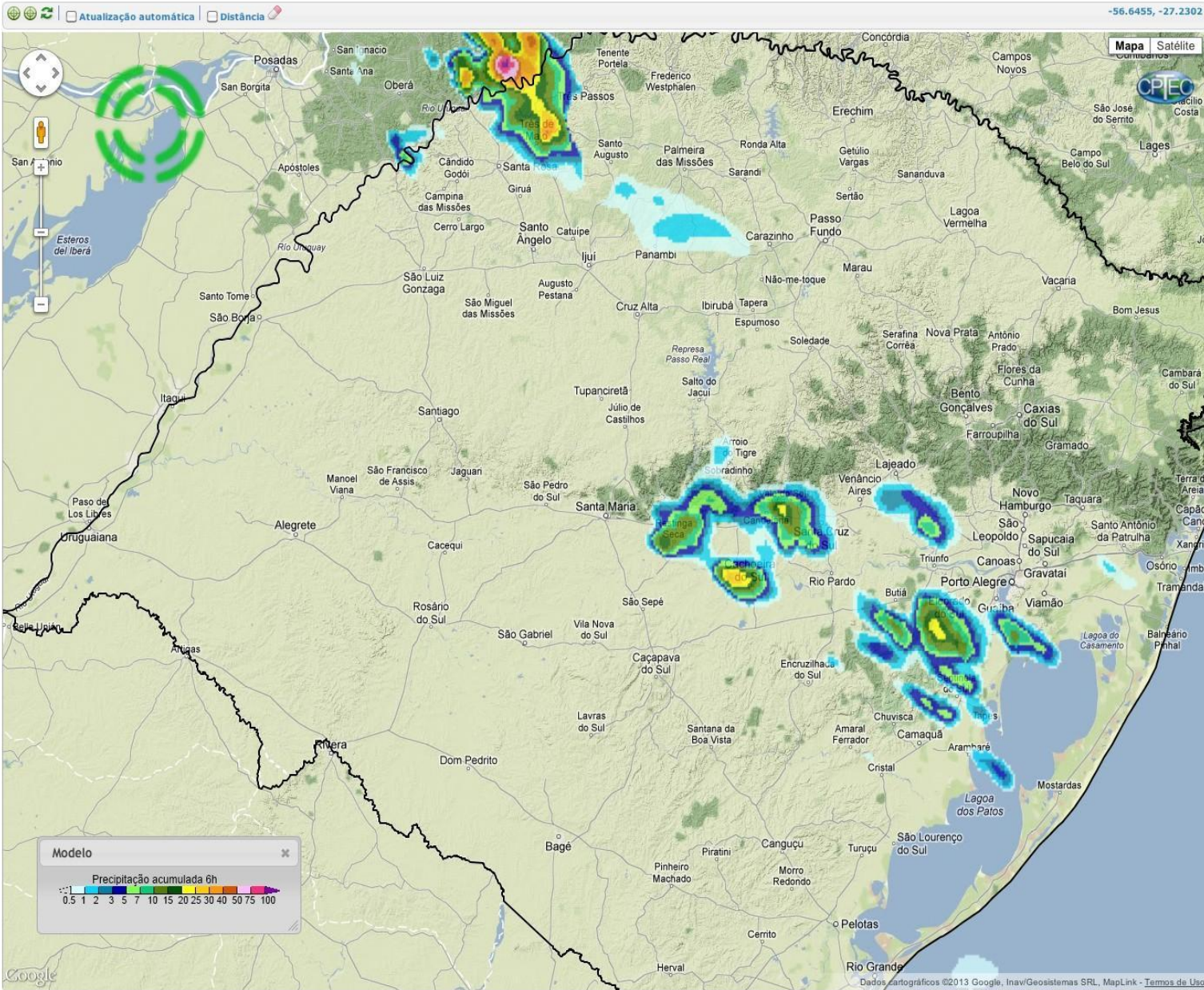
Estações

Camadas

Modelo TIGGE Ensemble

Modelo Meso-NH

Radiossonda



THE FRONT END

▶ Dados anteriores

▶ Santiago

▶ Canguçu

▶ Descargas Eléctricas

▶ Satélite

▶ Modelo BRAMS

▼ Modelo HRLAMENS

Precipitação Acum. 6h
Inicialização - Modelo

CPTEC-EPS
NCEP-EPS
WRF/CPTEC-EPS
WRF/NCEP-EPS
WRF/GFS-DETERM
BRAMS/CPTEC-EPS
BRAMS/NCEP-EPS
Multi-Model

▶ Camadas

Modelo TIGGE Ensemble

Modelo Meso-NH

Radiossonda

▶ Dados anteriores

▶ Santiago

▶ Canguçu

▶ Descargas Eléctricas

▶ Satélite

▶ Modelo BRAMS

▼ Modelo HRLAMENS

Precipitação Acum. 6h
Inicialização - Modelo

BRAMS/CPTEC-EPS

Inicialização

Selecione

Selecione

2012-11-13 12:00

2012-11-14 12:00

2012-11-15 12:00

2012-11-16 12:00

2012-11-17 12:00

2012-11-18 12:00

2012-11-19 12:00

2012-11-20 12:00

2012-11-21 12:00

2012-11-22 12:00

2012-11-23 12:00

2012-11-24 12:00

2012-11-25 12:00

2012-11-26 12:00

2012-11-27 12:00

2012-11-28 12:00

2012-11-29 12:00

2012-11-30 12:00

2012-12-01 12:00

semble

▶ Dados anteriores

▶ Santiago

▶ Canguçu

▶ Descargas Eléctricas

▶ Satélite

▶ Modelo BRAMS

▼ Modelo HRLAMENS

Precipitação Acum. 6h
Inicialização - Modelo

WRF/NCEP-EPS

Inicialização

2012-12-03 12:00

Previsão

2012-12-04 18:00

Selecione

2012-12-03 18:00

2012-12-04 00:00

2012-12-04 06:00

2012-12-04 12:00

2012-12-04 18:00

2012-12-05 00:00

Modelo Meso-NH

Radiossonda

semble



SOS - CHUVA SUL

Sistema de Observação de Tempo Severo

Monitoramento

Animação

Informações

Parceiros

Dados anteriores

Santiago

Canguçu

Descargas Eléctricas

Satélite

Modelo BRAMS

Modelo HRLAMENS

Precipitação Acum. 6h

Inicialização - Modelo

WRF/NCEP-EPS

Inicialização

2012-12-03 12:00

Previsão

2012-12-04 18:00

Selezione

2012-12-03 18:00

2012-12-04 00:00

2012-12-04 06:00

2012-12-04 12:00

2012-12-04 18:00

2012-12-05 00:00

Modelo Meso-NH

Radiosonda

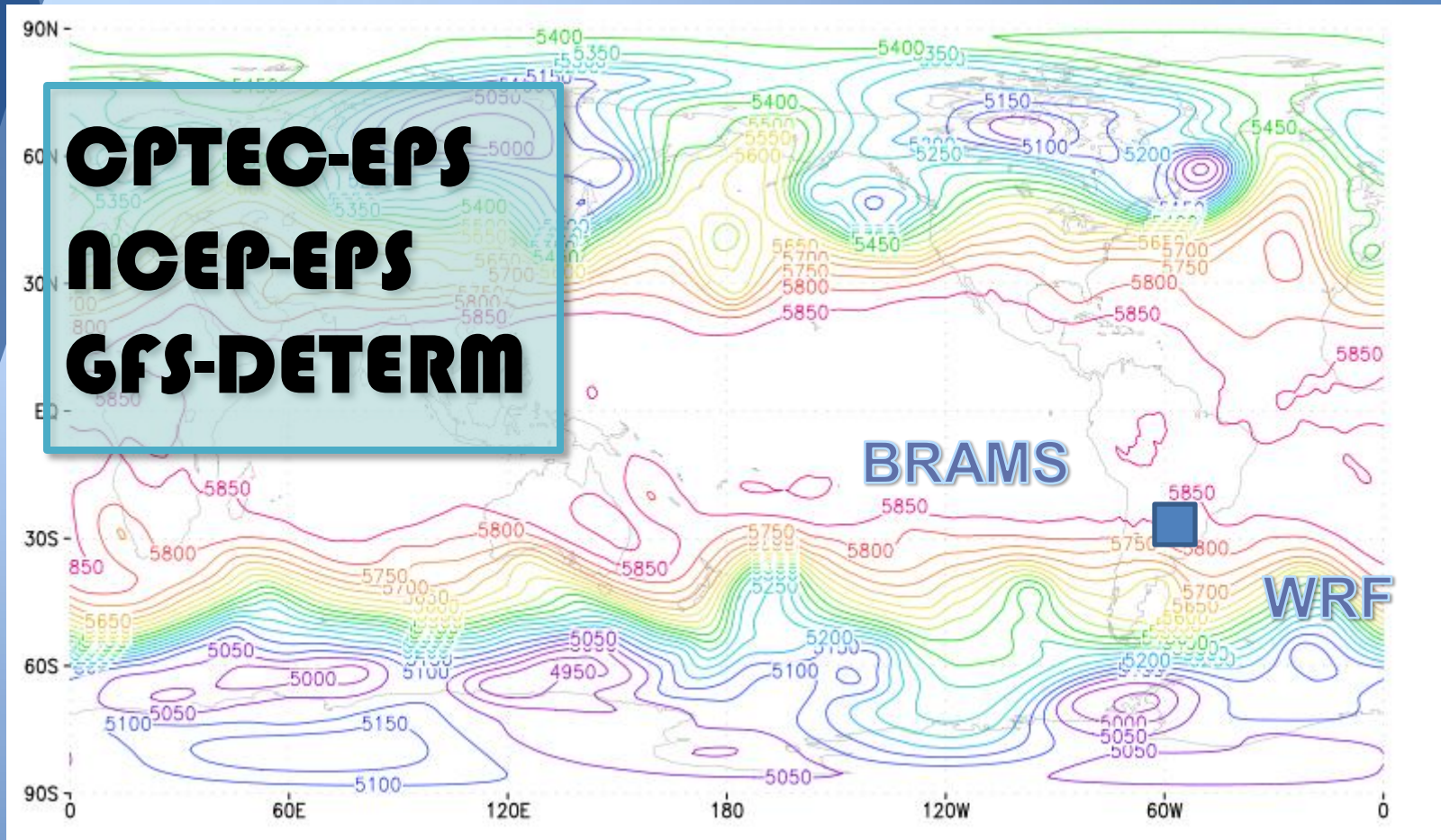


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Disposition in layers

Transparency adjustment and zooming

MEMBERS CONFIGURATION



5 members in a core system

Homogeneous in domain size, horizontal and vertical resolution

External collaborations: WRF-UBA-UNNE, WRF-Argentina SMN, WRF-UFSM and MESO-NH-LA

REPRESENTATIVE MEMBER

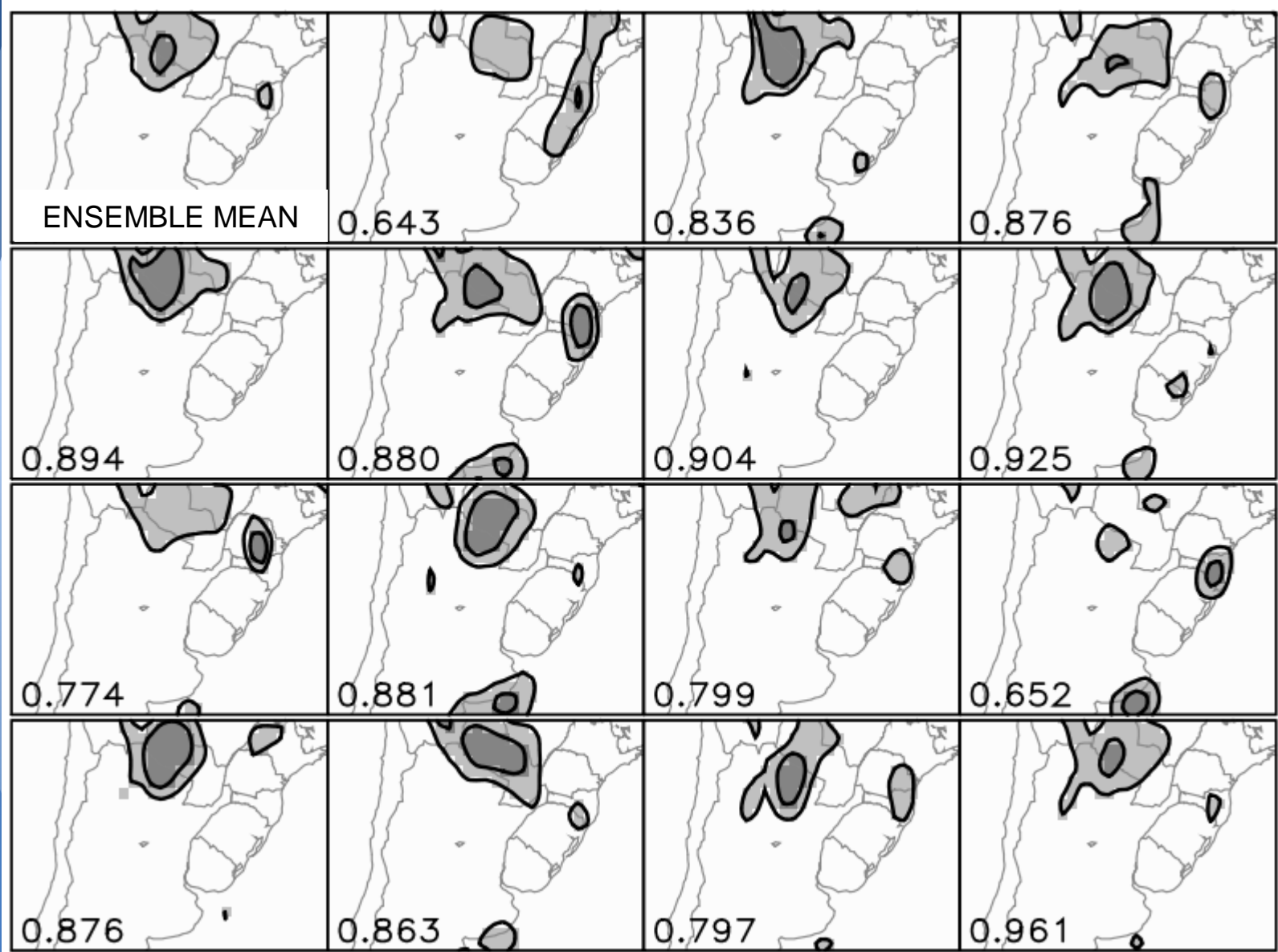
Key issue: how to choose one member (possibly the best one) among several

Premisse: the ensemble mean is the most likely scenario to occur

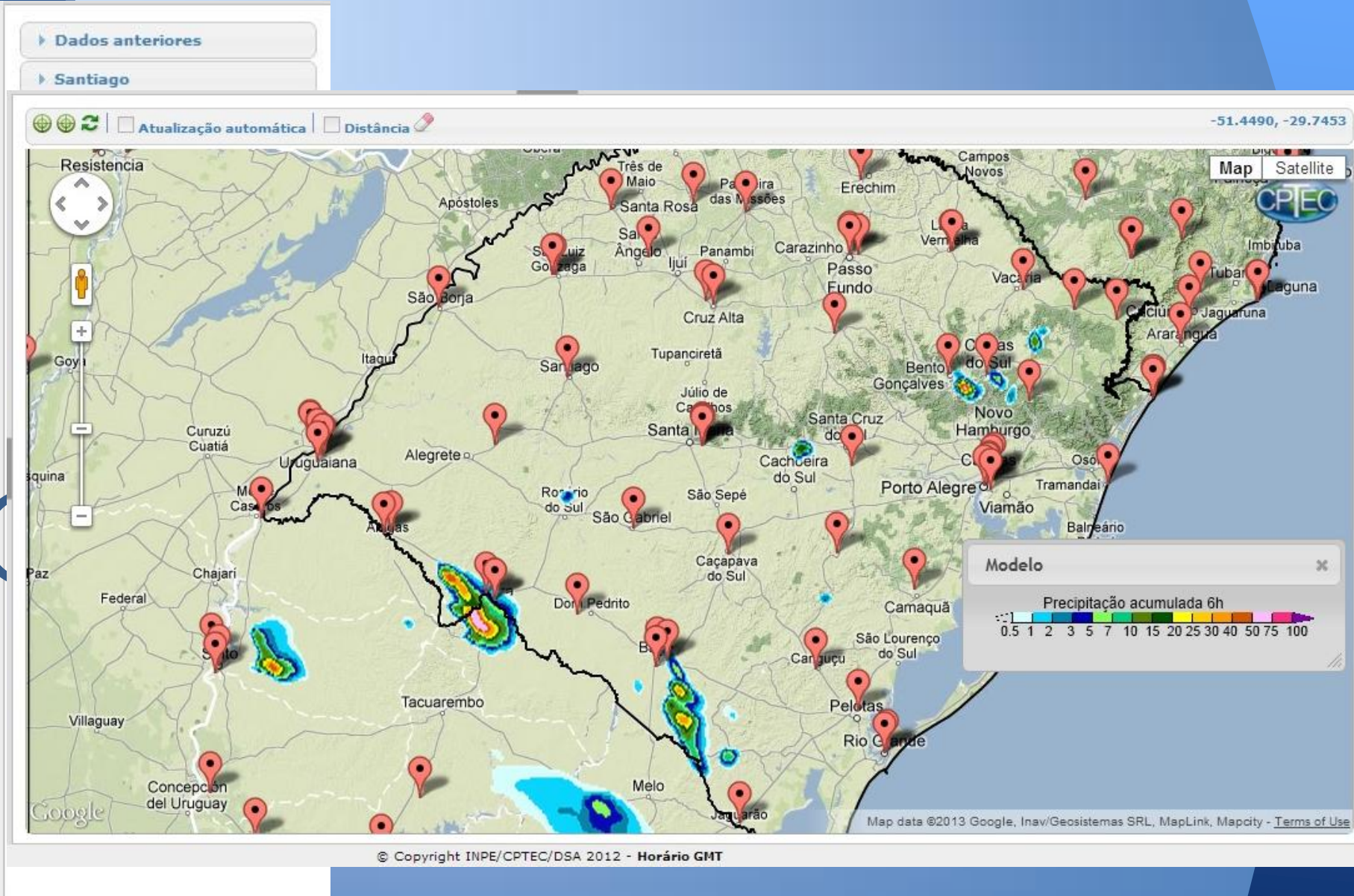
Based on spatial similarity between each member and the ensemble mean

Ranked spatial correlation in the first 48 hours

REPRESENTATIVE MEMBER

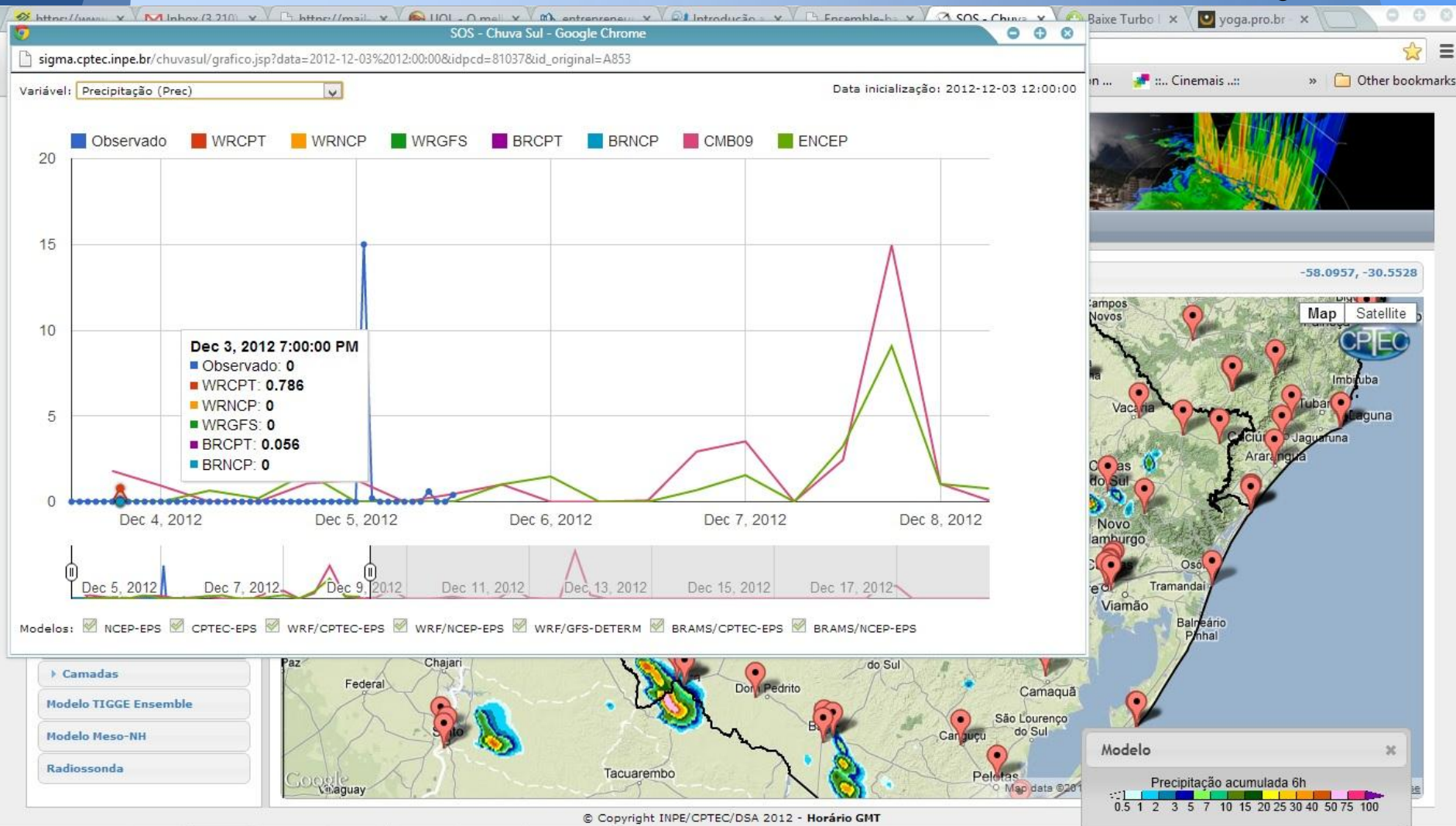


INTERCOMPARISON



INTERCOMPARISON

MOREIRA, D. S. ; SILVA DIAS, P. L. ; LUCIO, P. S. . Sistema de Avaliação Estatística de Modelos Numéricos de Previsão do Tempo. In: XIV Congresso Brasileiro de Meteorologia, 2006, Florianópolis. CDROM de trabalhos do congresso, 2006.



TIGGE CONTRIBUTION

Occurrence probability of extreme 24hr precipitation
Valid: 2012.11.29.12UTC +5-6days

[\[A short guide \(pdf\)\]](#)

Extreme events:

- heavy precipitation
- strong wind
- warm
- cold

Climatological percentiles:

- 90th or 10th
- 95th or 5th
- 99th or 1st

SWFDP and LPB regions:

- Southern Africa
- Eastern Africa
- Southwest Pacific
- Southeast Asia
- La Plata Basin

[\[Other regions?\]](#)

Initial times:

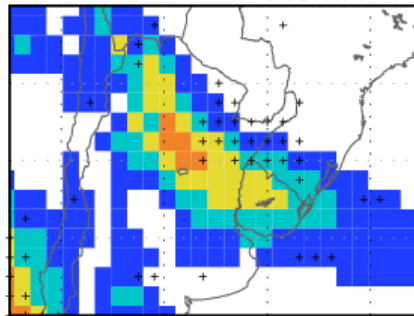
Year:Month

Day

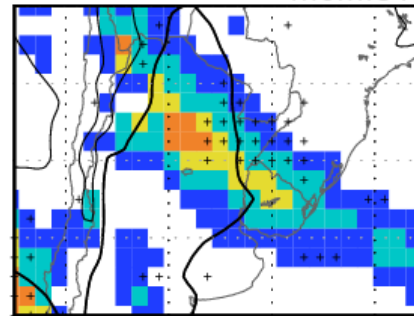
Forecast days:

- +0-1 days
- +1-2 days
- +2-3 days
- +3-4 days
- +4-5 days
- +5-6 days
- +6-7 days
- +7-8 days
- +8-9 days
- +9-10 days

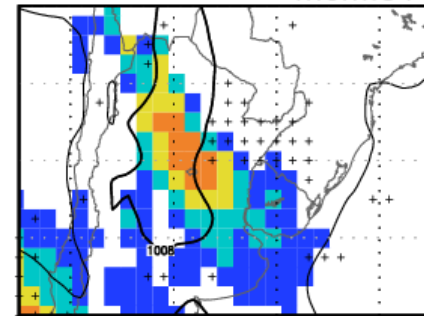
MCGE mem:147



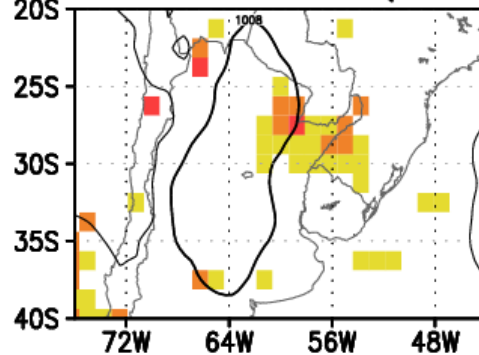
ECMWF mem:51



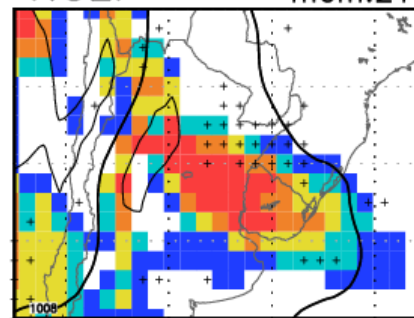
JMA mem:51



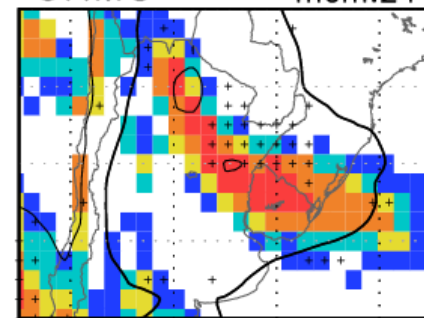
Extremes observed (GSMaP)



NCEP mem:21



UKMO mem:24

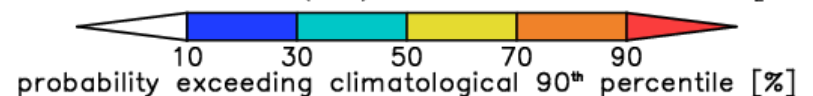


contour: observed SLP [hPa]

- observed extremes defined with 90th, 95th and 99th percentiles
- no observation

+: extremes observed (90th)

contour: control SLP [hPa]



Kindly prepared by Mio Matsueda (JMA)

RESOURCES SPENT

7.3 daily GB from NCEP EPS (up to 120h). Total: ~370G.

69 daily GB from CPTEC EPS (up to 360h). Total: ~3.5T.

2.2 TB from BRAMS-CPTEC_EPS

2.2 TB from BRAMS-NCEP_EPS

2.2 TB from WRF-CPTEC_EPS

2.2 TB from WRF-NCEP_EPS

2.2 TB from WRF-GFS

11.0 TB

Many hours of supercomputing CPU. Three machines. Five accounts.

More than 20 people involved directly or indirectly

THOUGHTS

- In general the probability of occurrence of extreme 24h precipitation detected the main events 7-8 days in advance
- CPTEC EPS was also able to anticipate the main events with this lead time
- High resolution ensembling is a resource consuming activity
- The tip of the iceberg