University of Campinas – UNICAMP
Department of Science and Technology Policy

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AIS and AET in Brazil

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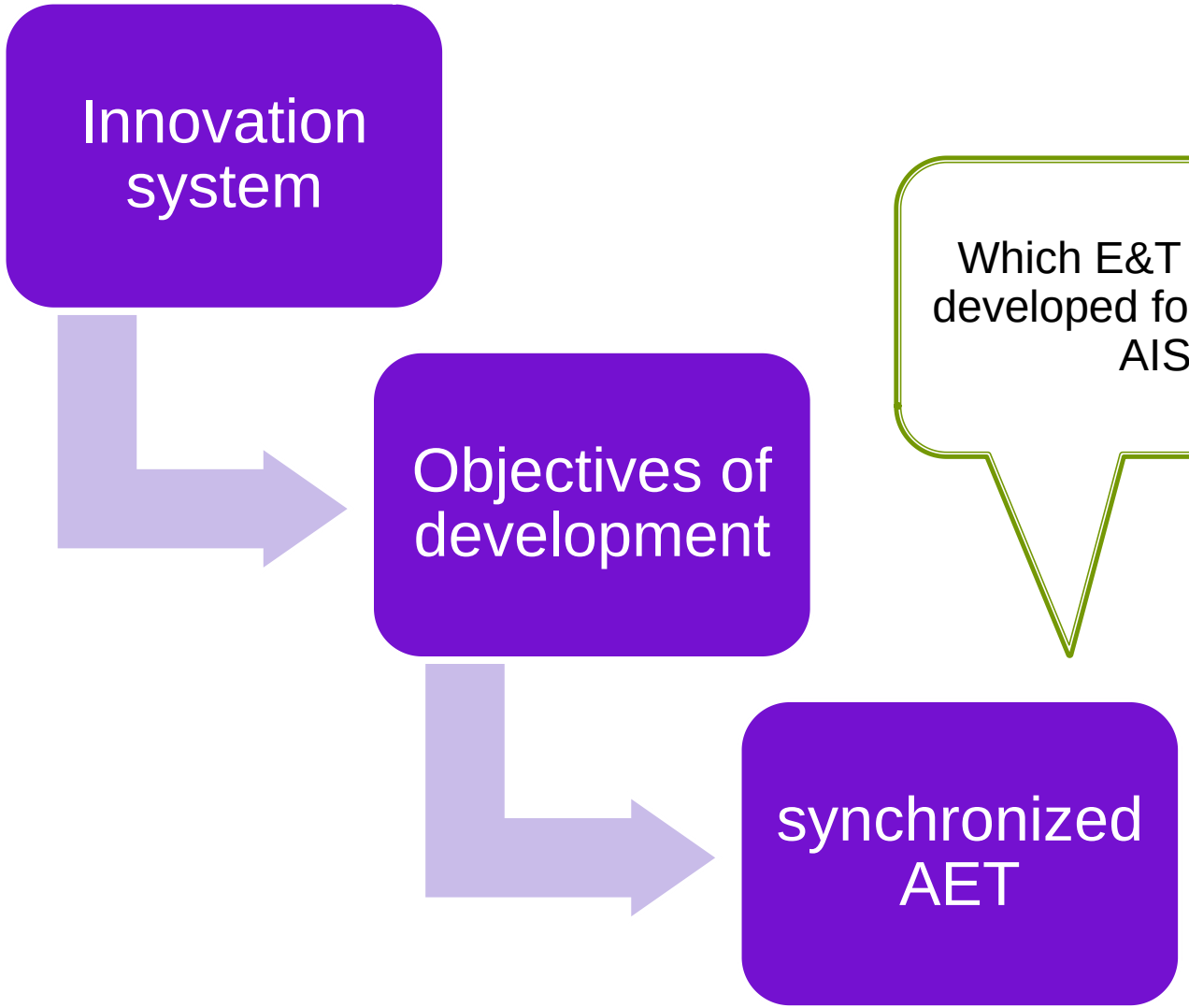
This presentation

- What kind of Education and Training for an Agriculture Innovation System?
- How is Brazil dealing with it?
- What do we need to do for the future?

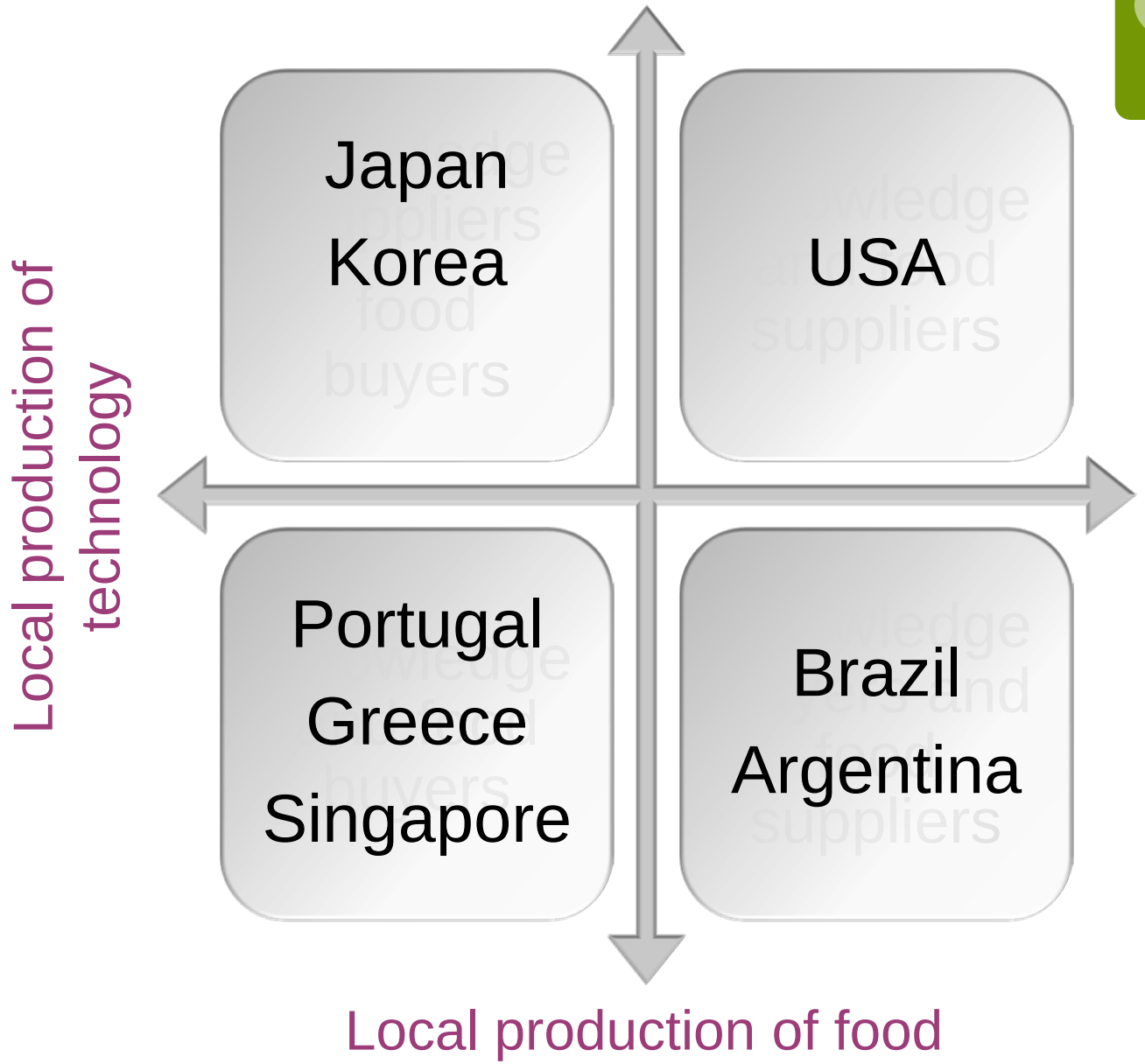
The logics of AET 4 AIS



Some premises

- The E&T programs should respond to the specificities of the country/region/local
- These specificities exist among and within countries/regions/locals
- And still worse:
  - These specificities are not static, they change in time, they are dynamics

A simple example



Isn’t there a common set of guidelines?

- Yes, there is and we can define them in 4 basic categories:
  - Productive
  - Commercial
  - Organizational
  - Informational

a list of general capabilities to E&T in IS

Types of Capabilities	Micro Level (firms, producers and their associations, NGOs)	Meso Level (networks, platforms)	Macro Level (Public and Private policy and strategy makers)
Productive (technical and technological skills)			
Commercial			
Organizational/Relational			
Informational			

Basic capabilities to E&T in IS

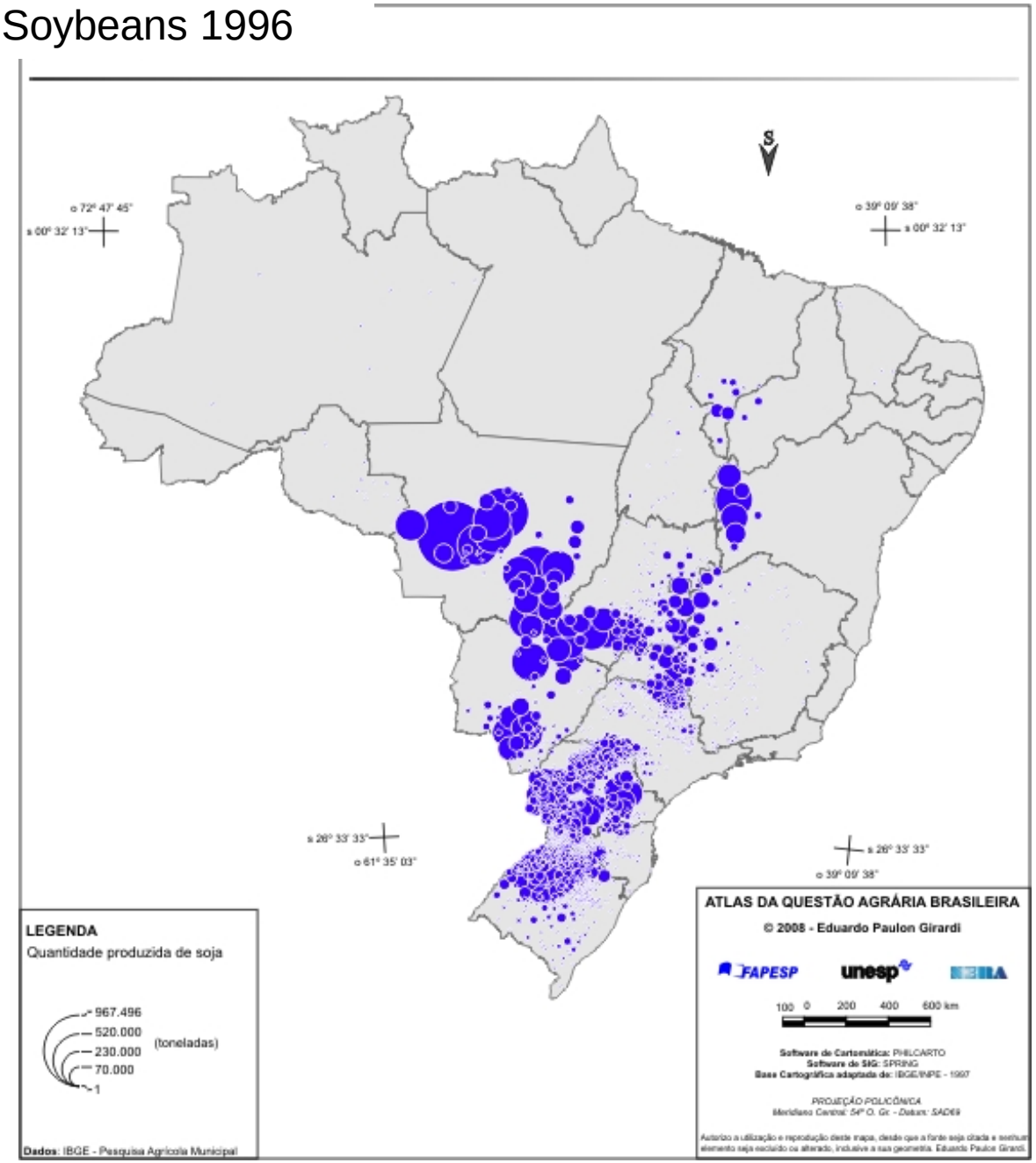
Types of Capabilities	Micro Level (firms, producers and their associations, NGOs)	Meso Level (networks, platforms)	Macro Level (Public and Private policy and strategy makers)
Productive (technical and technological skills)	skills to improve production and to introduce new techniques and new products and services permanently	skills to do it in a collective level	capabilities to foster modernization and innovation in production of goods and services
Commercial	skills to buy and to sell searching for value	skills to do it in a collective level	capabilities to foster commercial learning and practices
Organizational/Relational	habilities to create favorable relationships with different actors	skill to organize collective structures	capabilities to foster organizational and relational skills
Informational	Skills to find, access and understand information	Skills to do it as collective arrangements	Capabilities to promote informational skills

some figures about the Brazilian AIS (BrAIS)

Hypothesis

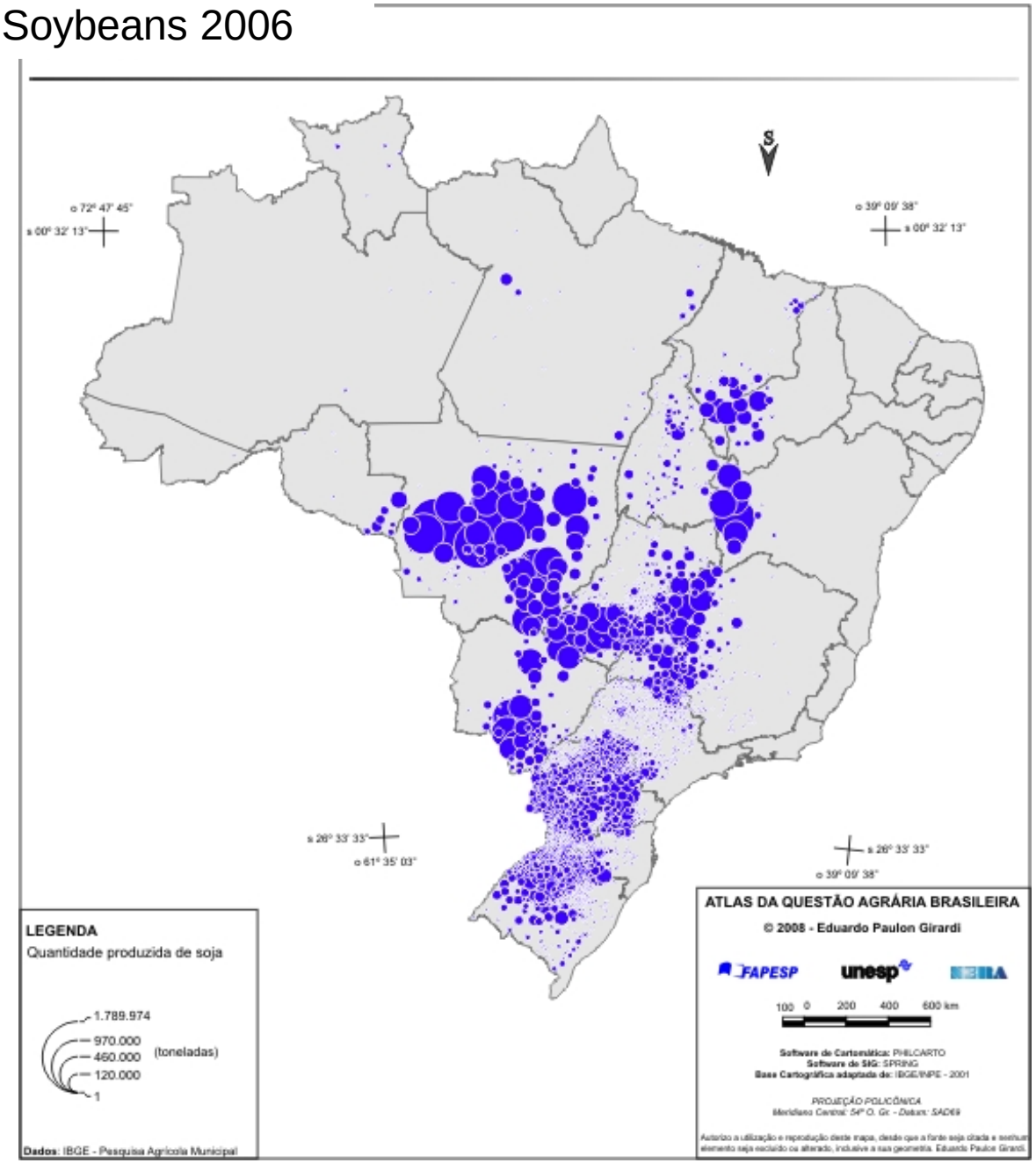
- The Brazilian AIS is growing by means of buying on-the-shelf technologies and profiting from comparative advantages because there are plenty of available technologies and a globally growing demand for food and raw material
- The AET system is still training people to modernize production and not to create innovation in a global scale
- In the long term this situation can jeopardize the present success of the Brazilian AIS

Soybeans 1996



Source: Atlas of the Brazilian Agrarian Profile. http://www4.fct.unesp.br/nera/atlas/

Soybeans 2006



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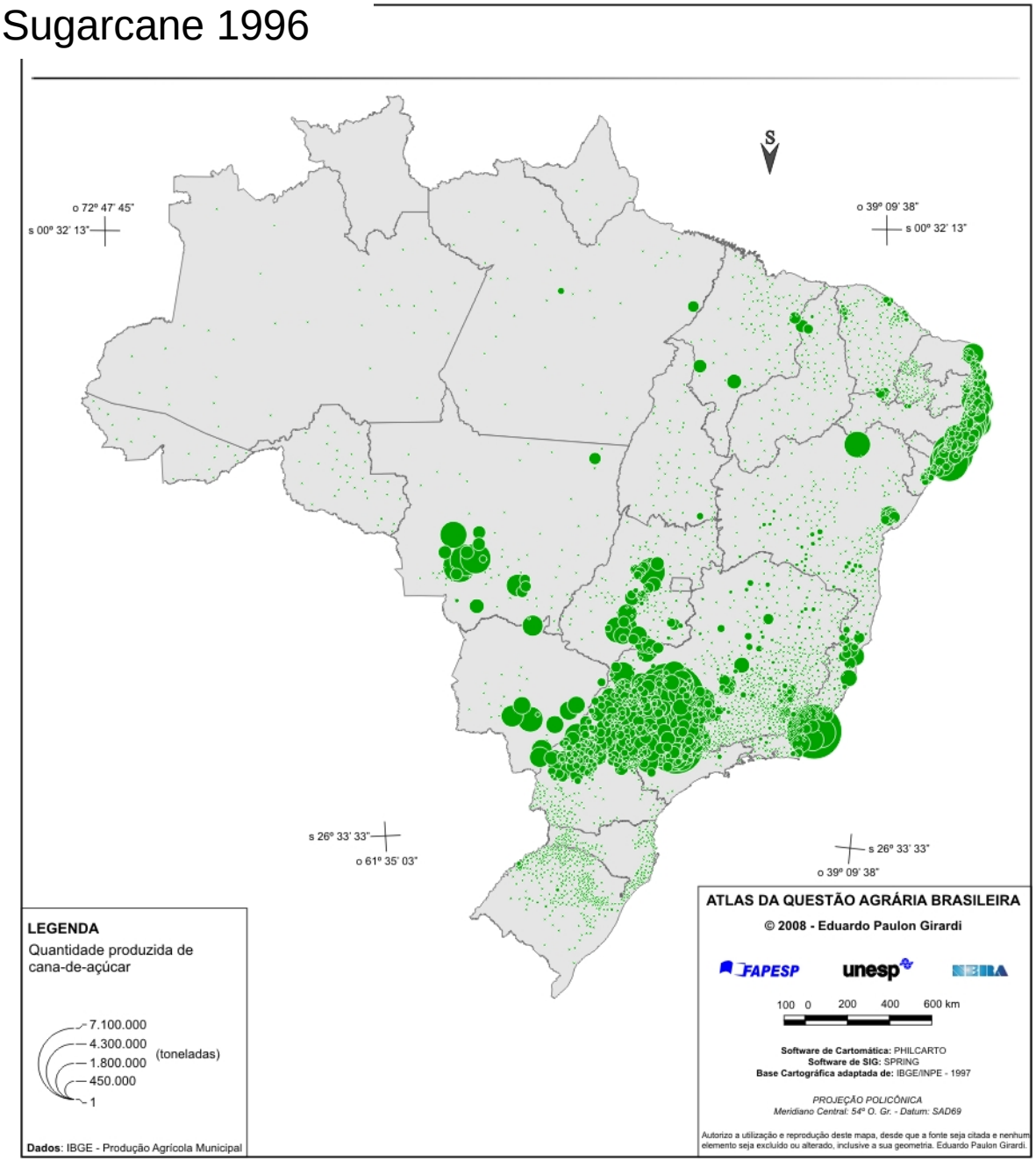
Sugarcane 1996



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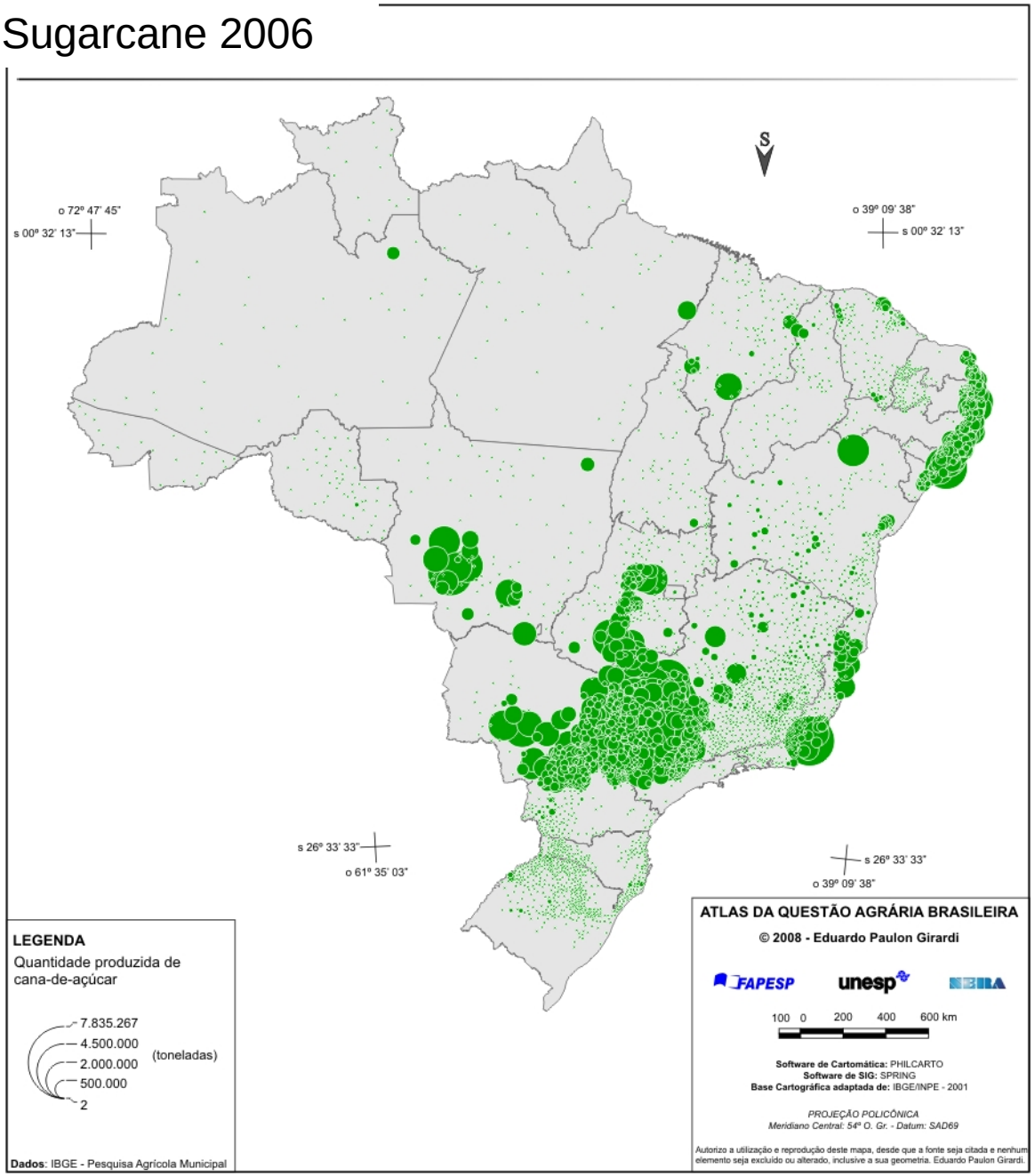
Sugarcane 2006



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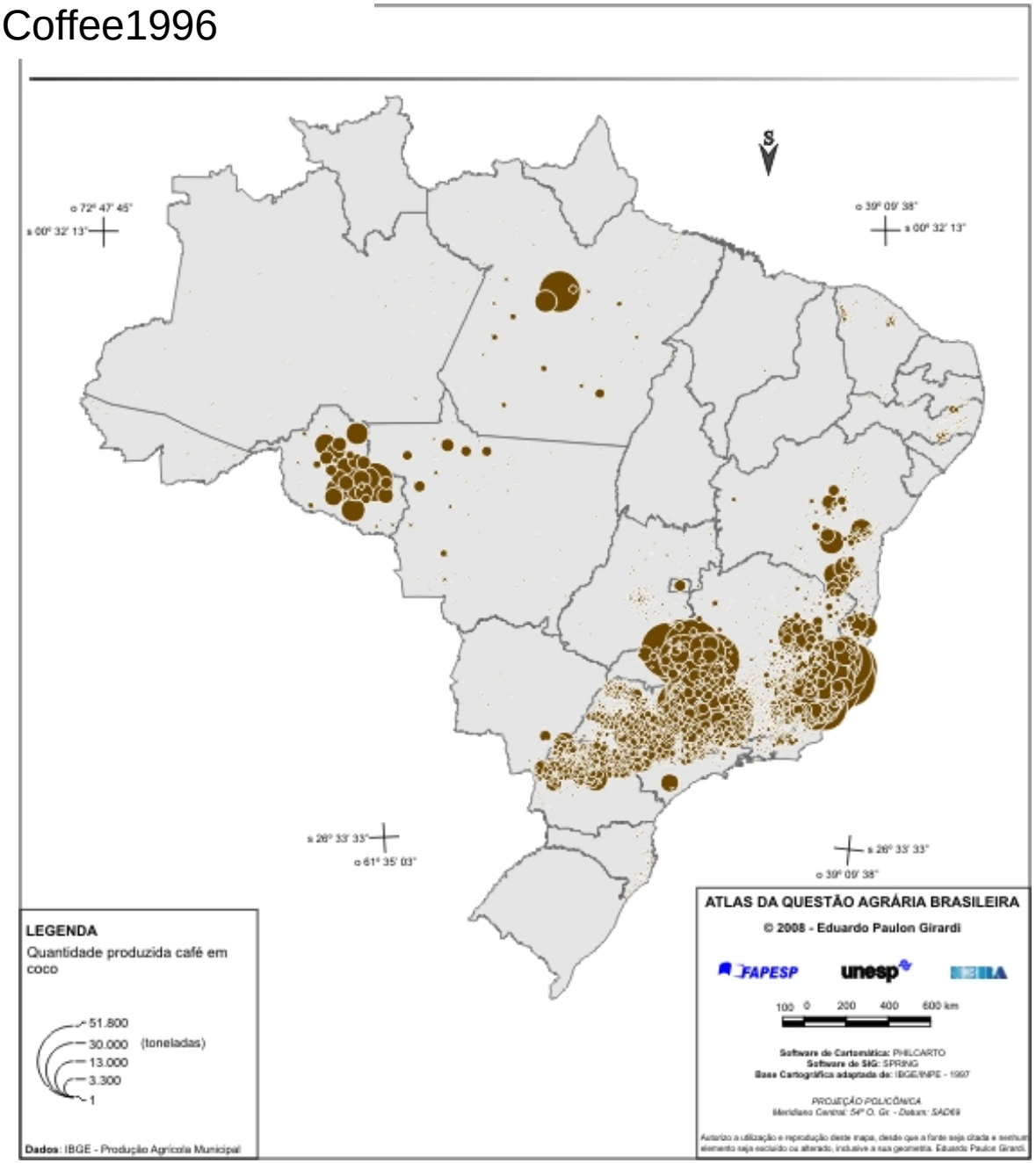
Coffee1996



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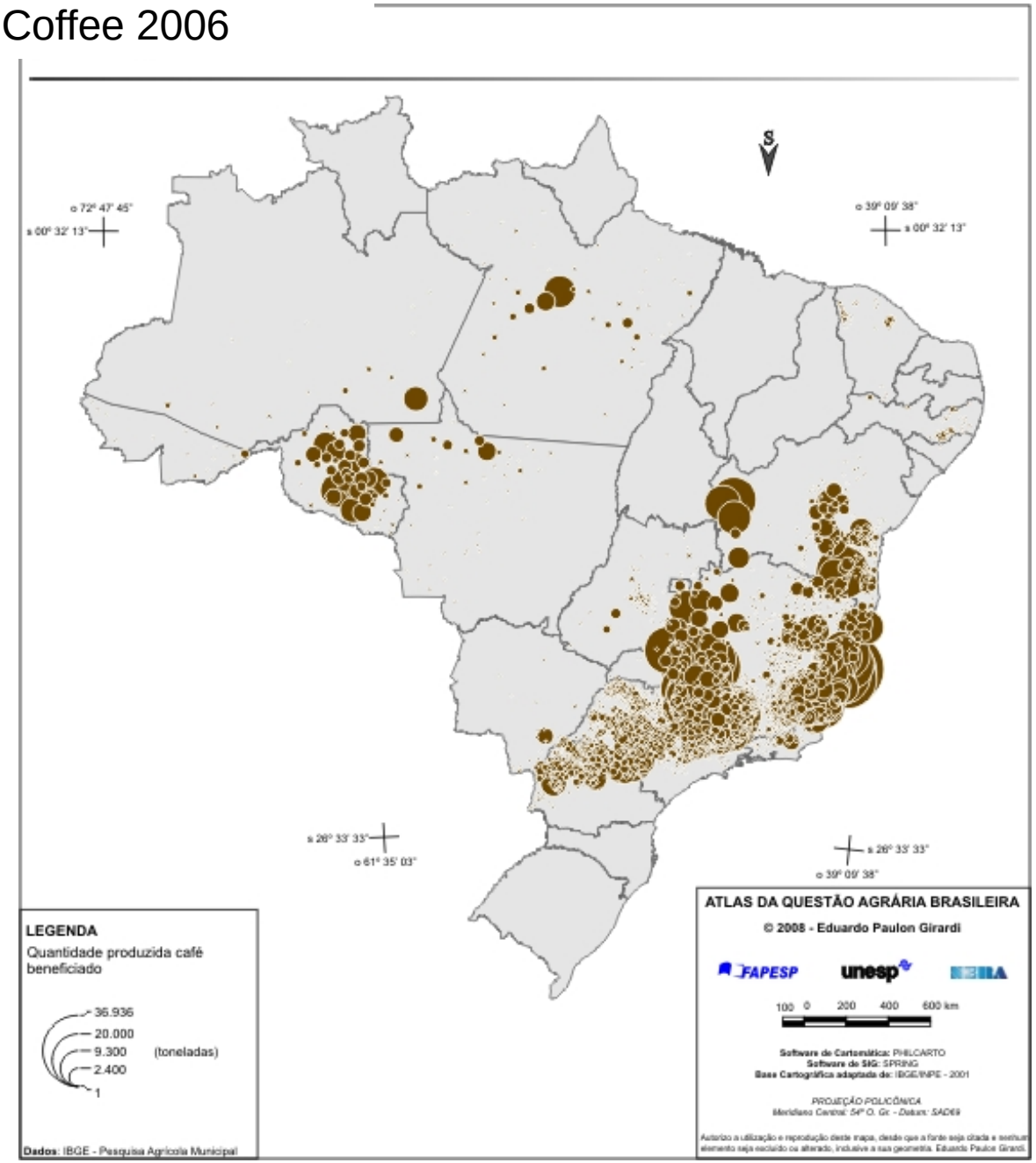
Coffee 2006



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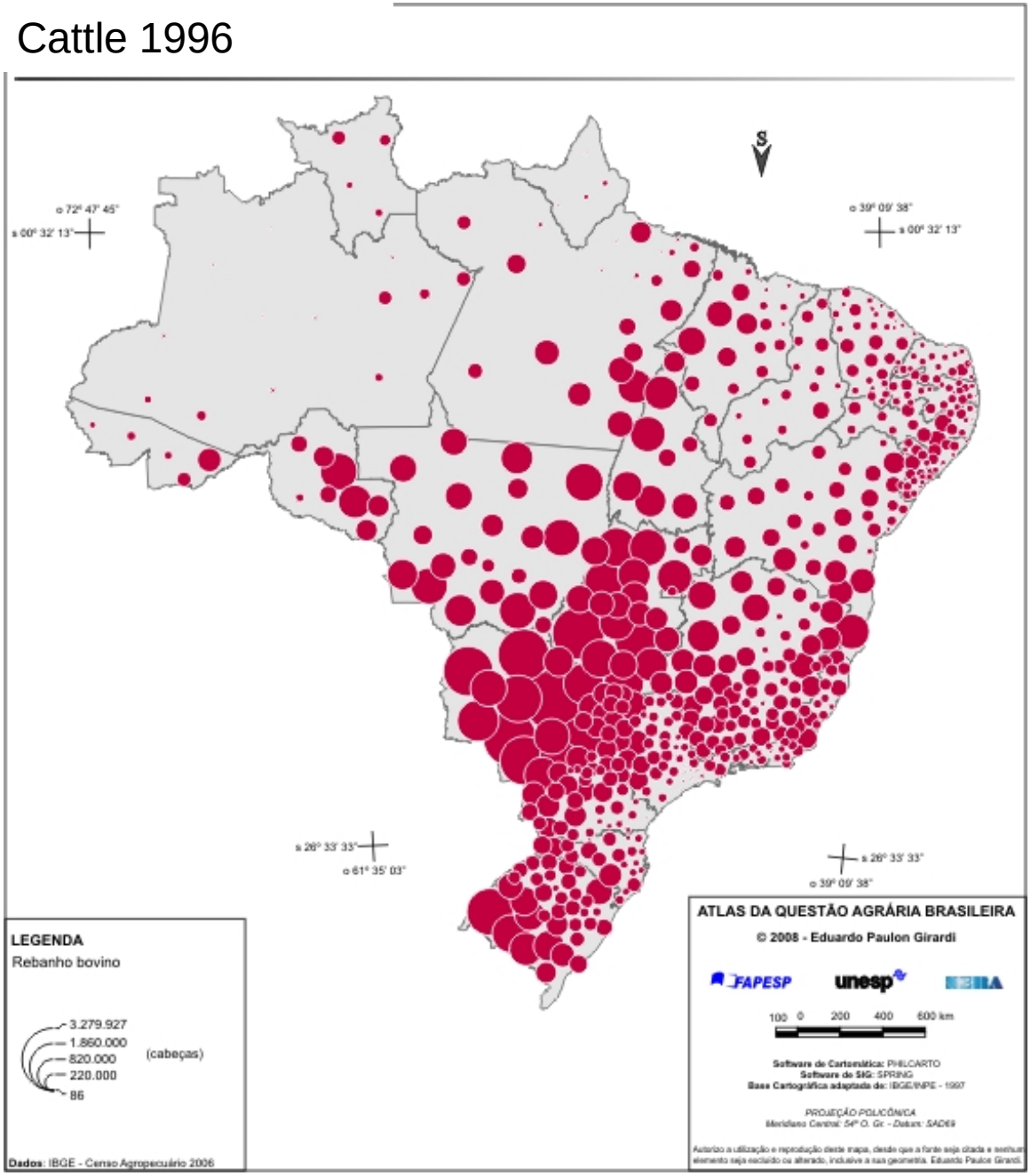
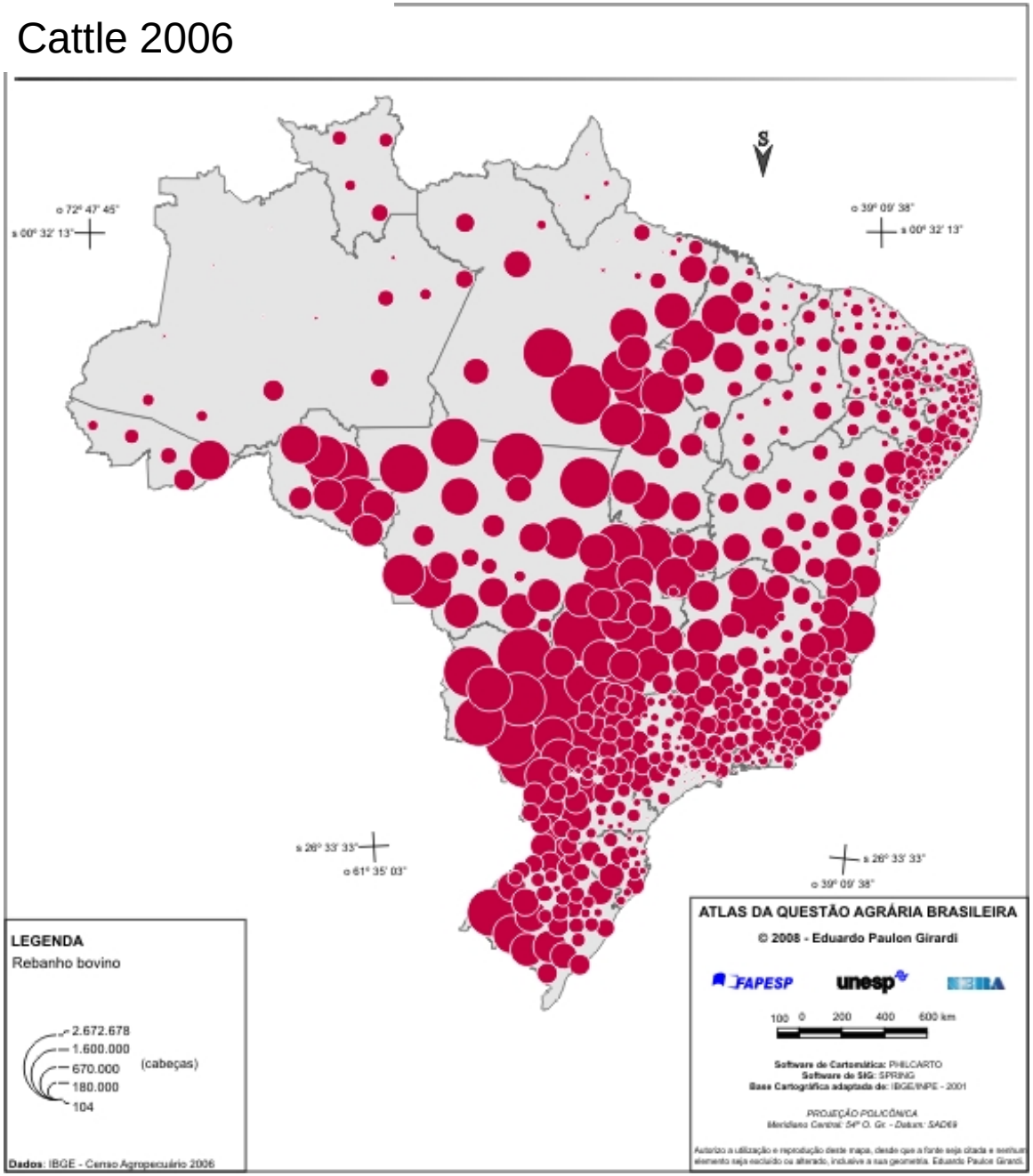
Cattle 1996



Source: Atlas of the Brazilian Agrarian Profile. http://www4.fct.unesp.br/nera/atlas/

Cattle 2006



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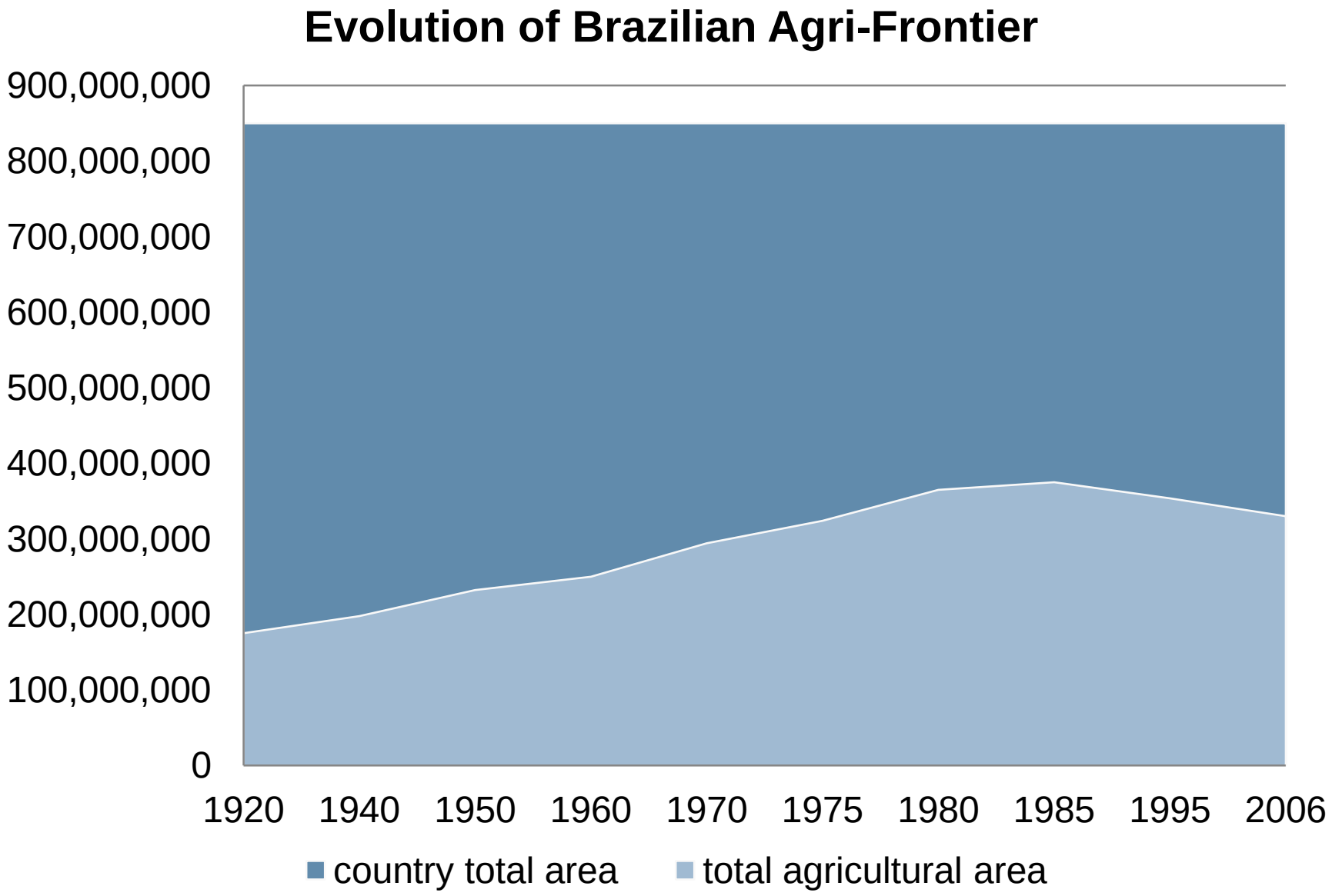
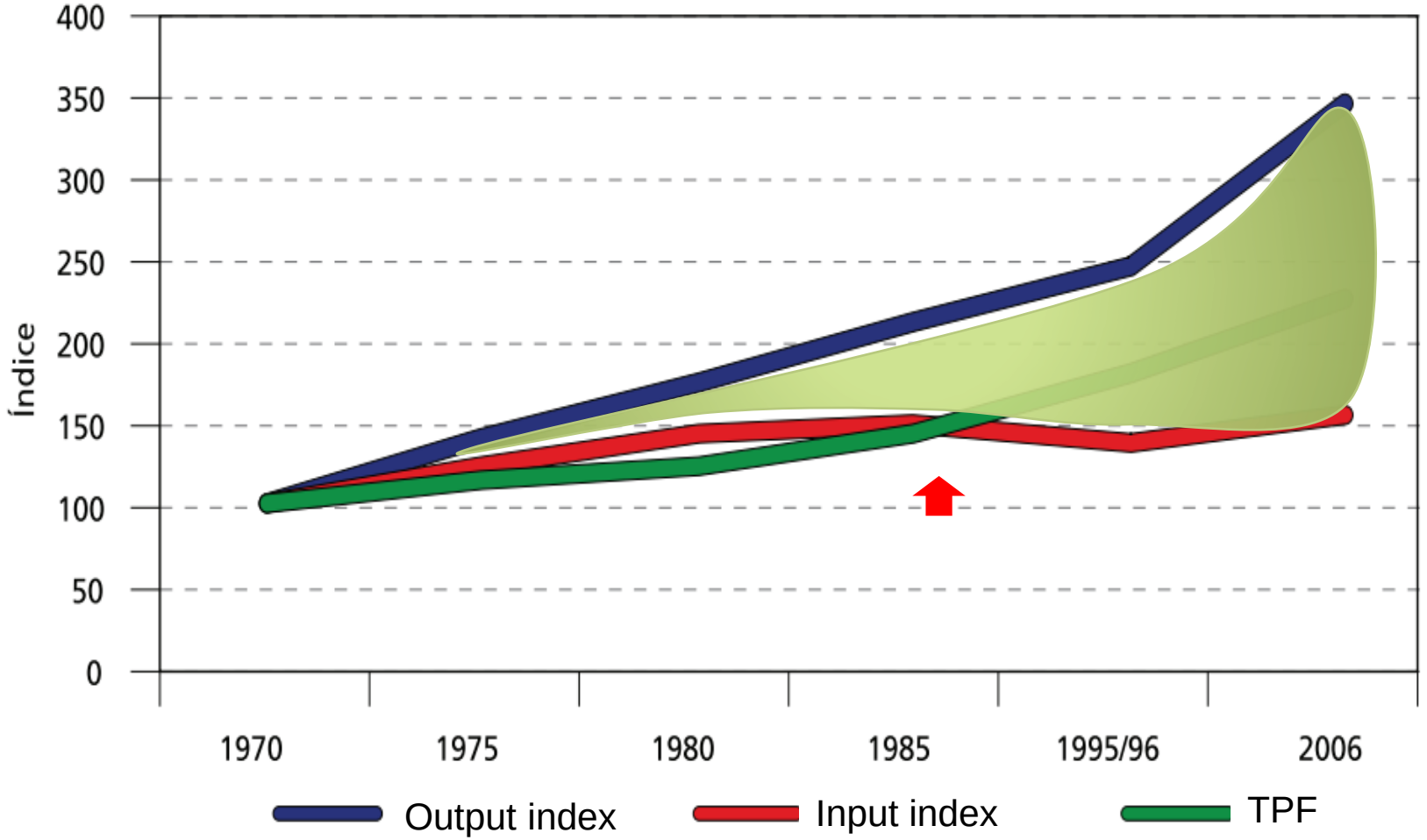
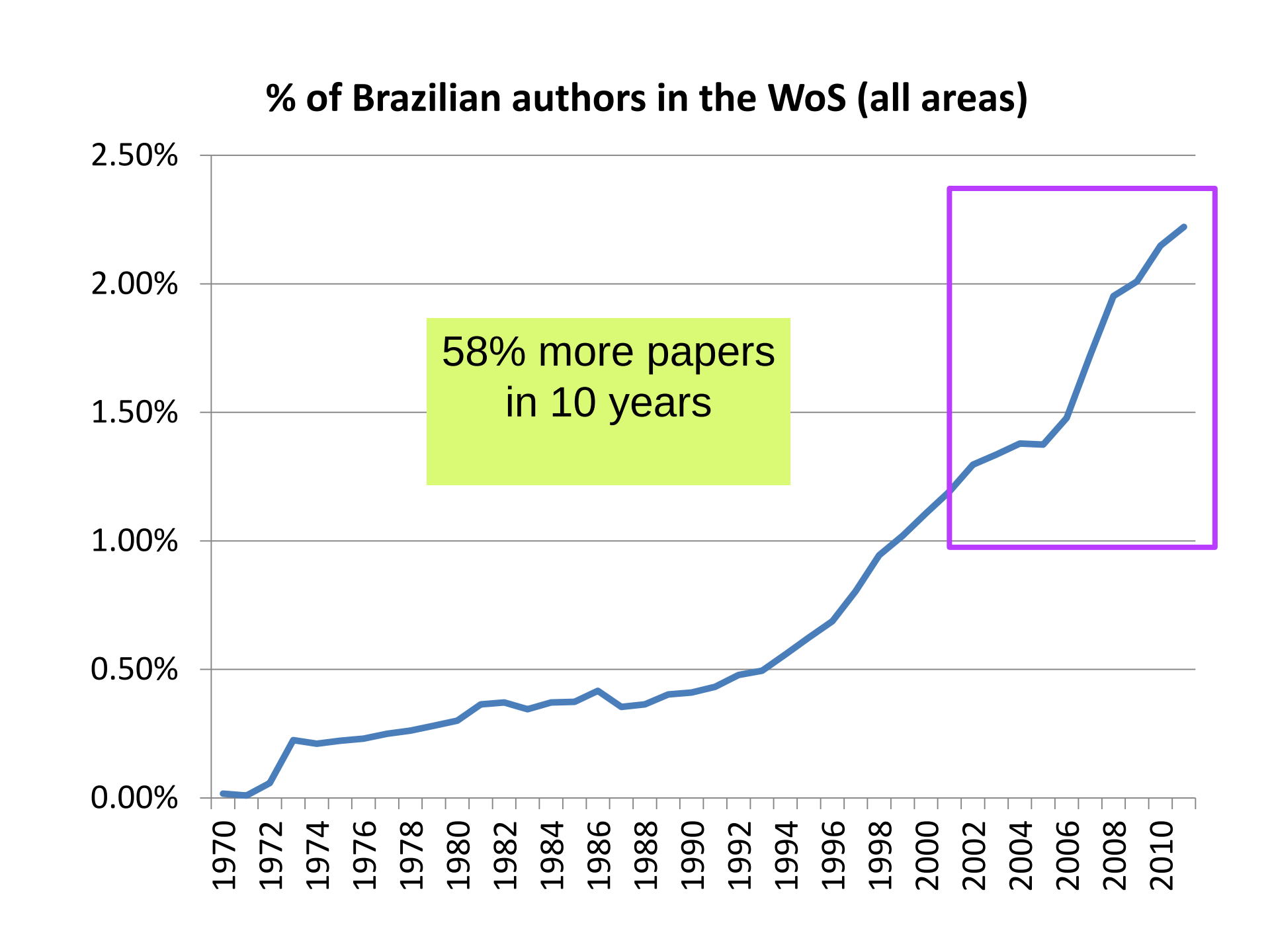

Evolution of Brazilian Agri-Frontier
900,000,000
800,000,000
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
0
1920
1940
1950
1960
1970
1975
1980
1985
1995
2006
country total area
total agricultural area

Total Productivity Factor



Source: Gasques, et al., 2010

A system producing science to and buying technology from the world ?


% of Brazilian authors in the WoS (all areas)
2.50%
2.00%
1.50%
1.00%
0.50%
0.00%
58% more papers
in 10 years
1970
1972
1974
1976
1978
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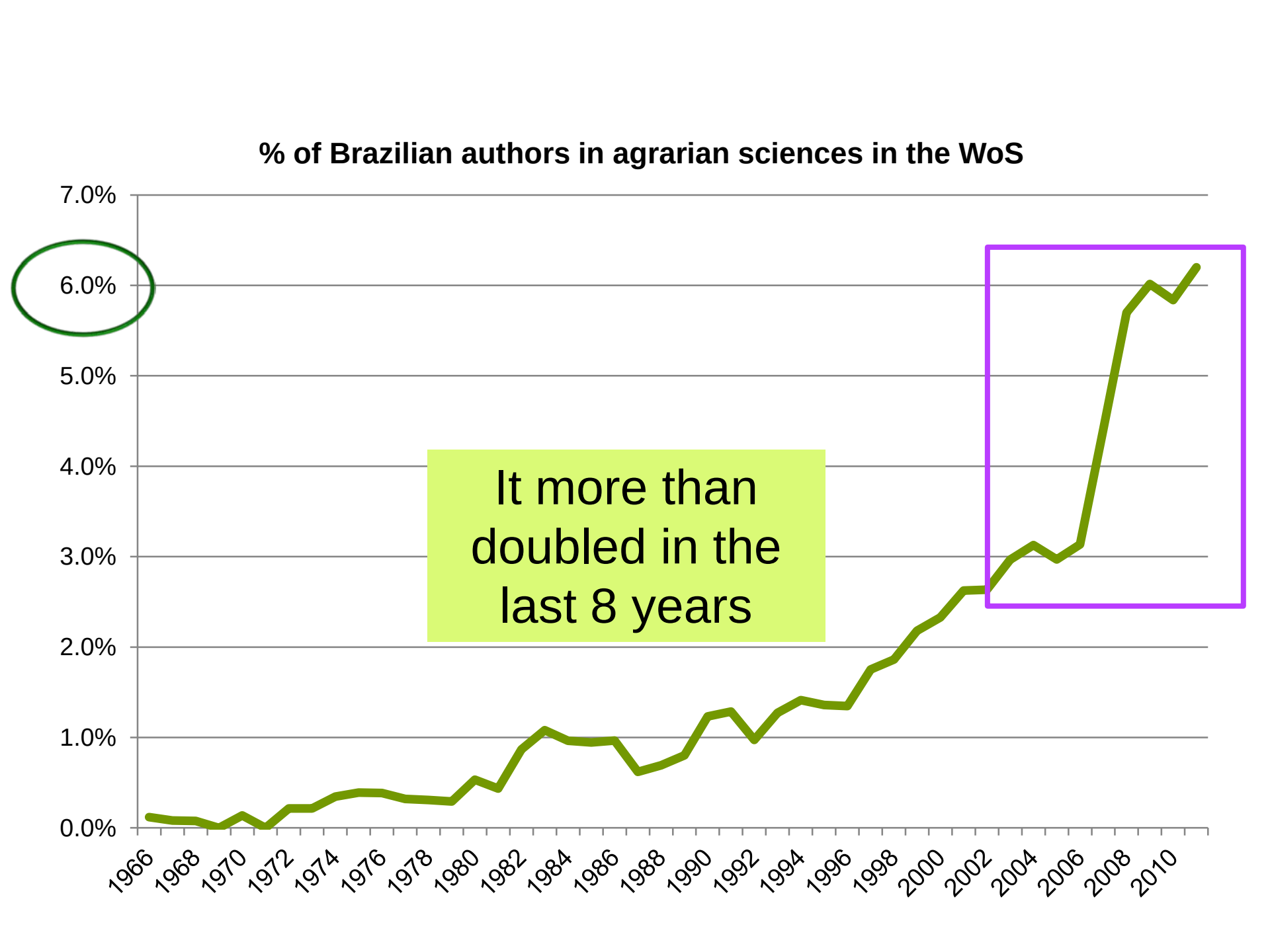
2006
2008
2010


% of Brazilian authors in agrarian sciences in the WoS
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
1966
1968
1970
1972
1974
1976
1978
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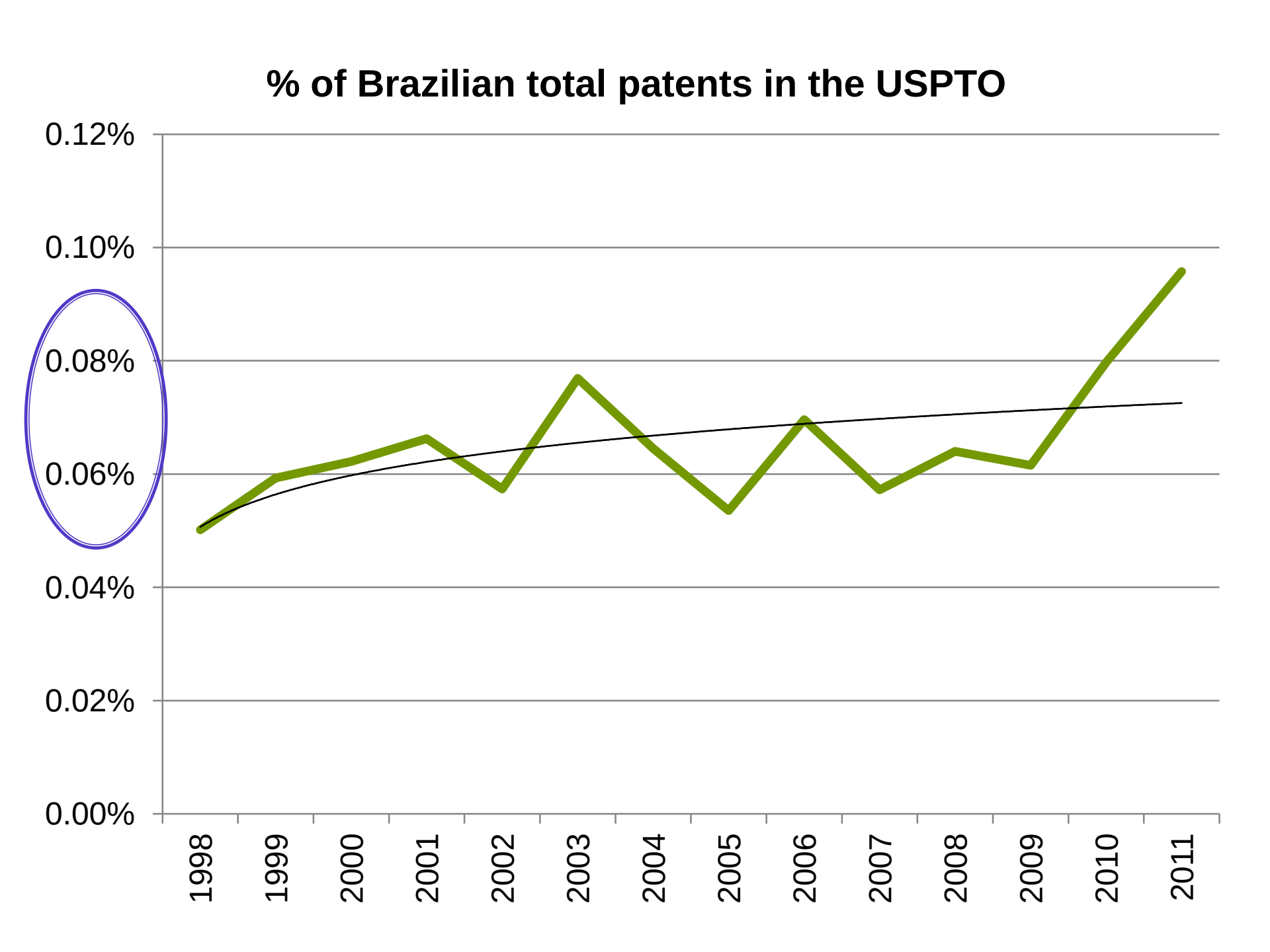
2010
It more than doubled in the last 8 years


% of Brazilian total patents in the USPTO
0.12%
0.10%
0.08%
0.06%
0.04%
0.02%
0.00%
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Patents of Agri-IPC in the USPTO

39 patents of Brazilians/43000 total patents in agriculture

(from 1976 to date)

Conclusion about AIS

- Strong in production
- Growing in scientific production
- Specially irrelevant in technology production
  - Chemical
  - Biological
  - Machinery
- It innovates by acquisition of technologies
- That is why Brazil AIS can be considered a productive global player without being a technological player

The BrAIS Education and Training Status (not system)

Main Programs for E&T

Main Programs in the Ministry of Education

- **National Program of Technical Education and Employment** (Pronatec) - will offer eight million jobs to Brazilians of different profiles in the next four years.
- **Certific Network** - autodidact courses to professionalize (mason, musician, fishery etc.).
- **Expansion of the Federal Network of Professional Education** - technical studies and academic technology, bachelor's, master's and doctoral degrees.
- **Network Brazil e-Tec** professional education in Brazilian States.
- **National Program of Integration of Professional Education with Basic Education for youths and adults (PROEJA)**
- **Technical Training Course for Professionals of Education –** training course for school staff

Professional education (technical and superior)

professional education: technical and superior

- 38 Federal Institutions of Education, Science and Technology IFET
  - 16 linked to Federal Universities
- 45 Federal Agrotechnical Schools (EAF)
- Total accounts for circa 350,000 students
- This number probably double at the States level

Distance education

Distance undergraduate courses

- From 2000 to 2010, the number of enrollments increased from 5,000 to 930,000
- Today 222 institutions offering a total of 930 distance courses

Expansion of distance education in rural areas

- The National Service of Rural Learning (SENAR) has created the EaD SENAR in 2010
- Today with 100,000 students from all Brazilian regions, in 17 courses.

Expansion of distance education in rural areas

- The courses are divided in four programs:

- Quality of Life,
- Digital Inclusion
- School of Agricultural Thinking and Entrepreneurship
- Business Management

Higher education

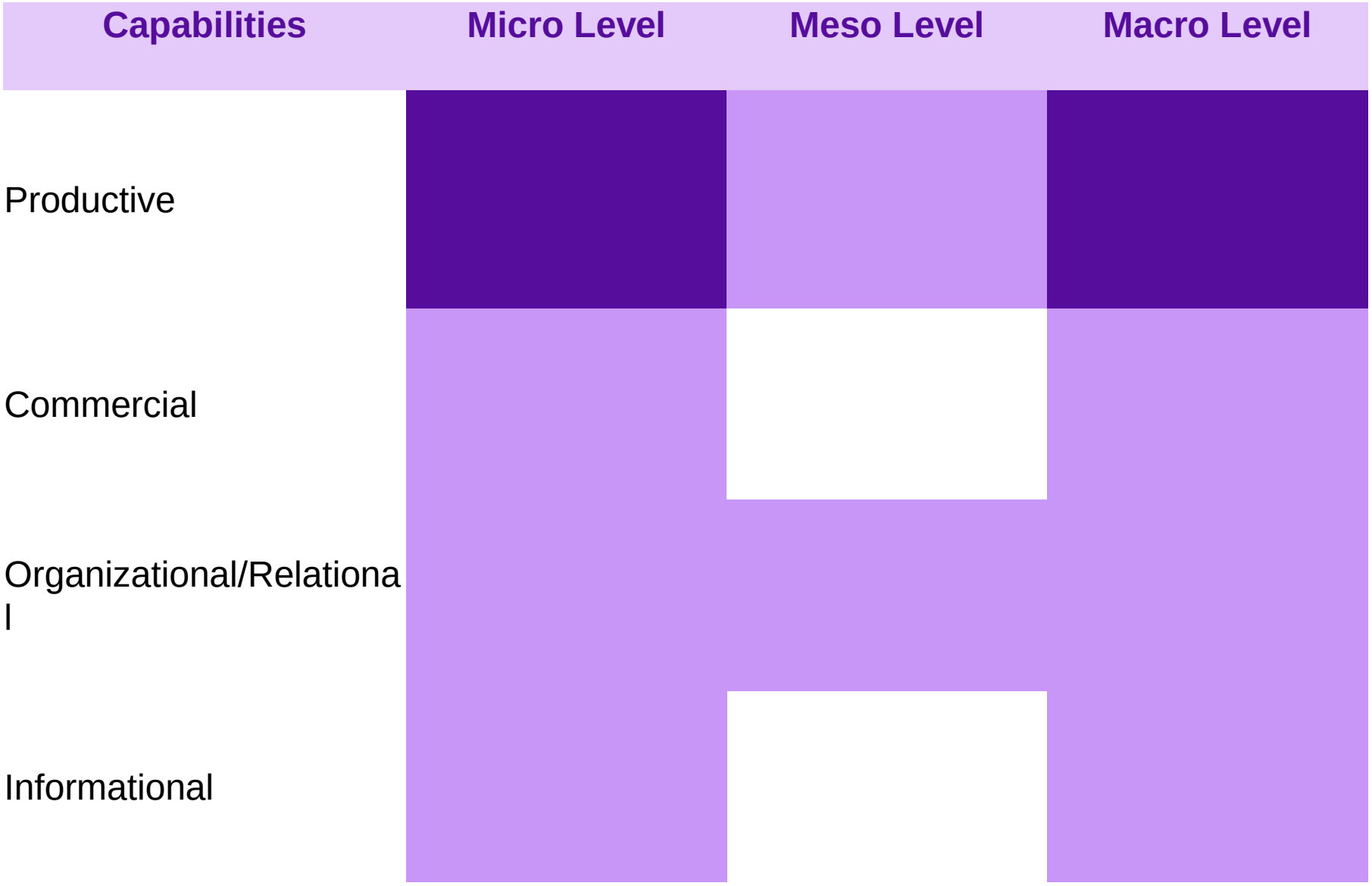
Higher education in Agrarian Sciences

- Circa 450 undergraduate courses in the country
- About 70,000 graduated students/year
- About 50 post-graduation programs, being 35 only masters
  - Agrarian sciences
  - Humanities and Applied Social Sciences
  - Multidisciplinary Areas
- Circa 1000 post-graduated students/year

Professional trajectories of scholarships in the agrarian sciences

- 41% of MSc and PhD in the agrarian areas are employed in public sector jobs
- Circa 28% of MSc and PhD get jobs in private firms
- 40% of MSc and PhD work on Education, most of them in Superior Education
- 27% of them get jobs in agricultural activities (crop, animal, and forest production)

general capabilities to E&T in the Brazilian AIS



Conclusions

- Growing AIS
- High and increasing rates of TPF
- Innovation by modernization
- Weak capabilities in local production of technologies
- Strong and growing scientific capabilities

Conclusions

- Large structure of Education and Training
- New subjects being taught in Technical, Professional and Higher Education
- AET still directed to two extremes of the AIS:
  - scientific and academic production
  - technology diffusion and transfer
- It lacks the technology push side

thank you for
your attention

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