A Climate Application using Grid Environment Solutions

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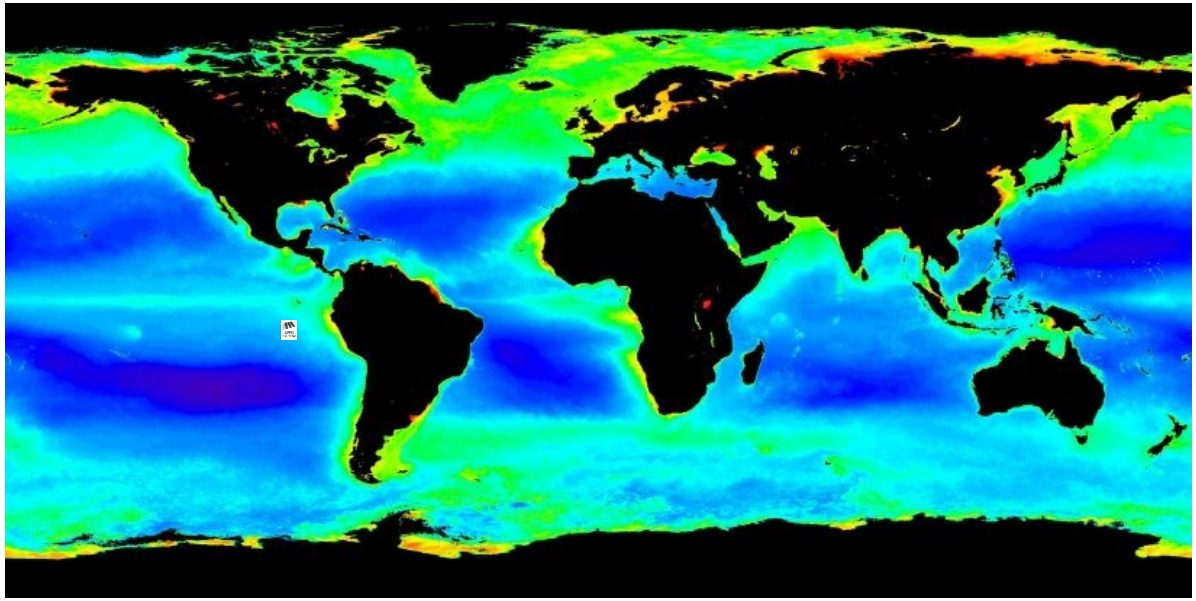

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GPPD
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Presentation Outline

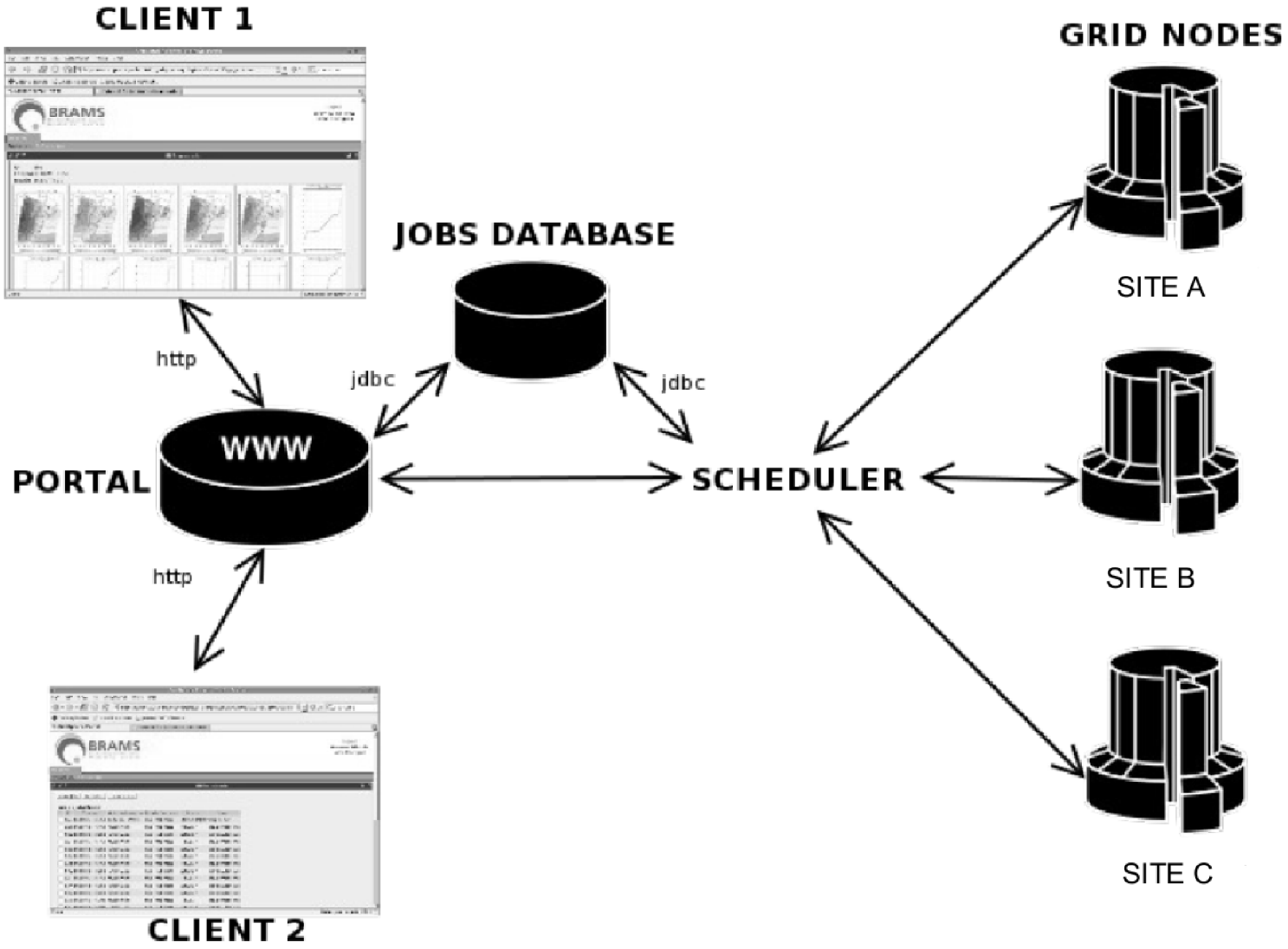
- BRAMS mesoscale model
- Climatology studies
- Grid Architecture
- GBRAMS Project
- RECLIRS Project
- GBRAMS results
- Final Remarks

BRAMS - Brazilian Regional Atmospheric Modeling System

- BRAMS = RAMS v5 + tropical parametrizations + better software quality + higher efficiency
- Used at several South American Whether Forecast Centers
- For execution in clusters of PCs
- Wide distribution (Open Source)
- Used in Research and Operational Meteorology
- 20 man-years effort

http://www.cptec.inpe.br/brams/

Grid Architecture



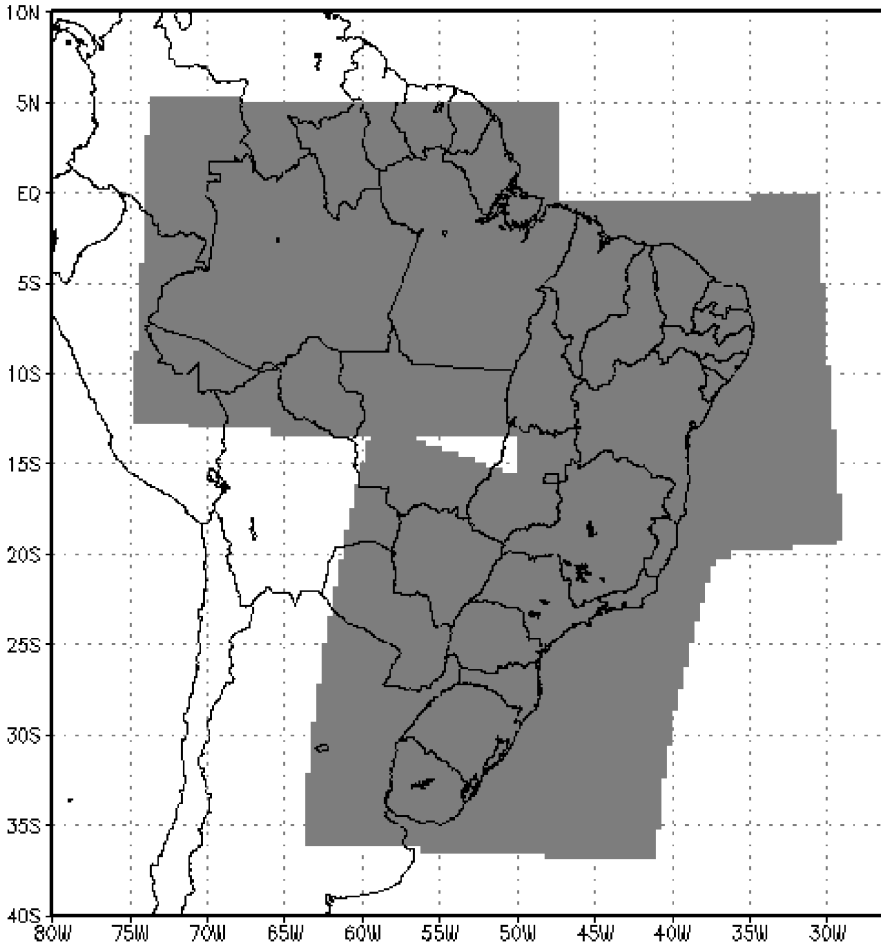
GBRAMS Project

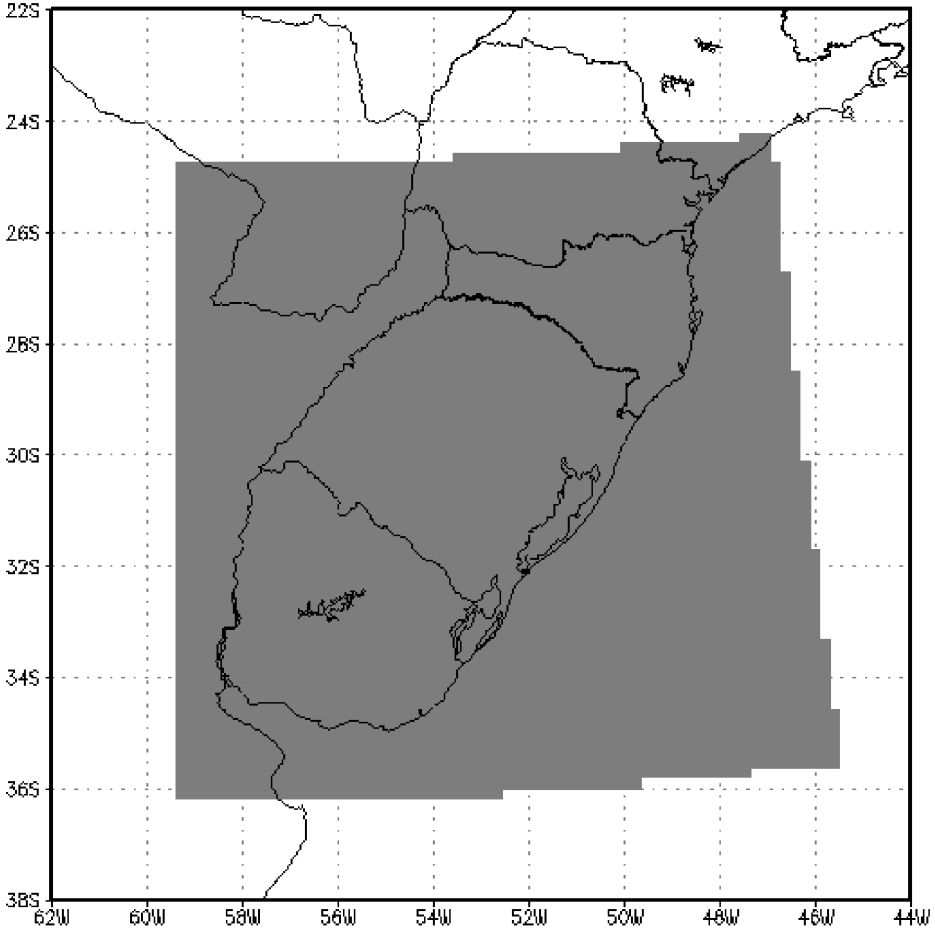
- A 10-year climatology was obtainded;
- IRI climatology method
  (International Research Institute for Climate and Society);
- Each year is a different job;
- BRAMS checkpoint/restart scheme;
- 3 Brazilian regions and 3 initial conditions:
  9 independent jobs;
- 3 Middlewares: Globus, OurGrid, OAR/CIGRI

RECLIRS Project

- A 10-year climatology will be obtained;
- ECMWF climatology method
  (European Center Medium-Range Weather Forecasts);
- Fully independence between jobs;
- RS and SC Brazilian states
- 2 Middleware: OurGrid and OAR/CIGRI

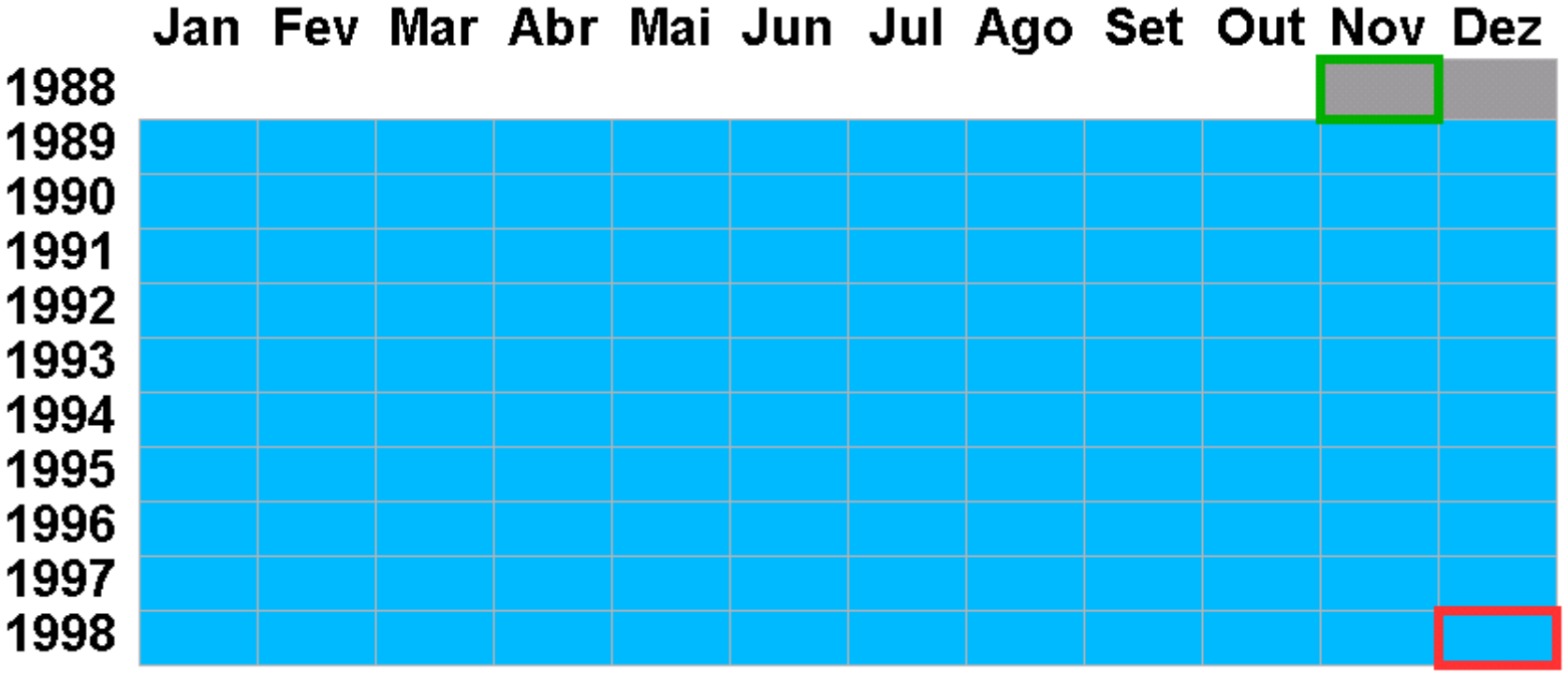
GBRAMS and RECLIRS domains





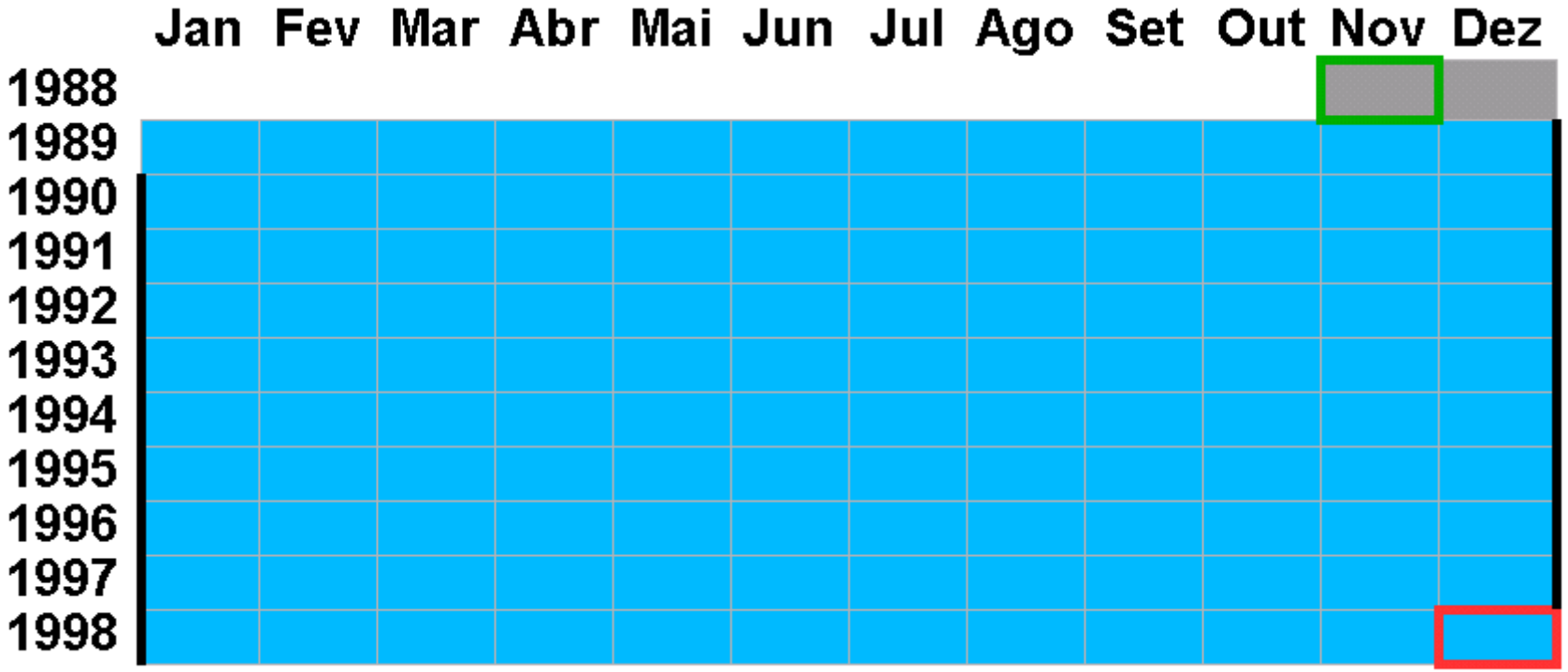
GBRAMS and RECLIRS climatology methods

IRI method



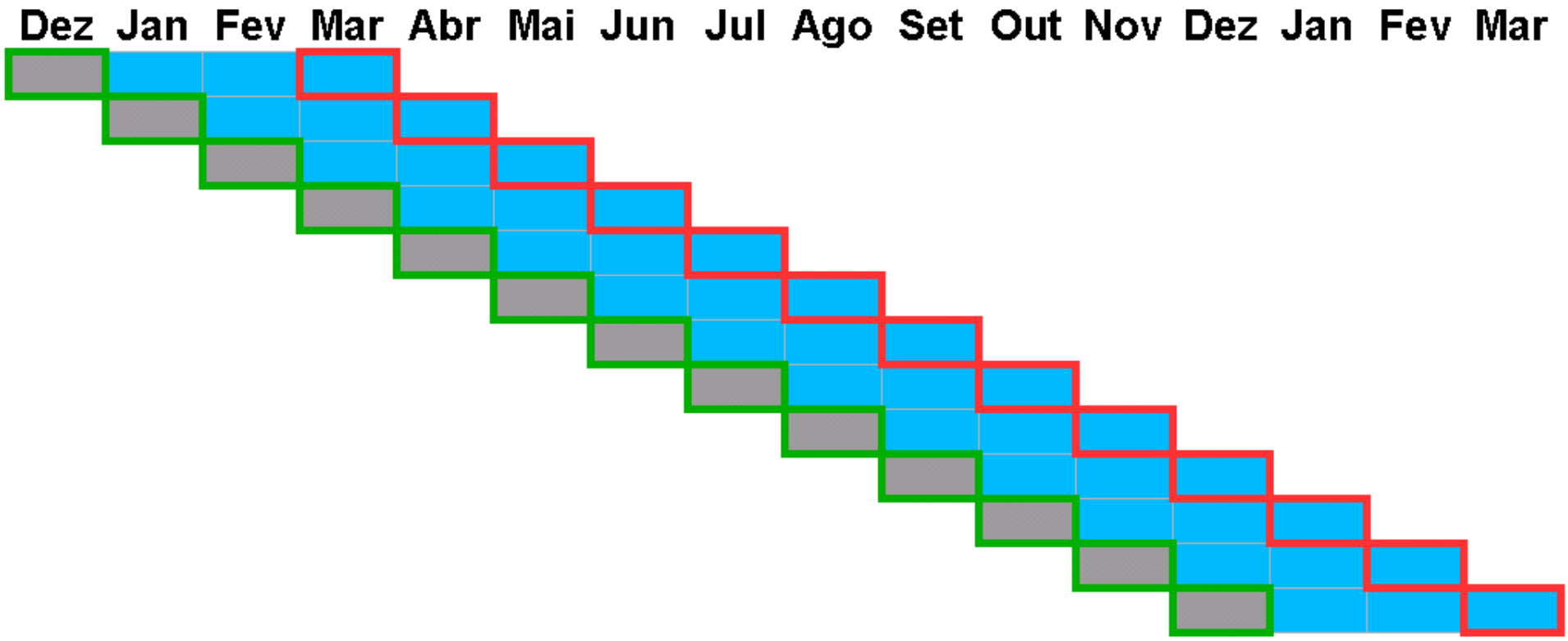
GBRAMS and RECLIRS climatology methods

IRI method



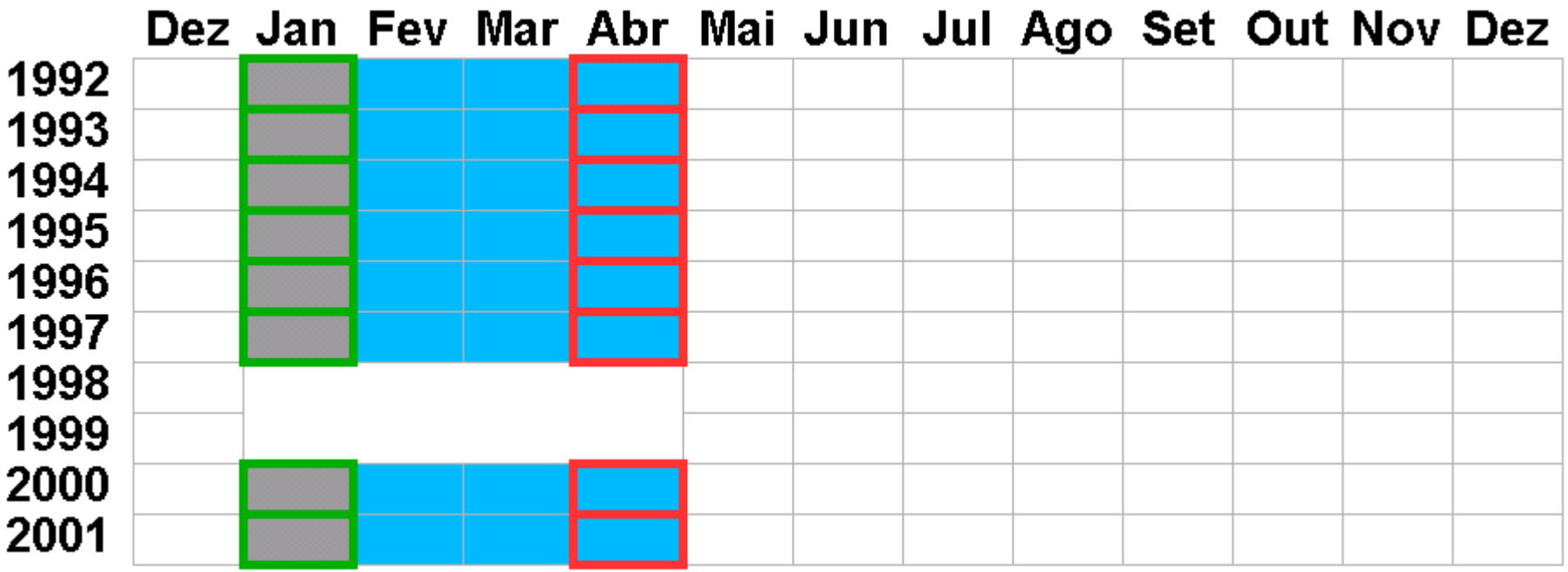
GBRAMS and RECLIRS climatology methods

ECMWF method



GBRAMS and RECLIRS climatology methods

ECMWF method



GBRAMS results

	T_p – cluster time (days)	Integrated months (m)	T_p/m (hh:mm)
Globus	43.7	414	02:32
OurGrid	33.7	342	02:30
CIGRI	39.6	378	02:30
	117.0	1134	

Table 1. Accumulated cluster time (T_p)

GBRAMS results

	T_g – grid elapsed time (days)	Integrated months (m)	T_g/m (hh:mm)
Globus	23.9	414	01:23
OurGrid	16.3	342	01:08
CIGRI	21.3	378	01:20
	61.5	1134	

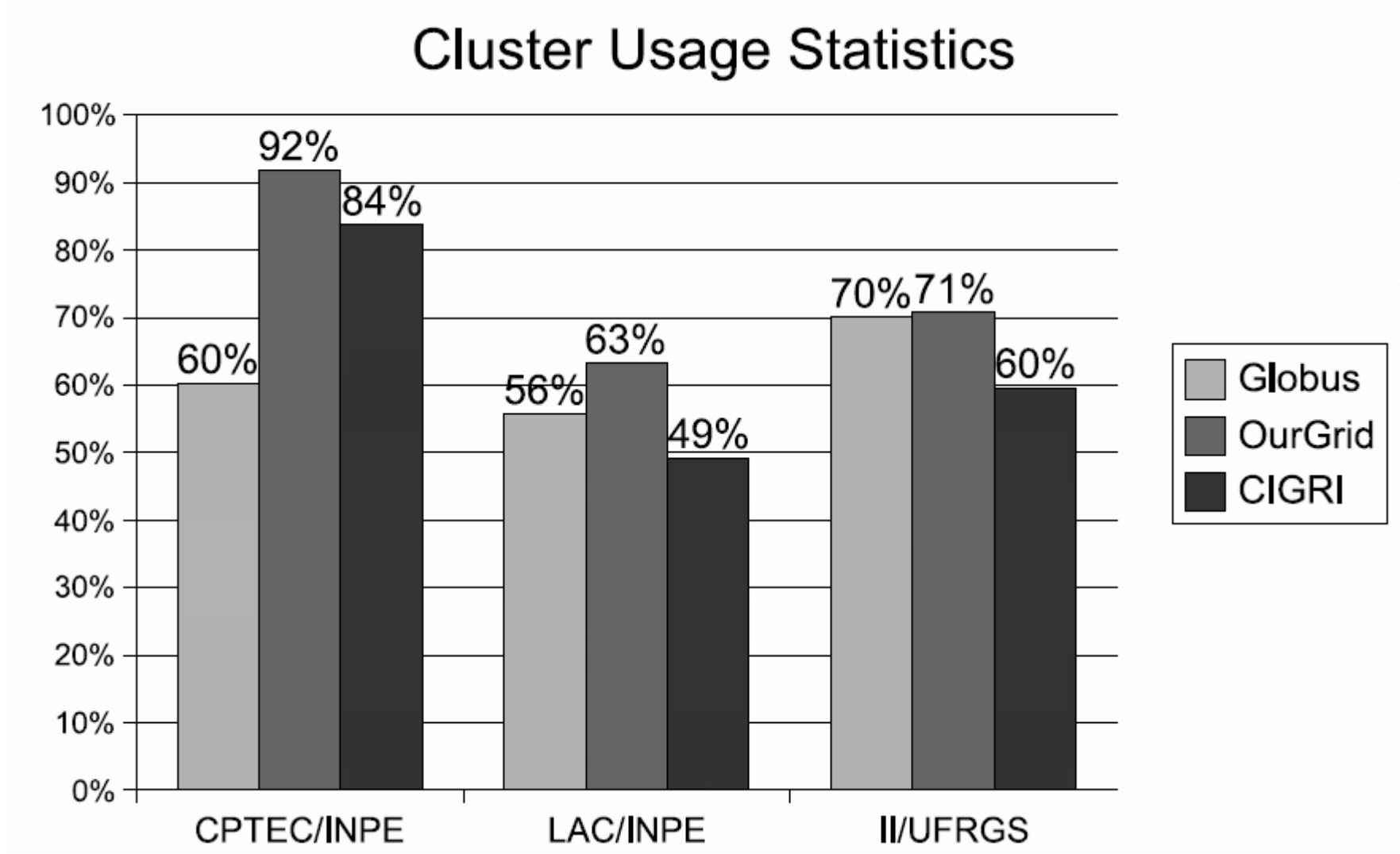
Table 2. Elapsed time (T_g) of all jobs

GBRAMS results

	3	2	1	avg. use
Globus	0.26	0.34	0.40	1.86
OurGrid	0.44	0.37	0.19	2.25
CIGRI	0.31	0.31	0.38	1.93

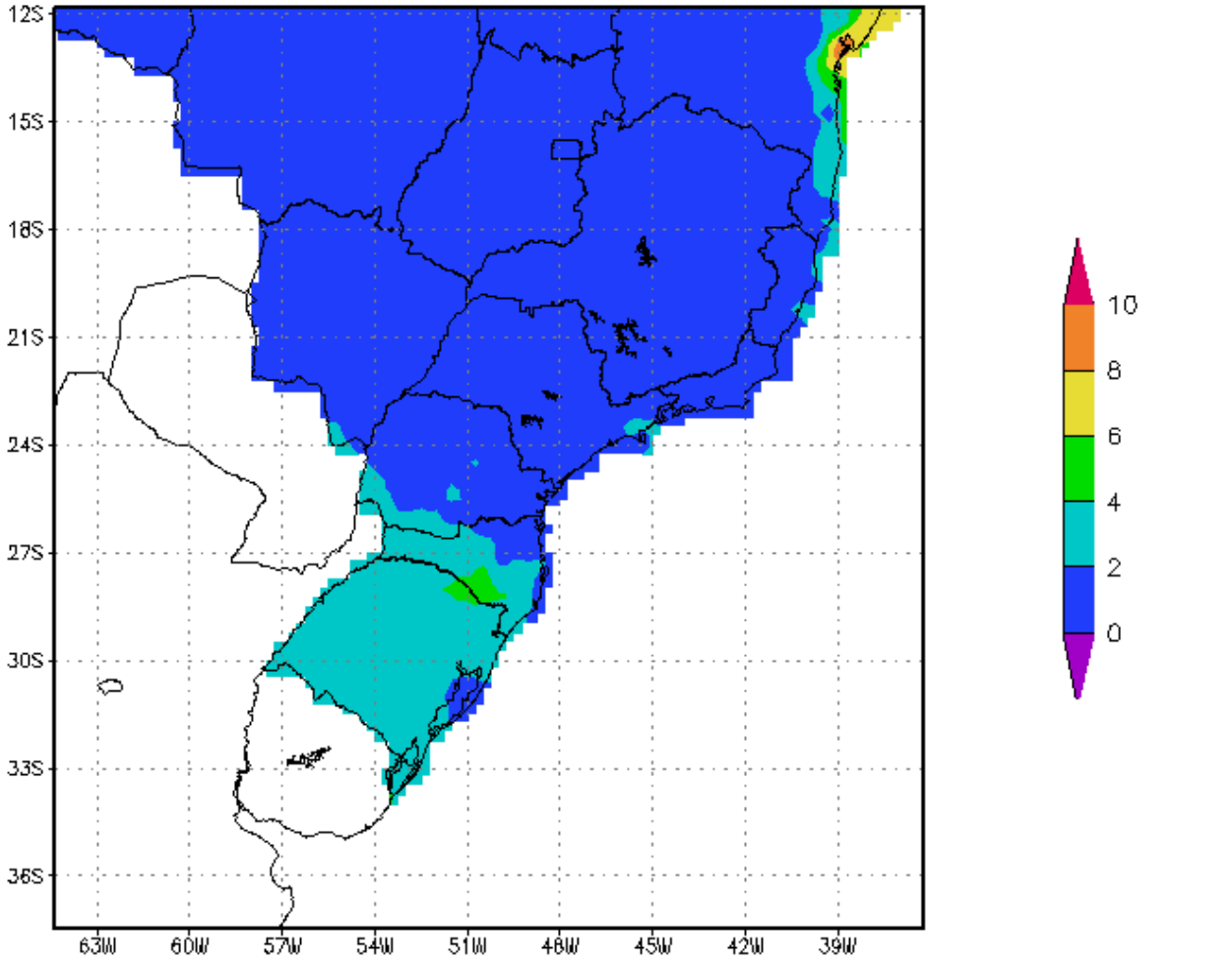
Table 3. Cluster usage

GBRAMS results



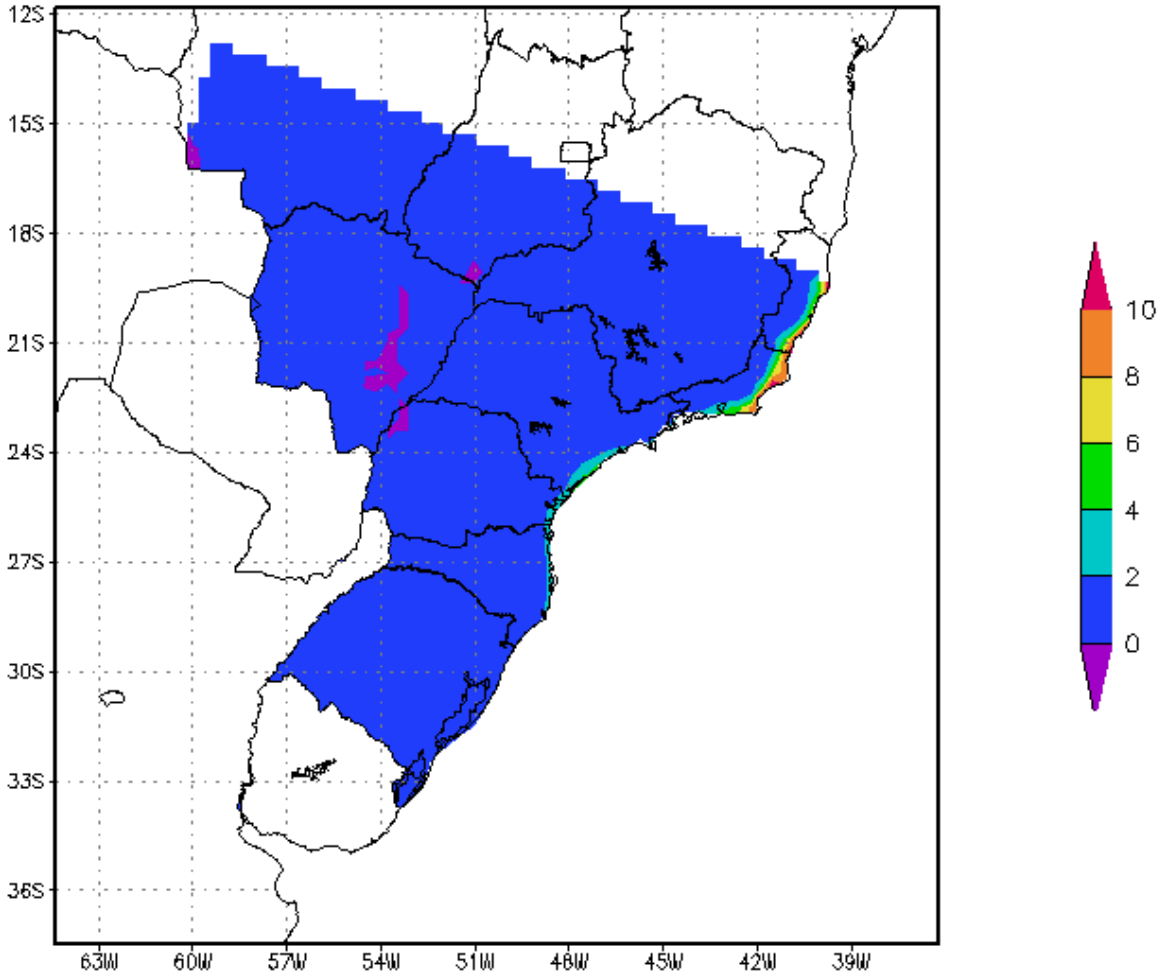
GBRAMS results

Observed



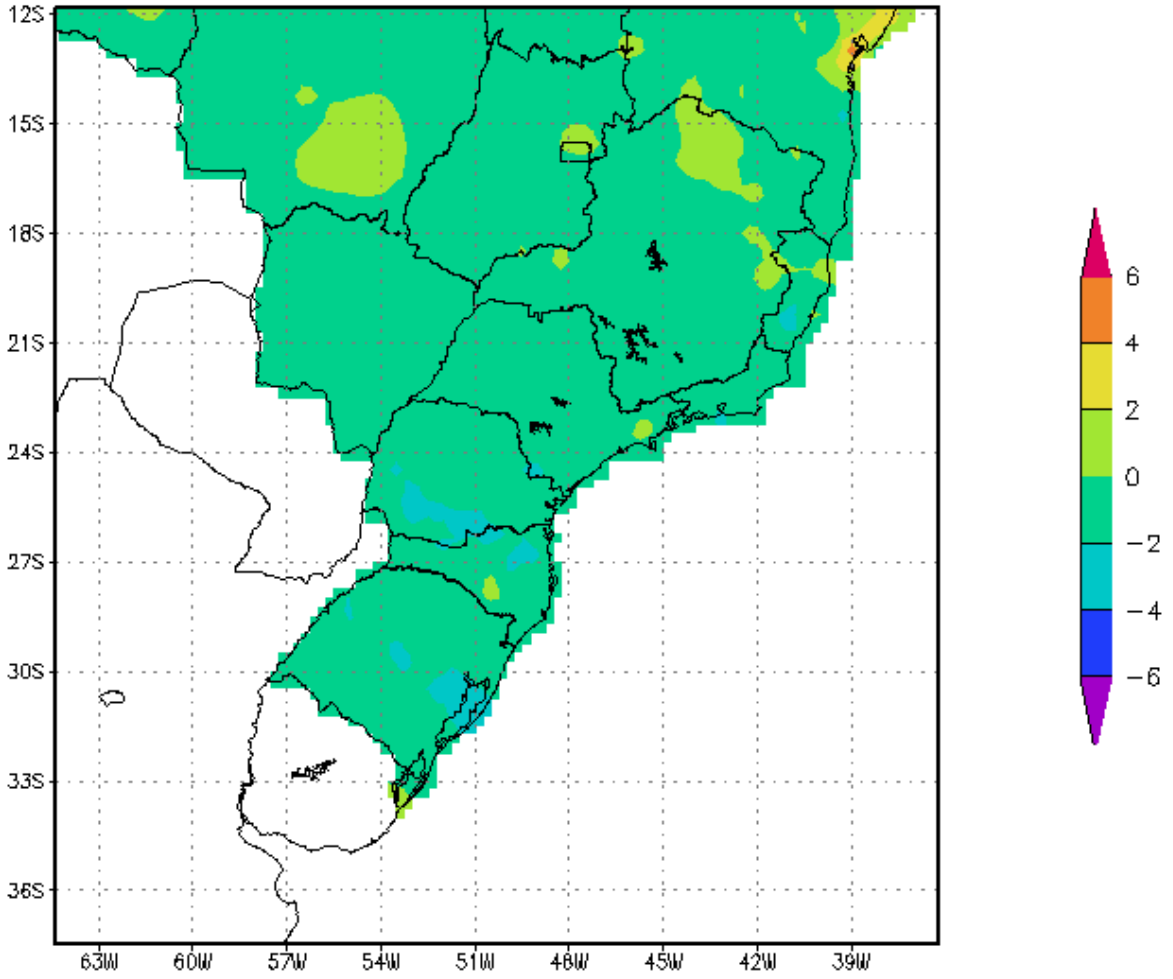
GBRAMS results

Forecast



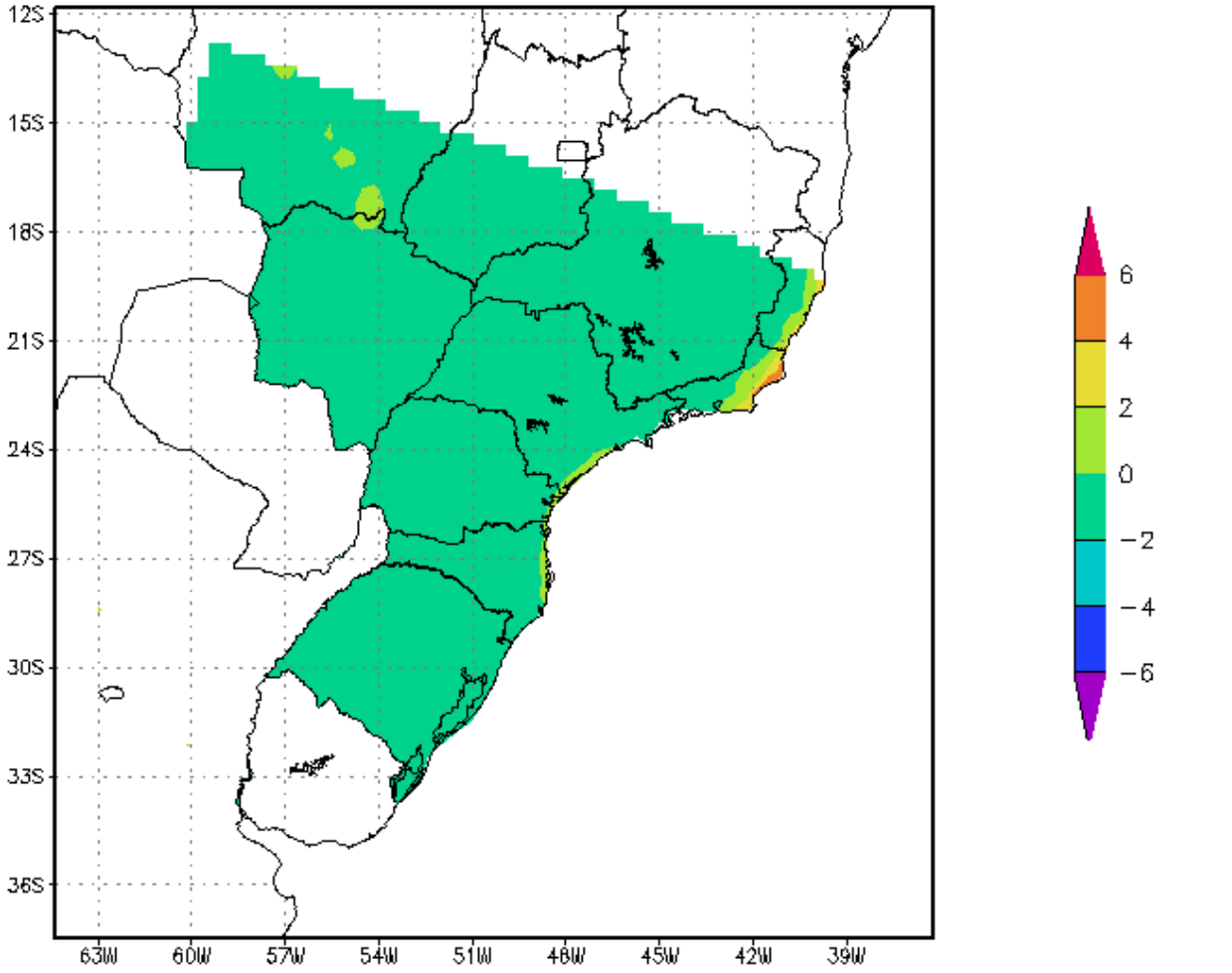
GBRAMS results

Observed anomalies



GBRAMS results

Forecast anomalies



Final Remarks

- Any of the 3 middlewares was able to execute the climatology.
- With the distribution of jobs on the grid nodes we have effectively reduced by 50% the time needed to obtain the climatology.
- In relation to the obtained climatology, we can observe that it has correctly been applied to predict climatic anomalies for the period of June–August 2006, in the southern region of Brazil.
- A more stressful utilization of the clusters may be obtained with ECMWF method in RECLIRS project.

Acknowledgements

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