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# ***e-Science related research in Brazil***

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São Paulo Research Foundation, FAPESP

# Brazil: 180 million people, 9th GNP

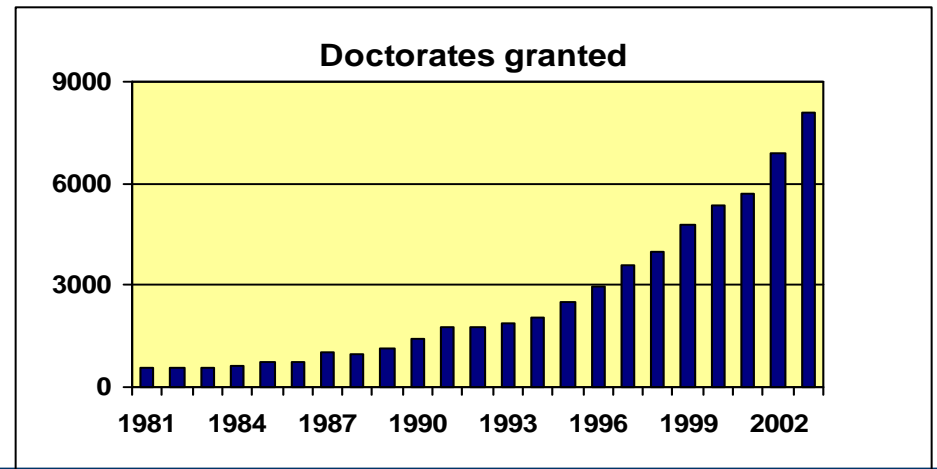
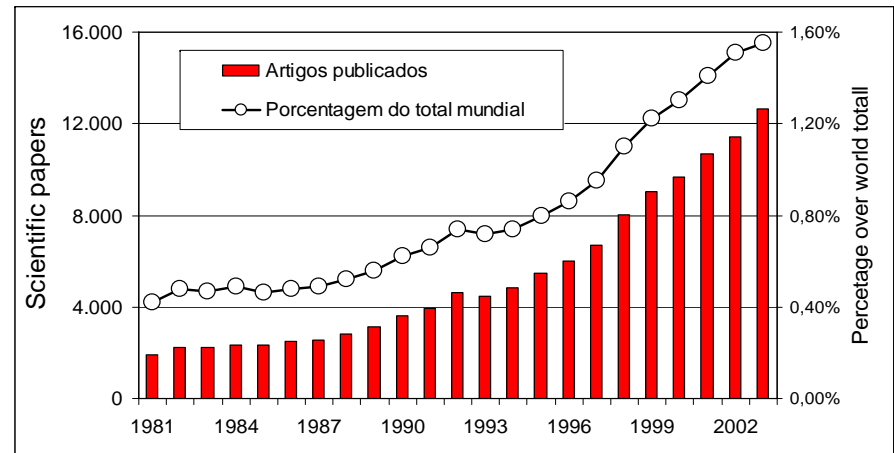
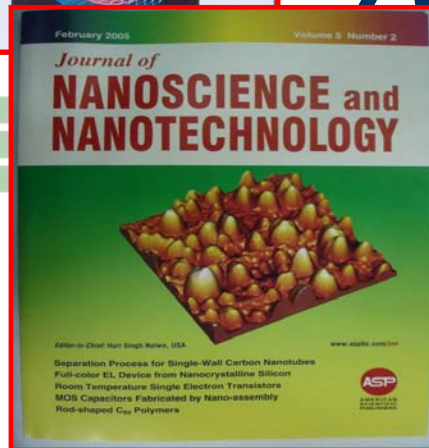
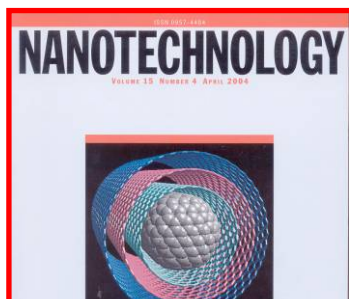
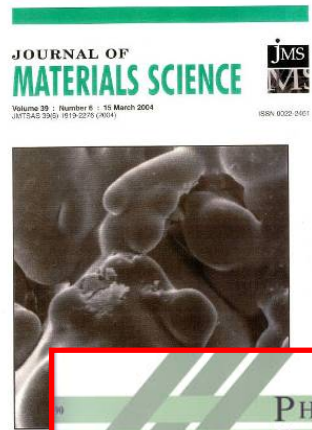


Brazil

We are here



# Brazil Academic Research



# ***e-Science infrastructure and some present applications***

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- Distributed global collaborations: Internet connections
- Large scale: Climate; Biodiversity; Grid computing; High Energy Physics; Digital Libraries and Open Access

# Internet connectivity in LA

## RedCLARA Topology

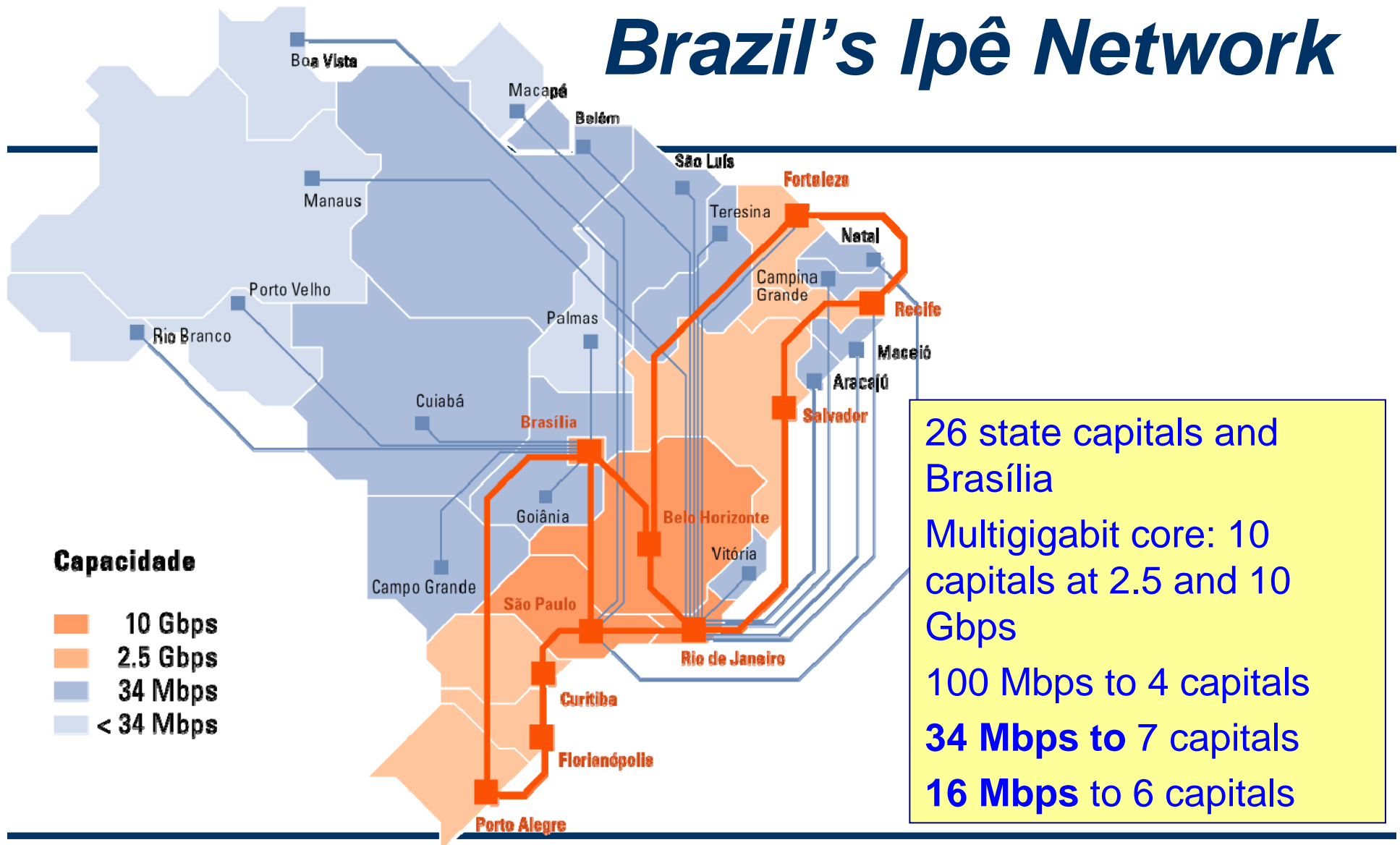
April 2007

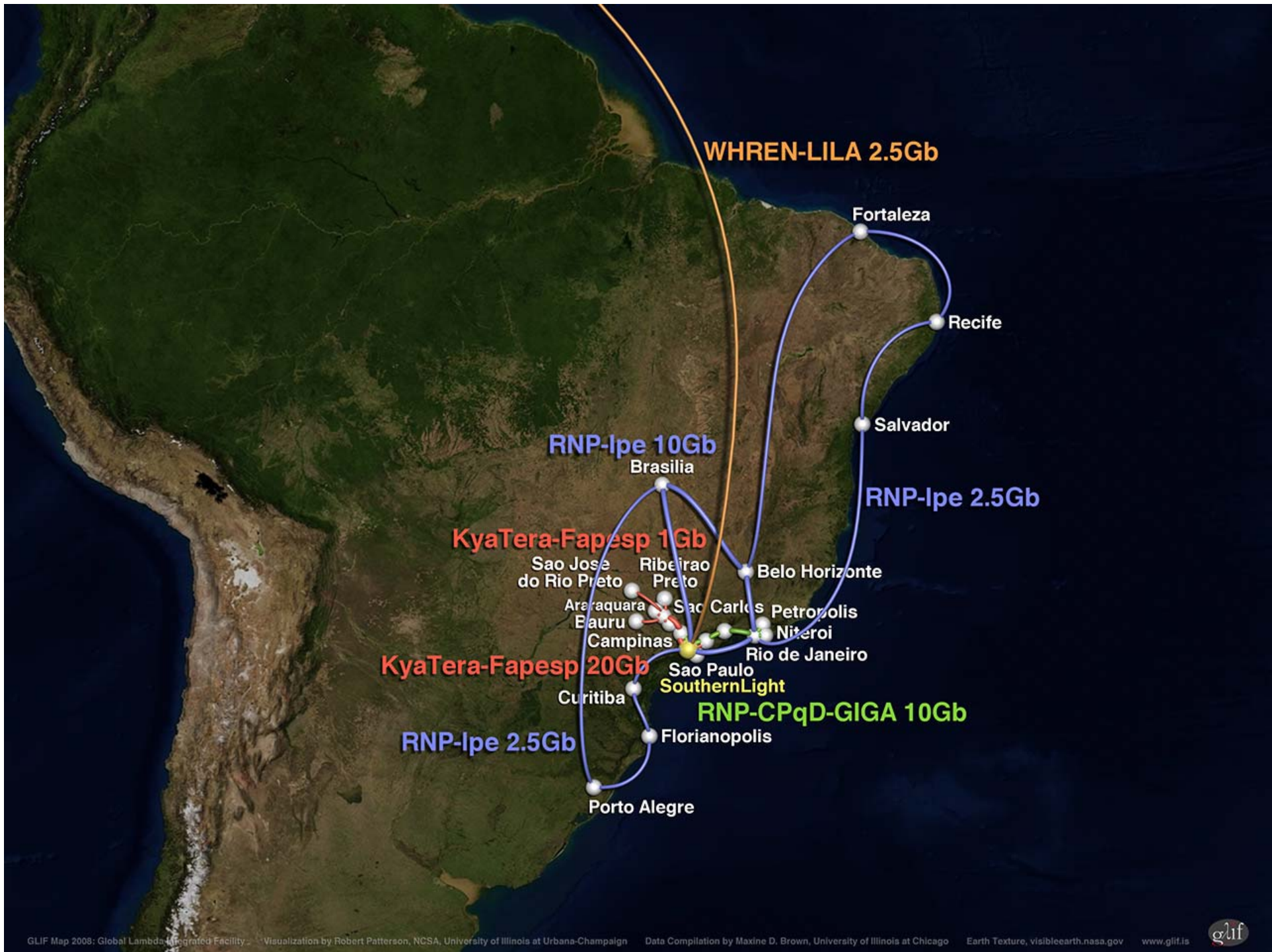


	GÉANT2 PoP - Spain		622 Mbps, ALICE
	RedCLARA PoPs		155 Mbps, ALICE
	Connections established		90 Mbps
	Connections planned		45 Mbps
	PoP Los Angeles - Pacific Wave		34 Mbps
	PoP Miami - Atlantic Wave		10 Mbps
			1 Gbps, WHREN-LILA
			2.5 Gbps, WHREN-LILA
			155 Mbps, LAUREN
			155 Mbps, LAUREN, planned



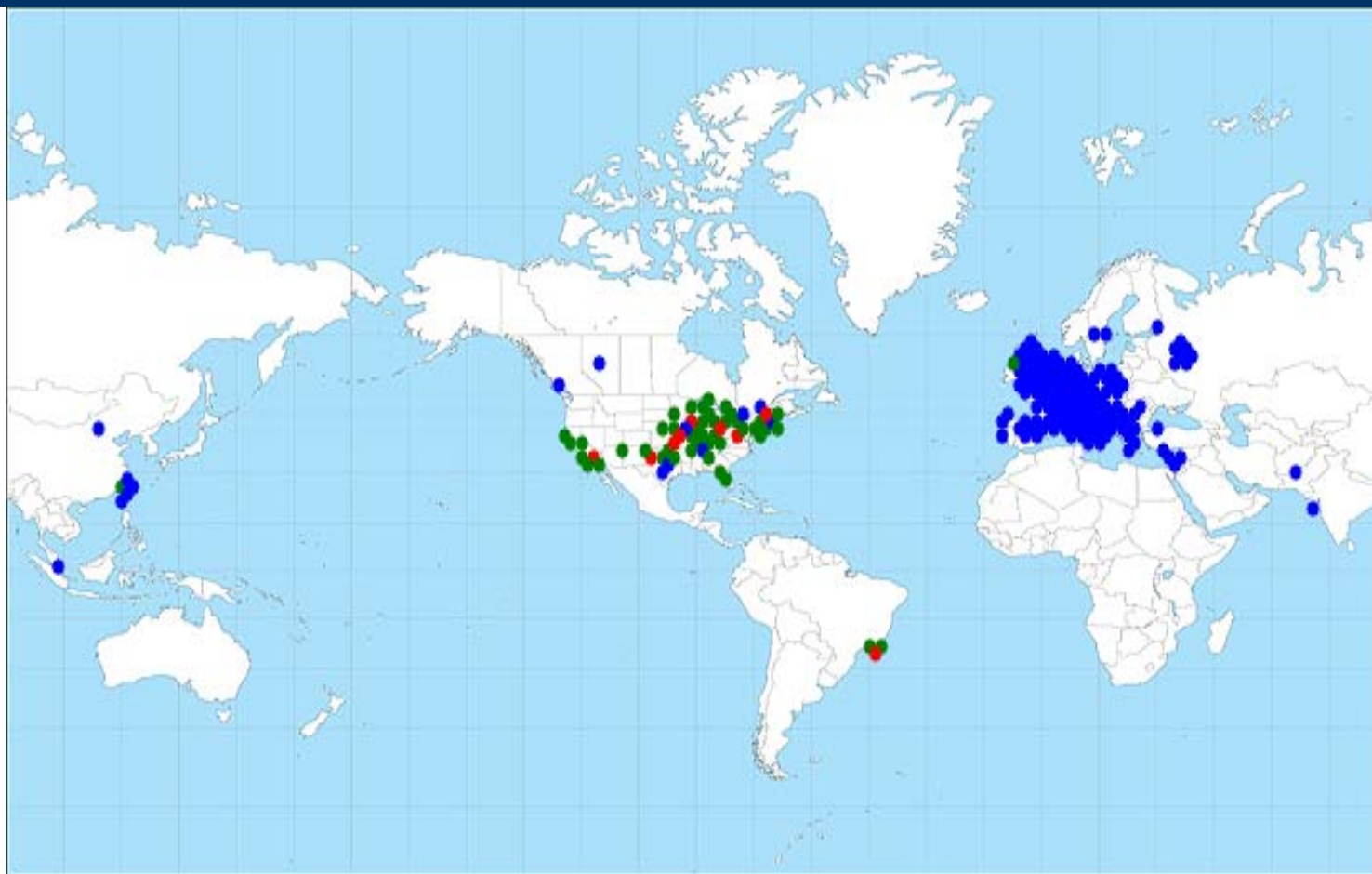
# Brazil's Ipê Network





# *OSG usage map*

## *All Grids, June 1st, 2008*



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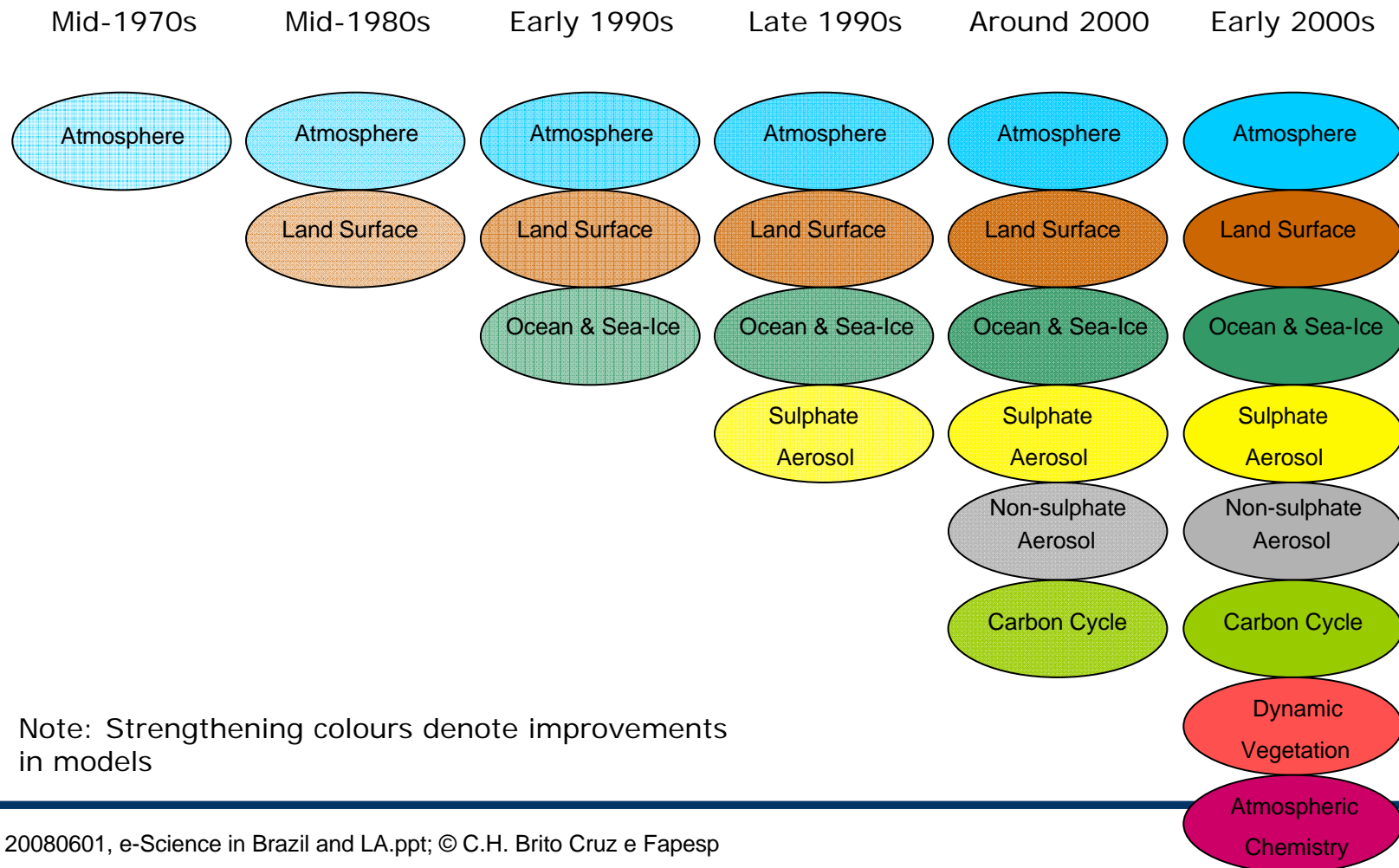
# ***Some e-Science related applications***

# ***Some e-Science related applications in Brazil***

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- Global Climate Modeling
  - LHC data processing – Tier 2 and Tier 1
  - Biodiversity databases
- Scientific Electronic Library Online – SciELO
  - CFD modeling
  - Bioinformatics

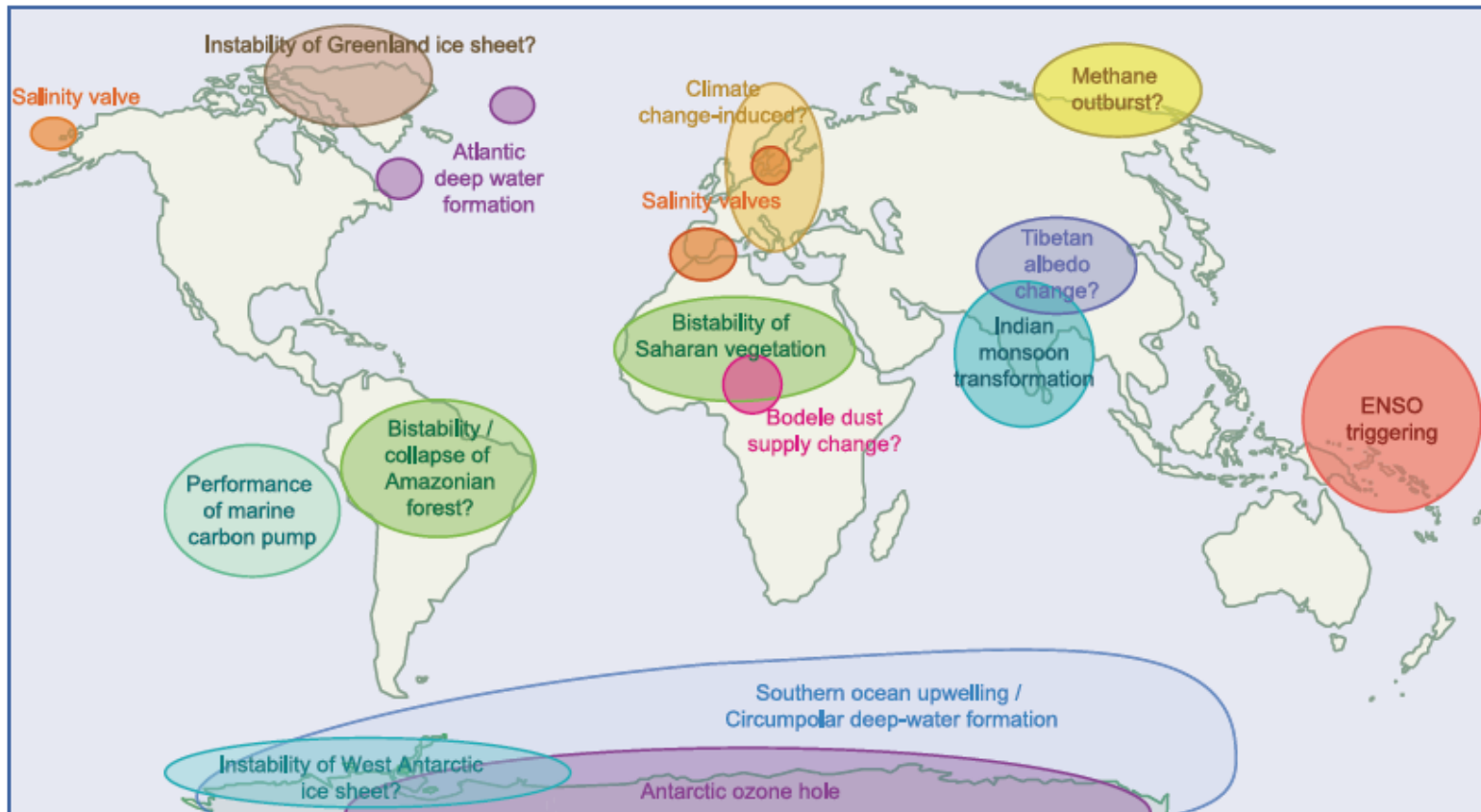
# Global Climate Modeling



Note: Strengthening colours denote improvements in models

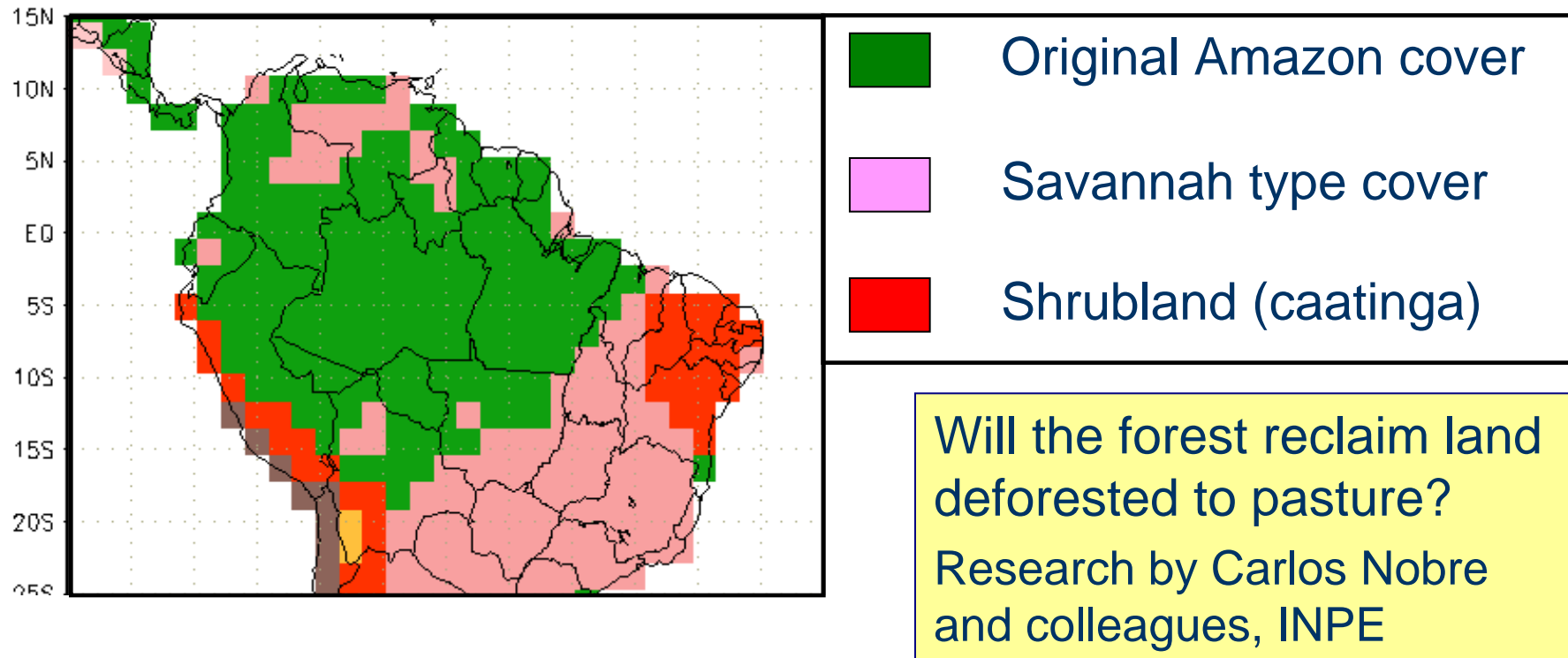
# Global change and the Amazon

Figure 9. Regions known or anticipated to have strong influences on the Earth System. Courtesy of HJ Schellnhuber.



# Modeling Amazon self-healing

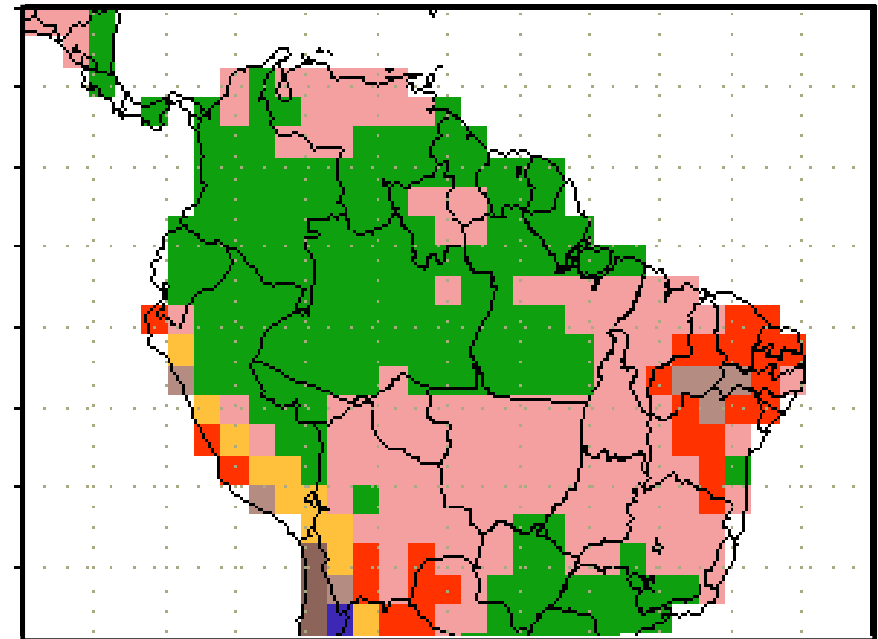
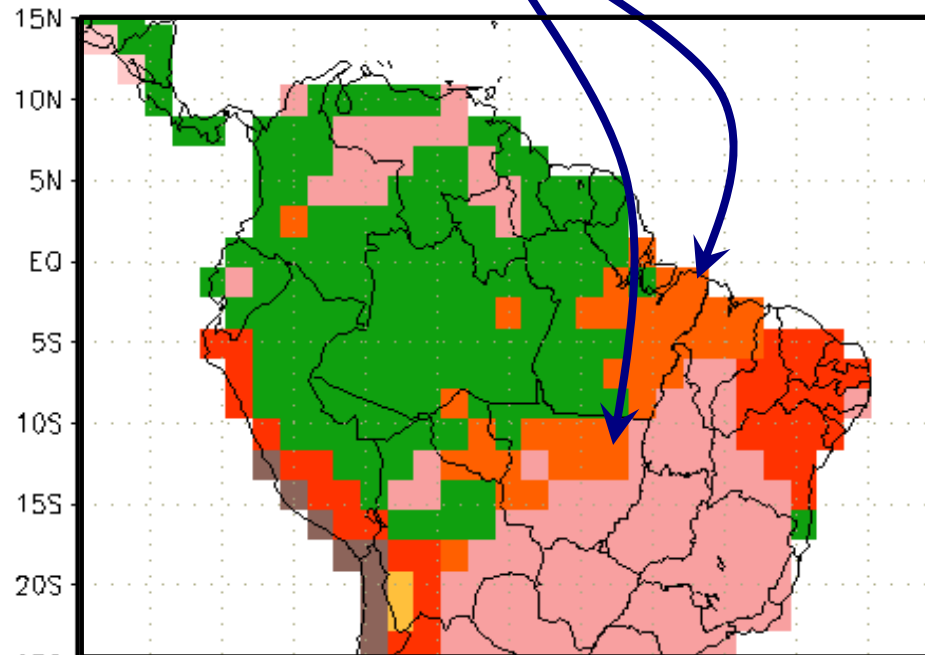
Oyama and Nobre, GRL 2003 e Salazar, Oyama and Nobre, GRL 2007  
Sampaio et al., GRL 2007



# Can the Amazon always heal itself?

20% deforestation to pasture

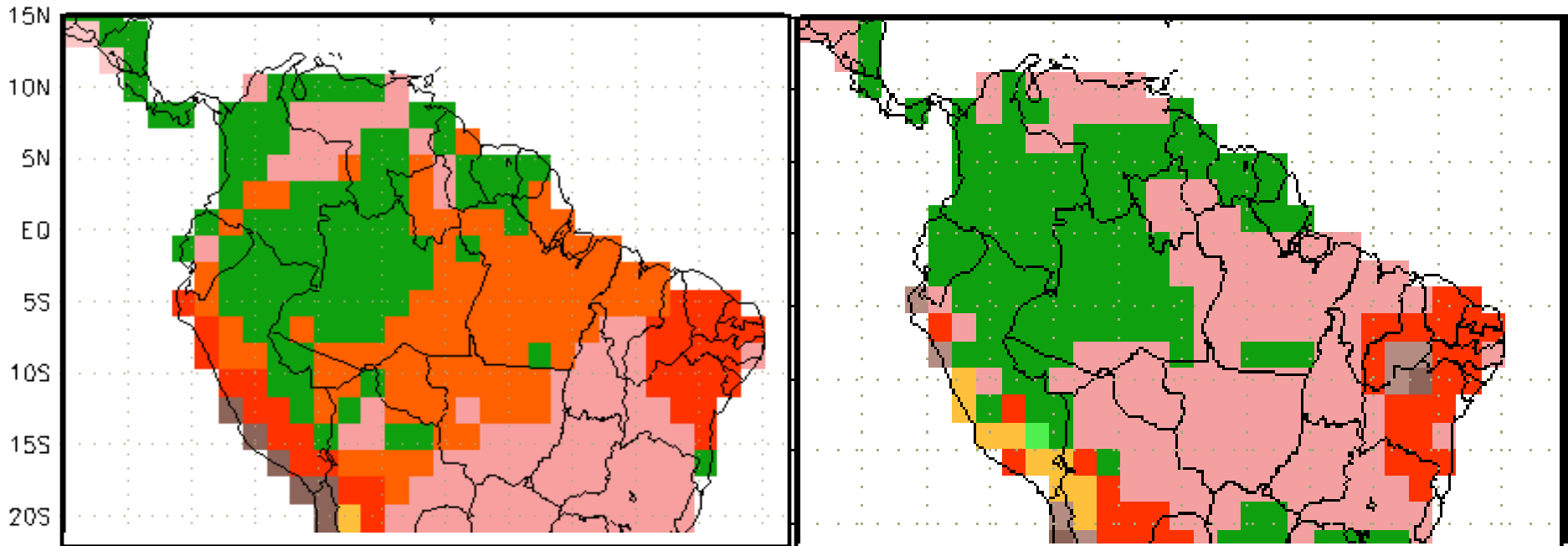
Self-healing when pastures abandoned



# *No self-healing above 50% deforestation – threshold at 40%*

 50% deforestation to pasture

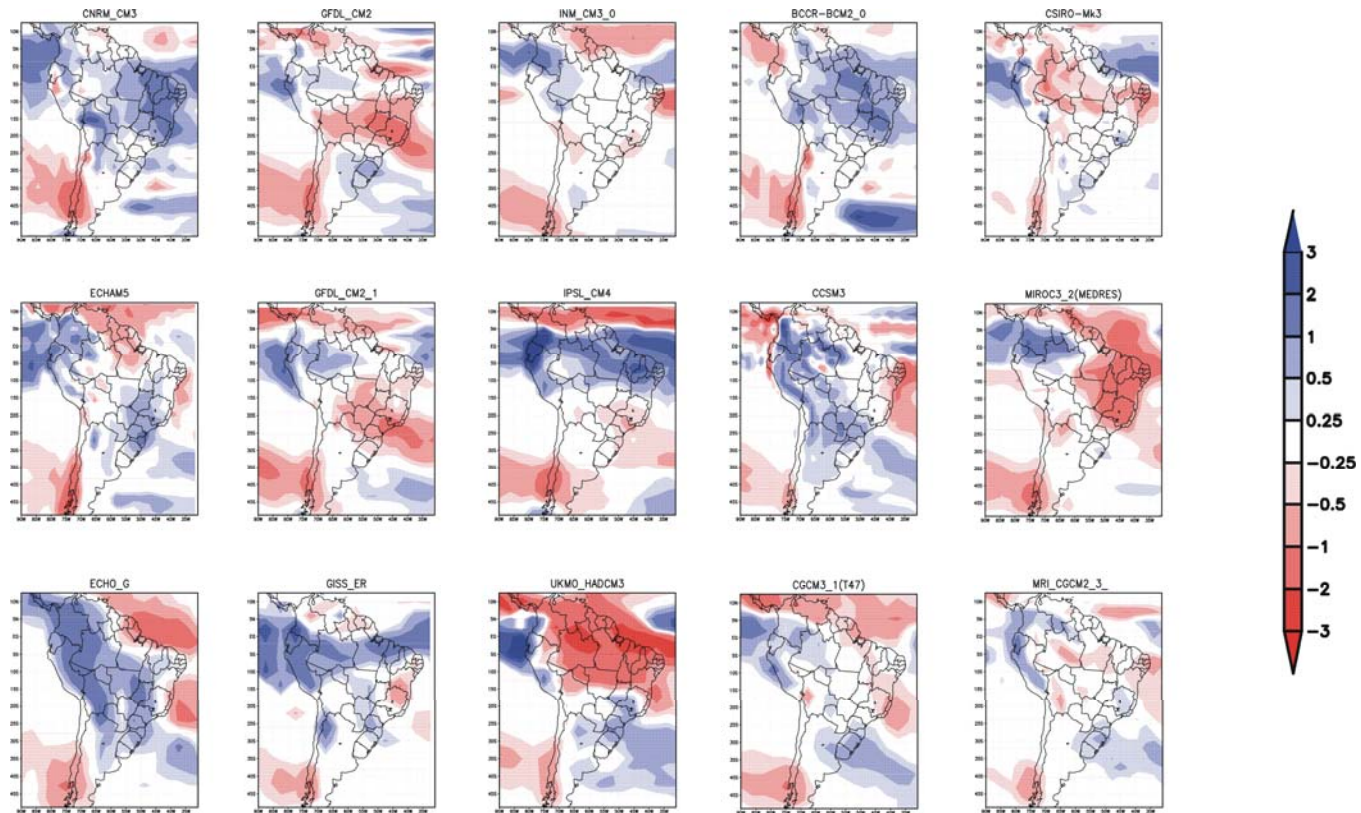
No self-healing when pastures  
abandoned



Sampaio et al., GRL 2007

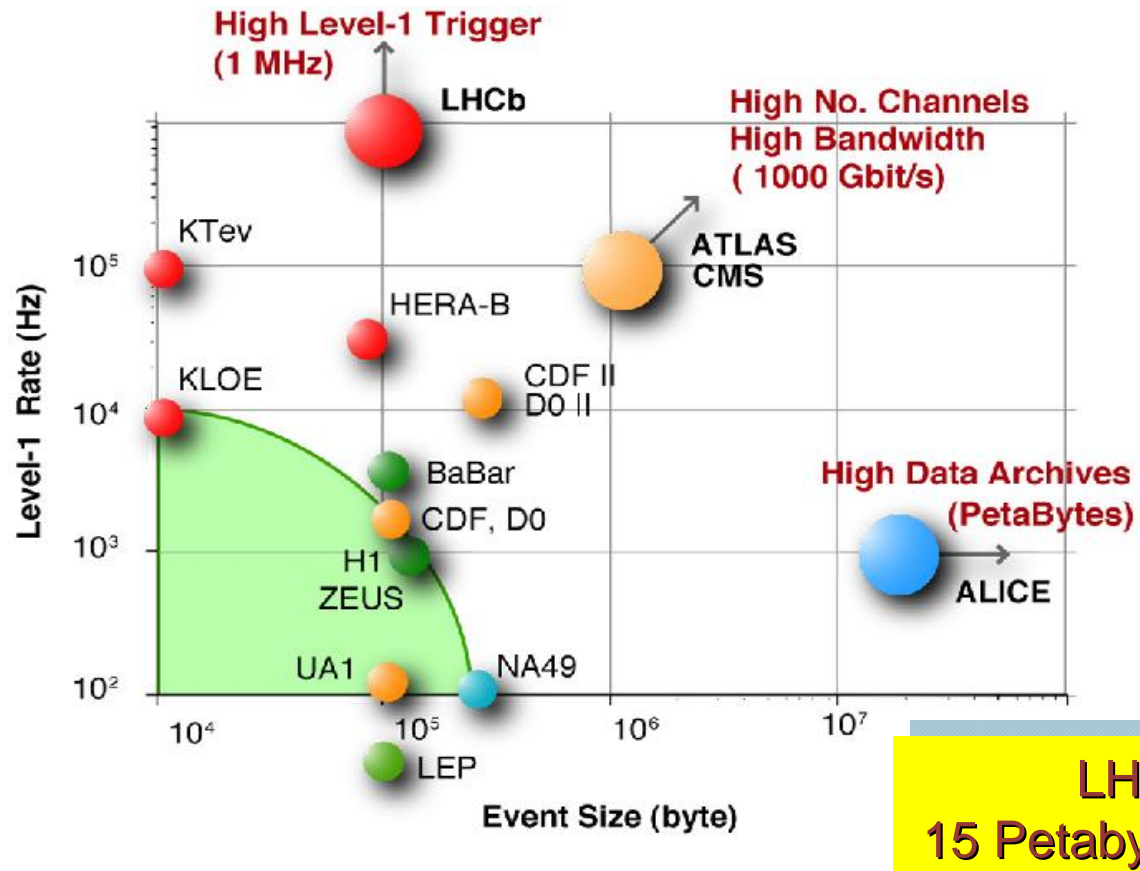
# Why do we need HPC? Variance in global modeling

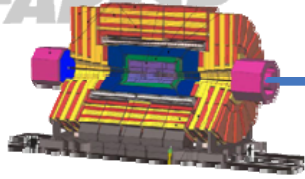
## Precipitation in Latin-America: results from 15 IPCC models



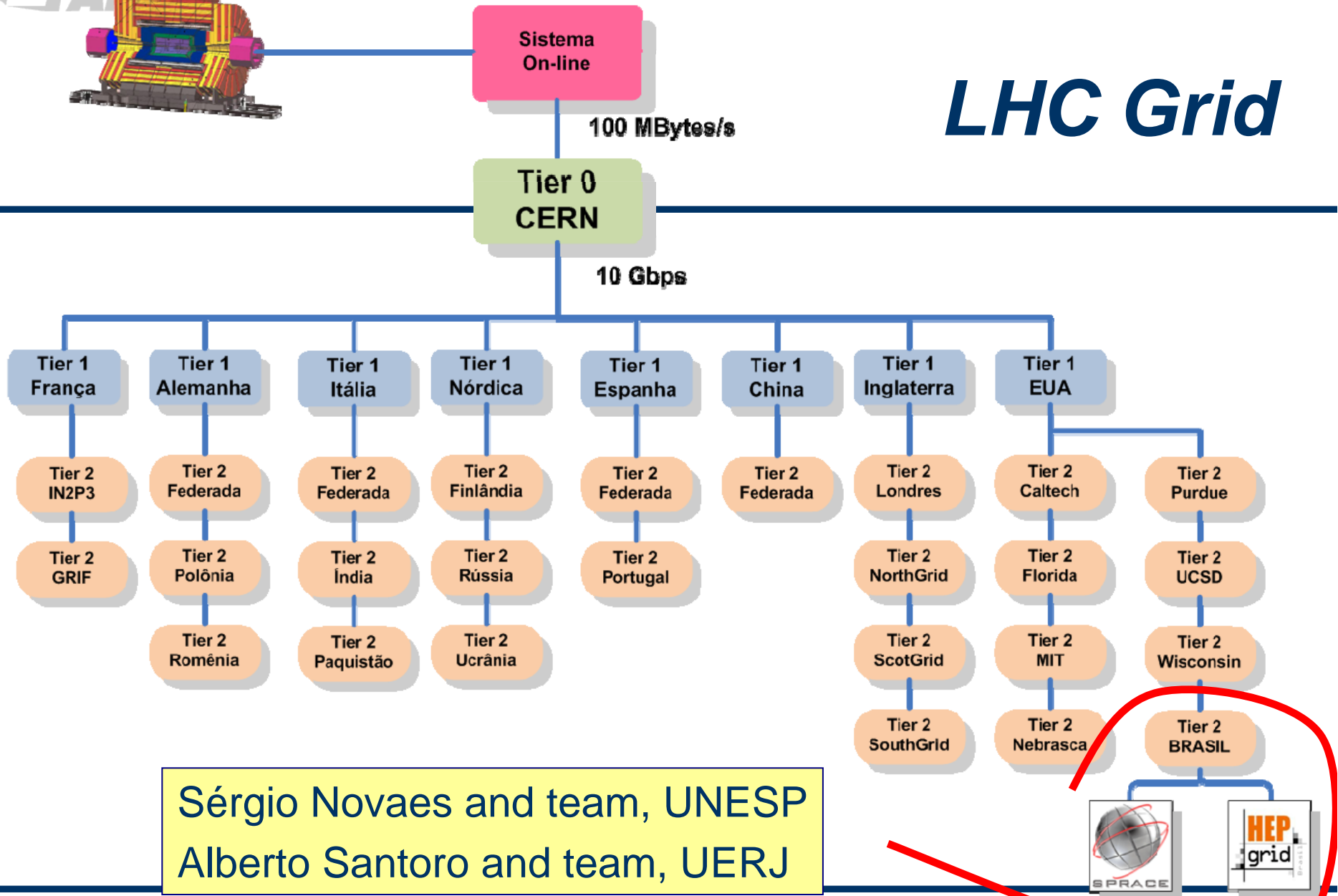
# LHC data analysis

## Compact Muon Solenoid (CMS) data





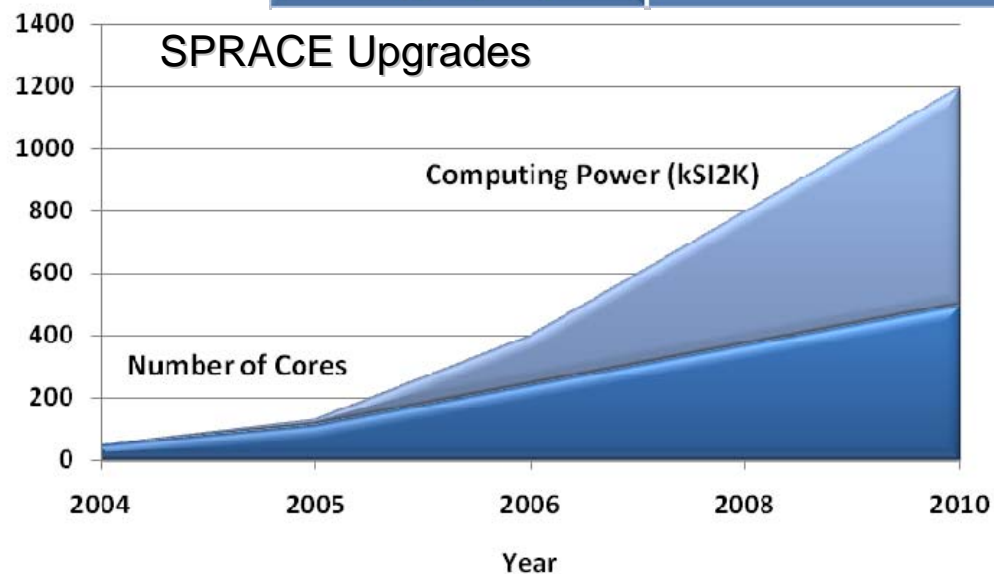
# LHC Grid



Sérgio Novaes and team, UNESP  
 Alberto Santoro and team, UERJ

# SPRACE

	2004	2005	2006	2008	2010
CPU Cores	48	112	240	368	496
Power (kSI2K)	45	130	400	800	1200
Storage (TB)	4	12	12	108	204



## Upgrades for Tier-2:

Computing power: **1000 kSI2K**  
 Disk: **200 TB**  
 Network: **10 Gbps**

# *Biodiversity Virtual Institute*

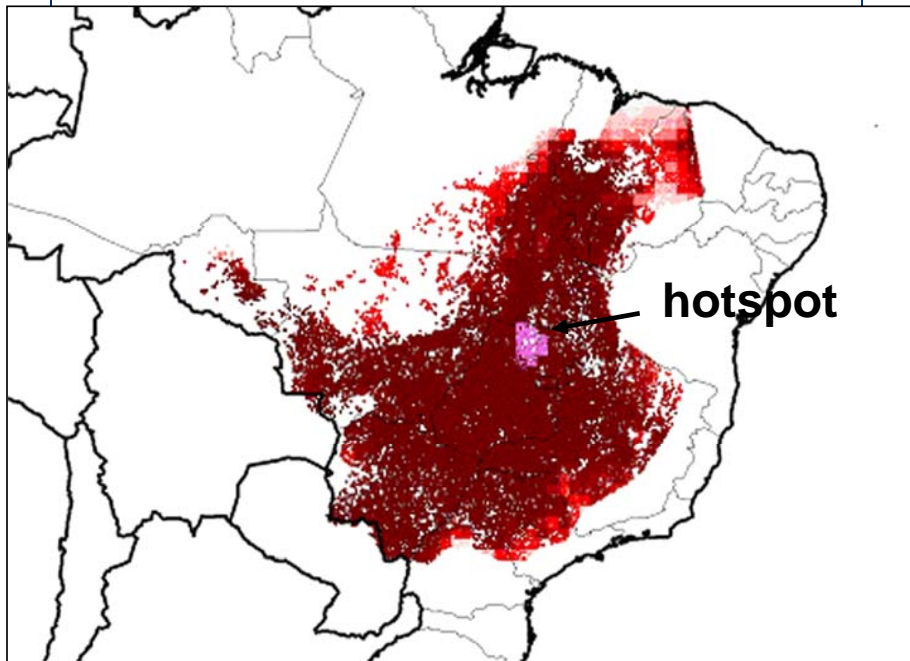
## *BIOTA*

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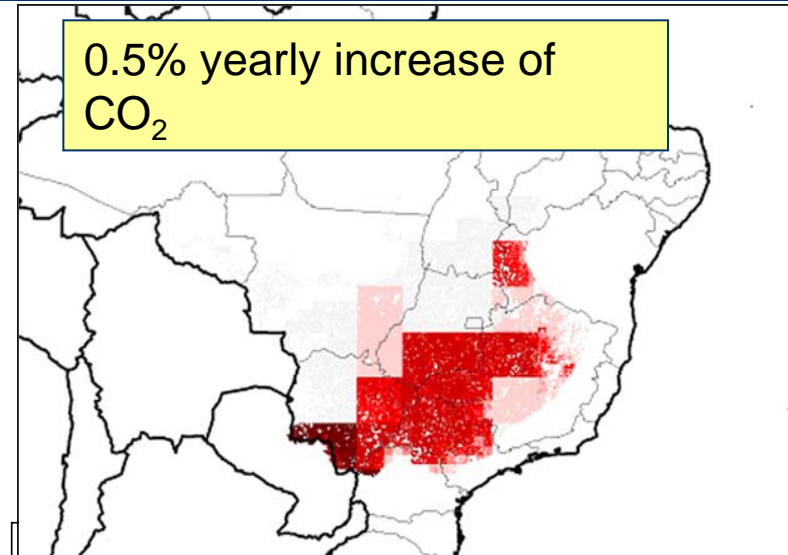
- A network of 200+ scientists
- Characterize the biodiversity of the State of São Paulo, and define mechanisms for its conservation and sustainable use
  - Study and disseminate data, information, and knowledge about São Paulo's biodiversity and its importance.
  - Increase public and private organizations' capacity in managing, monitoring and using biodiversity.
  - Promoting informed decisions
- <http://www.biota.org.br/>

# Modeling for species of cerrado trees : 2 scenarios of climate change

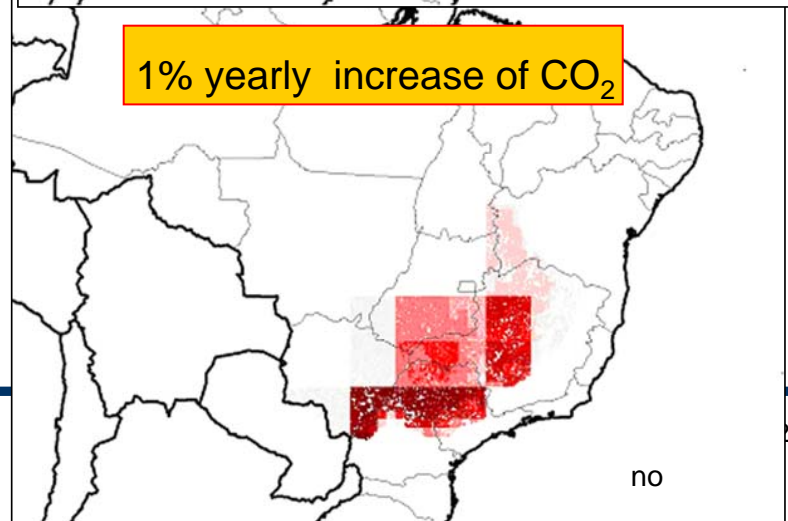
Present potential distribution



0.5% yearly increase of CO<sub>2</sub>

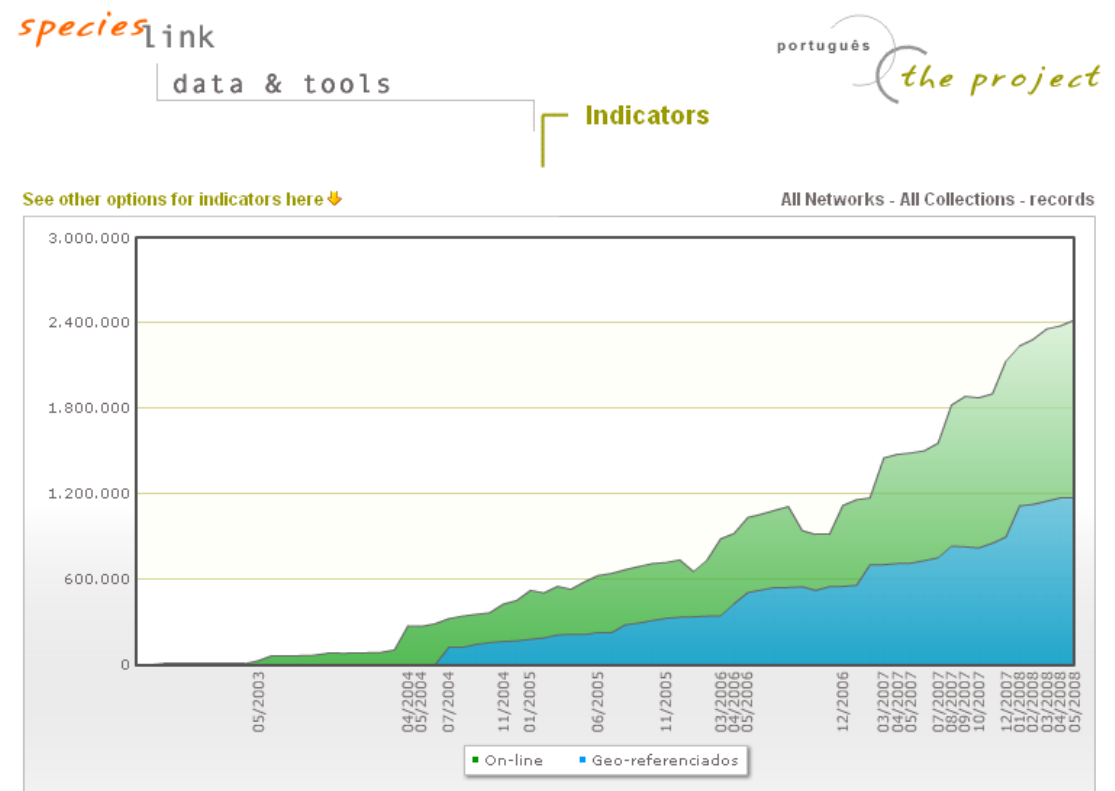


1% yearly increase of CO<sub>2</sub>



# speciesLink database

- 138 collections and subcollections connected
- More than 60% of the collections updated their data in the last 6 months
- ~85% updated in the last 12 months
- <http://www.cria.org.br>



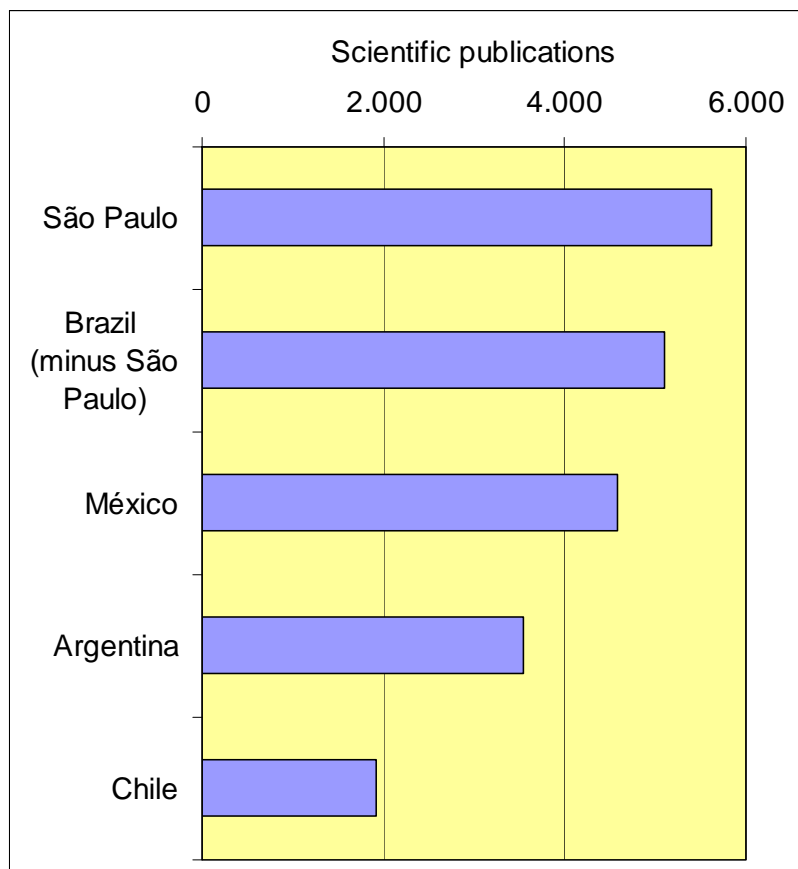
# State of São Paulo, Brazil



38% of Brazil's GNP  
 38 million people  
 55% of Brazilian science  
 13% of State budget for  
 Higher Education and  
 R&D funding

3 State universities  
 19 Technology Schools  
 40% PhD formation in Brazil  
 19 Research institutes  
 1 Foundation  
 60% of research funding  
 comes from state  
 sources  
 ANSP Network

# Academic Research in São Paulo: 10,000 faculty, 130,000 students



Brasil	EUA	Doutorados
<b>USP</b>		<b>2.041</b>
<b>Unicamp</b>		<b>873</b>
	U. CA, Berkeley	769
	U. TX-Austin	702
	U. CA, Los Angeles	664
	U. MI	658
	Nova Southeastern U.	645
	U. WI-Madison	627
	Stanford U.	591
	PA State U., The	580
	Harvard U.	579
	U. IL-Urbana-Champaign	574
	U. MN	565
	OH State U., The	560
	U. FL	522
<b>Unesp</b>		<b>522</b>
	U. WA	506

Dados de 2004 do Survey of Earned Doctorates, 2004, Table 3.

USP, Unesp: 2004 ou mais recente; Unicamp 2005

# *Fapesp: São Paulo State Foundation for the Support of Research*

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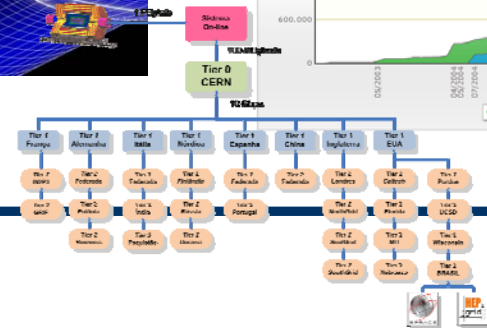
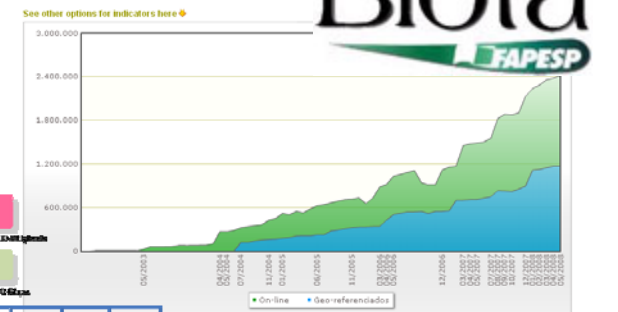
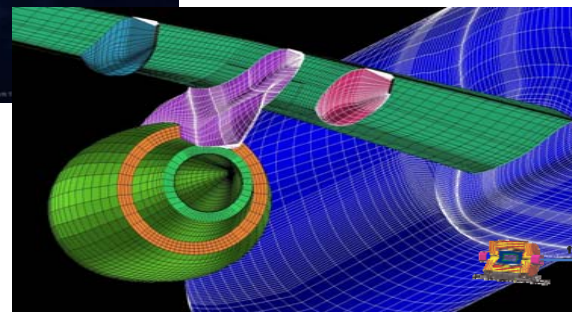
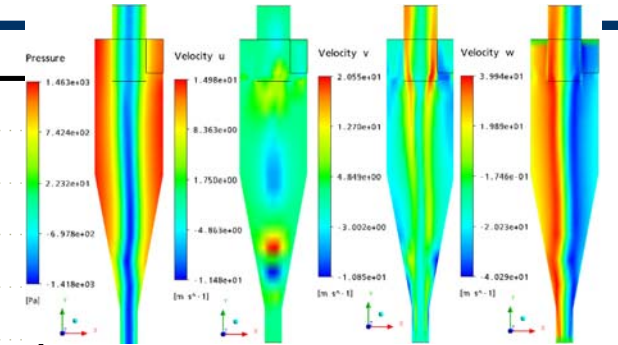
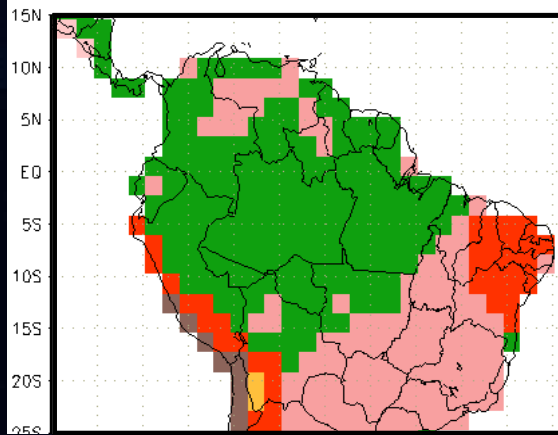
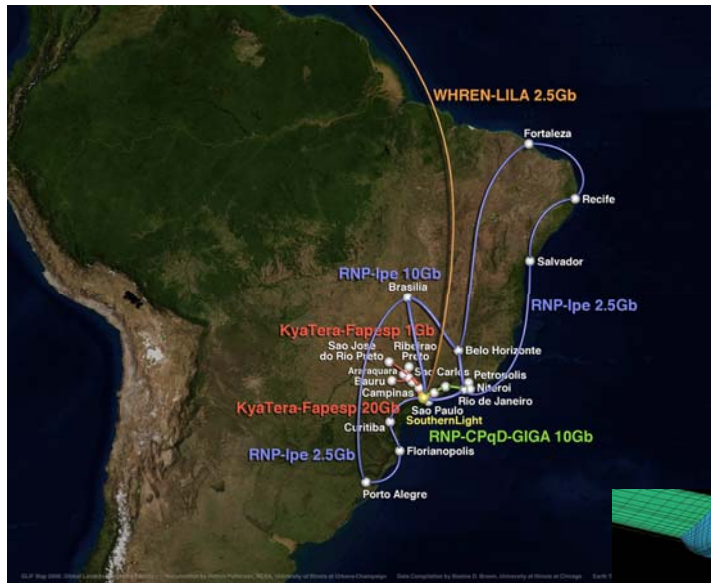
- Mission: support research in all fields
- Receives 16,000 proposals per year, all peer reviewed
- Funded by the State of São Paulo with 1% of all state tax revenues
- Started operations in 1962
- Annual budget: US\$ 379 M in 2007
  - Fellowships (2,830 SI, 2,350 MS, 2,550 DR, 1,200 PD)
  - Academic R&D
  - University-Industry Joint R&D
  - Small bussiness R&D
    - 800 SBE's (three awards per week in 2007)

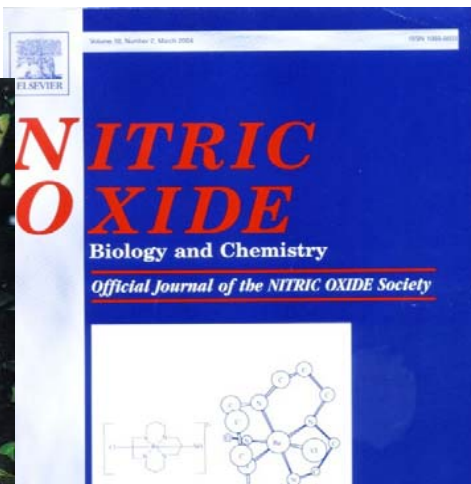
## *International agreements for co-funding joint research*

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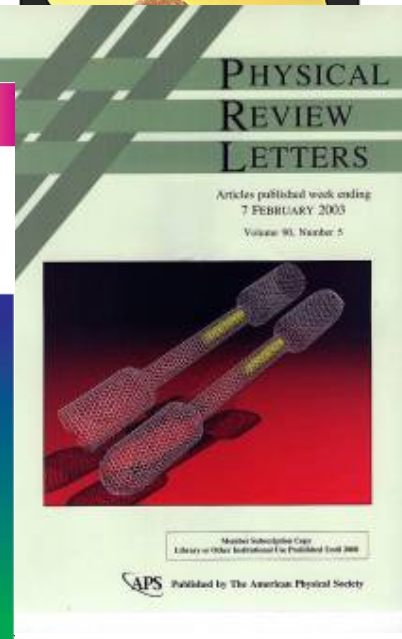
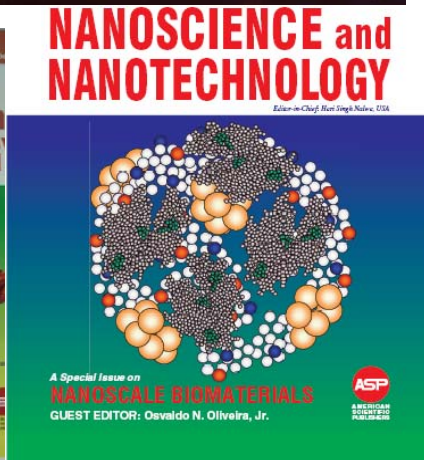
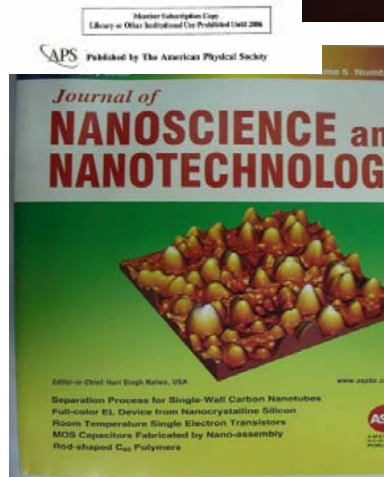
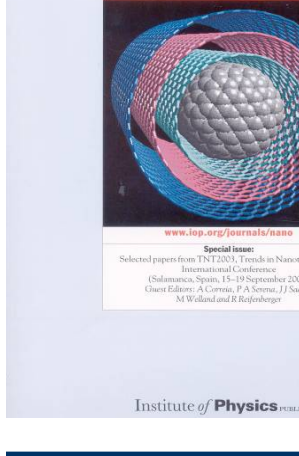
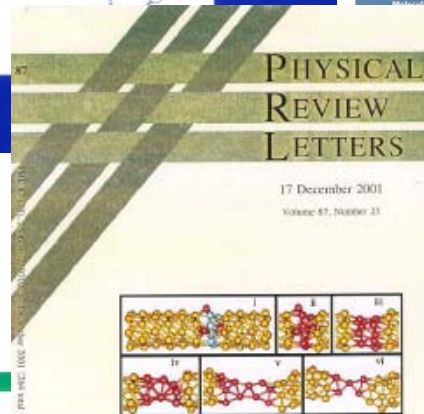
- France
  - CNRS, INRA, INRIA, INSERM
- Germany
  - DFG, DAAD
- Portugal
  - Fundação C&T
- UK
  - BBSRC, British Council

# e-Science related research





# Cancer Research



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