BRICS Brasil 2025
COOPERATING FOR AN INCLUSIVE AND SUSTAINABLE WORLD

Use of Foresight techniques in Artificial Intelligence and Climate Change in Brazil

XV International Academic Conference
Foresight and Science, Technology and Innovation Policy

November 12-14, 2025

A Think Tank connected to the Brazilian **Ministry of Science Technology and Innovation**

Fernando Rizzo,
Director-President

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Centro de Gestão e Estudos Estratégicos
Ciência, Tecnologia e Inovação

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MINISTÉRIO DA **CIÊNCIA, TECNOLOGIA E INOVAÇÃO**

Non-profit
Organization

Created
2001

Located in
Brasília (Federal District)

STI studies for
Sustainbable development competitiveness and well being in Brazil

Composed by representatives from the following entities:

CONSECTI
CONFAP
ABIPTI
ACADEMIA BRASILEIRA DE CIÊNCIAS
FOPROP
SBPC Sociedade Brasileira para o Progresso da Ciência
CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico
CNI Confederação Nacional da Indústria
anprotec
ANPEI
DIEESE
SEBRAE
Finep
CNA Confederação da Agricultura e Pecuária do Brasil

Member representatives

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CGEE's core activities

Strategic Intelligence for decision making

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BRAZILIAN GOVERNMENT
BRASIL
UNITING AND REBUILDING

Observatories

Monitoring of national and international tendencies in strategic themes for support policymaking

Introductio

Foresight Research Landscape in Brazil

- *Thematic Focus: Artificial Intelligence and climate change*
  - Low production of foresight studies on AI and climate
  - High concentration in agriculture, nanotechnology, and health
  - Research conducted in "silos" with limited cross-thematic integration
  - Opportunities e.g., Bridge agriculture studies with climate crisis research
- *Methodological Preferences of Brazilian scholars*
  - Bibliometrics, systematic literature reviews, and case studies dominate
  - Significant focus on methodological justification and comparison

Key Research Themes in Brazilian Foresight Studies under the umbrella of IA and Climate

Governance & Decision-Making

- AI-augmented anticipatory governance and university roles in policy influence
- Strategic intelligence systems in public administration (Embrapa case)

Emerging Technologies & Methods

- Big data and machine learning integration in foresight studies
- Concerns about data literacy and potential biased results
- Multi-criteria decision-making and prospective structural analysis

Energy & Agriculture Nexus

- Corn-to-ethanol production in the Brazilian Amazon
- Energy scenarios and low-carbon pathways for Brazil
- Renewable energy innovation (biomass, wind, hydropower)

Urban & Environmental Systems

- Smart and sustainable cities challenges
- Food-Energy-Water (FEW) Nexus governance in peri-urban regions
- SDG prioritization and 2030 Agenda implementation framework

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Recent Brazilian Future Books

Brasil 2035 (IPEA, 2017)

- 17 key uncertainties, 880 participants
- 4 scenarios:
  - Vai Levando (inertia)
  - Crescer é o Lema (growth-focused, unequal)
  - Novo Pacto Social (social priority)
  - Construção (sustainable & inclusive)

Cenários Brasil 2045 (ASSECOR/PROCAD, 2025)

- 13 national megatrends, 8 critical uncertainties
- 4 scenarios:
  - Protagonismo Global (bioeconomy leader)
  - Inclusão sem Ambição (commodity exporter, tech-dependent)
  - Sem Rumo (political/economic chaos)
  - Ilhas de Desenvolvimento (niche excellence, inequality)

Megatendências Brasil 2050 (Ministry of Planning, 2025)

- 14 global megatrends, 28 uncertainties (5 global, 23 national)
- Phase 1 complete; Phase 2 underway: exploratory scenarios for national development strategy

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AI Research Labs in Brazil

LAPIAM – Amazon AI Research Lab

- EcoLMM: Multimodal biodiversity monitoring using LLMs (audio/video analysis)
- ARTES: AI-controlled aerostat for large-scale Amazon monitoring with autonomous navigation
- Species Classification: Automated wildlife identification from camera traps for non-intrusive ecological inventories
- GenAI & Gene Therapy: Genomic and therapeutic research applications
- IoT for Sustainability: Water quality monitoring in remote Amazon regions

LNCC – National Scientific Computing Lab

- Sistema Pororoca: AI tool for rapid, reliable meteorological responses
- Rionowcast: AI models for extreme rainfall prediction

CEIAER – AI Center for Renewable Energy

- AI applications for wind, solar, biomass, and hydrogen energy forecasting and operations
- Reducing green hydrogen uncertainties
- Sustainable biomass energy production

GPTICAM – ICT Research Group in the Amazon

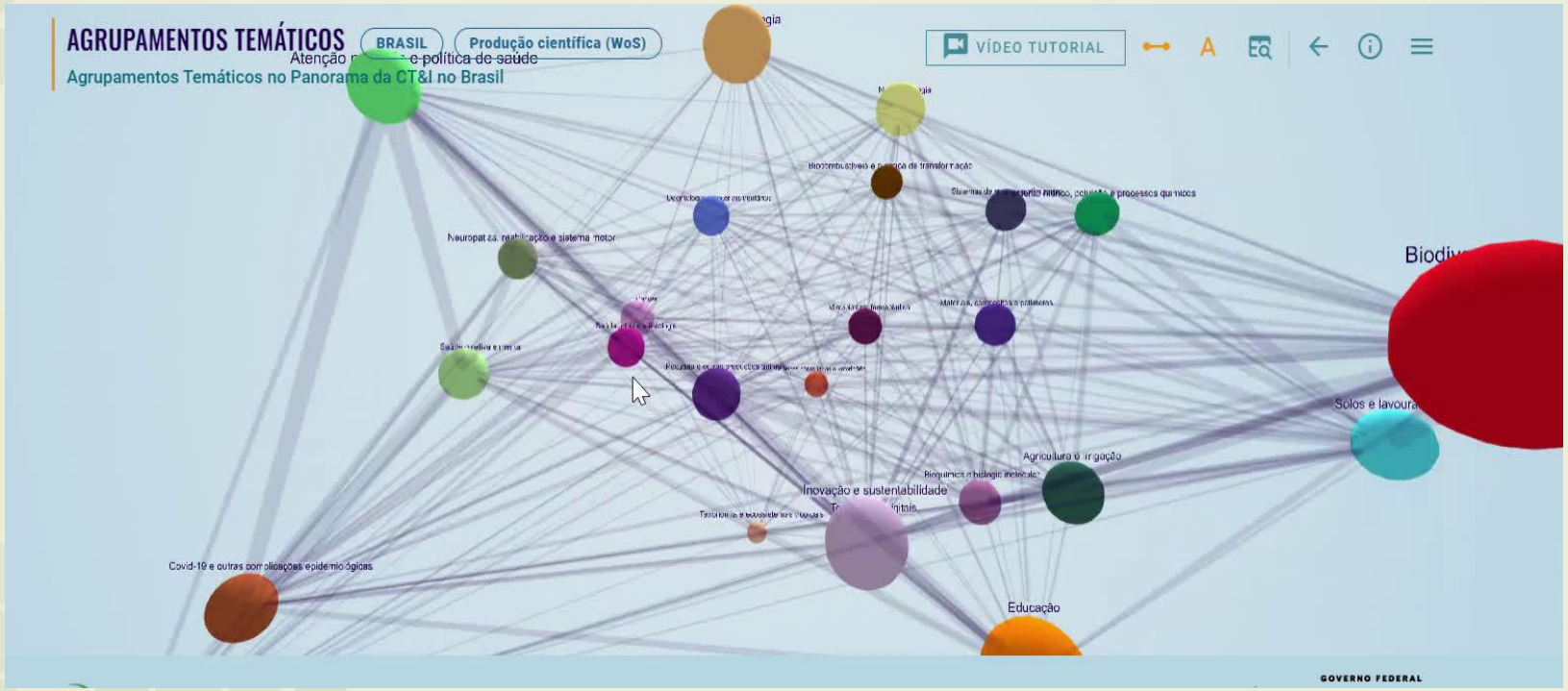
- Açaí Tech 4.0: Integrating Industry 4.0 technologies into açaí production chain for innovation and sustainability

Foresight and the COP30

Current foresight appears tangentially in COP30 preparatory meetings, not as a core structural element, but present in specific initiatives:

- **AI Climate Academy Pilot Workshop** (Oct 13-17, 2025, Belém)
  - Organized by ITS Rio & Climate Change AI
  - 5-day intensive: readings, case studies, facilitated discussions
  - Focus: ethical, effective, contextualized AI applications for climate mitigation & adaptation
- **Futuros Positivos Project** (*Positive Futures,* Heinrich Böll Foundation)
  - Maps transformative projects grounded in local knowledge
  - Interactive platform for networking & experience sharing
  - Collaborative construction of positive future scenarios (local to global)
  - Results presented at COP30 (official & parallel spaces) with UNAMA, UFPA, Cúpula dos Povos

Observatory of Science, Technology and Innovation



- Identifies key **research strengths and trends** in Brazil and globally
- Promotes **international partnerships** for evidence-based solutions
- Builds a **national network of ST&I competencies**.
- Maps projects advancing the **UN SDGs**.
- Strengthens **local capacities** and informed decision-making.

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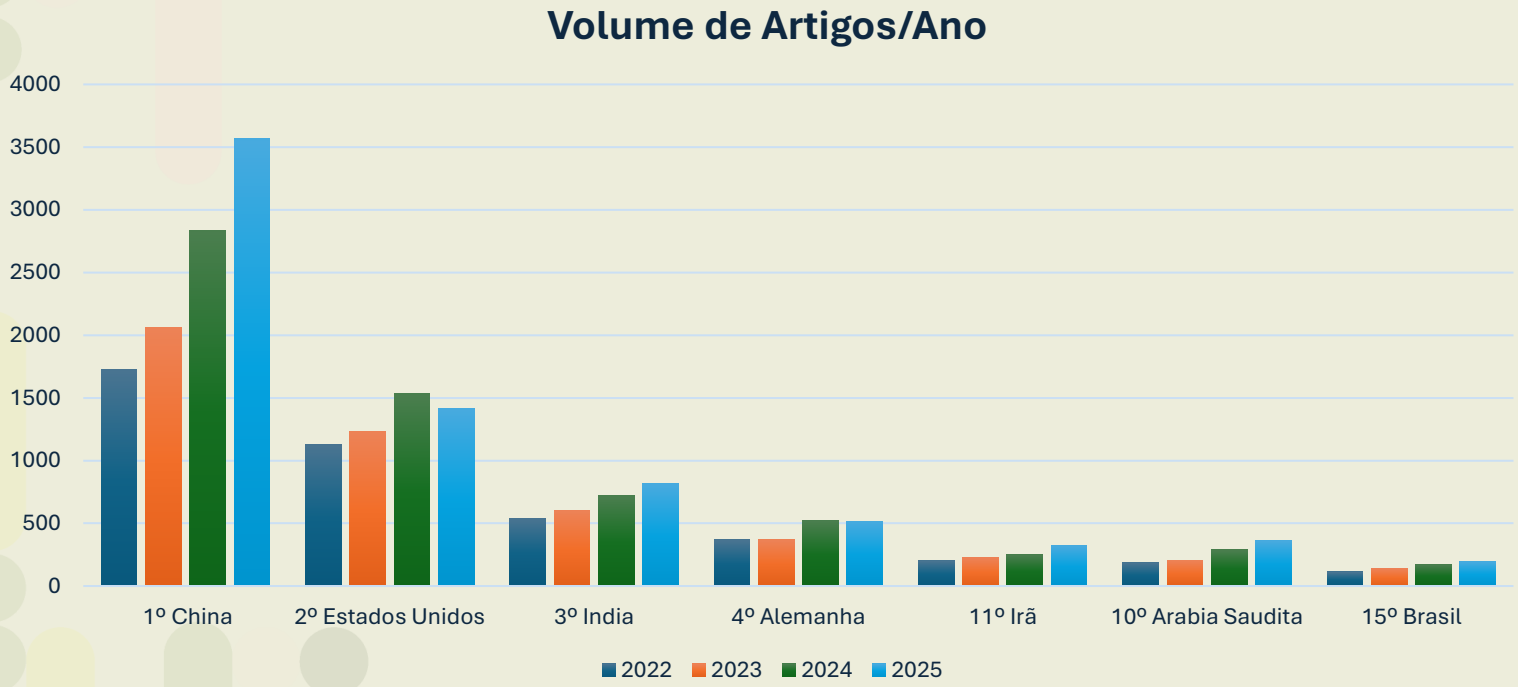
Climate Intelligence Tracking



The **monitoring of research in climate intelligence** will be featured as one of the chapters in the **new Annual OCTI Report**, released every year.

Between 2022 and 2025, **29,368 scientific articles** on climate intelligence were published, showing a steady growth in the field. Publications nearly **doubled**, from **5,626 in 2022 to 9,219 in 2025**, reflecting the **rising global interest** in scientific and analytical solutions for climate challenges.

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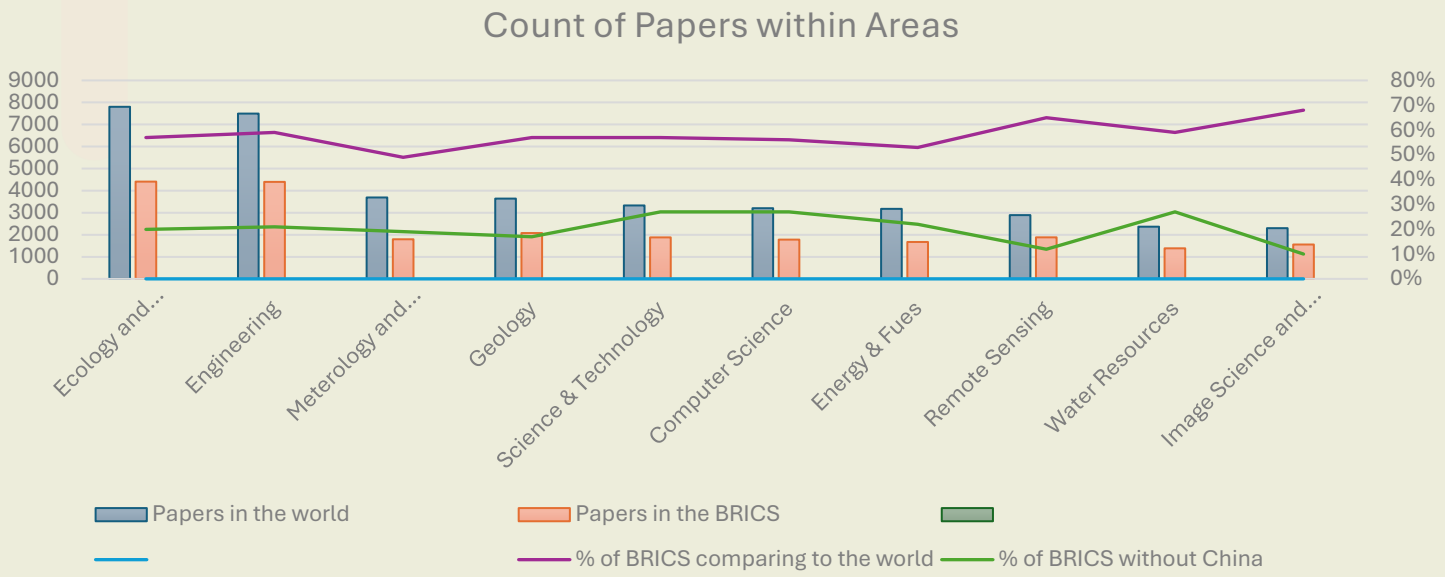

Between 2022 and 2025, **BRICS countries accounted for 49–68%** of global scientific output in climate intelligence, leading in applied technologies such as **Imaging Science (68%)** and **Remote Sensing (65%)**. Excluding China, the bloc still contributed **10–27%** of world production, with strong results in **Science & Technology**, **Computer Science**, and **Water Resources** (each 27%).

However, the lower shares in **Remote Sensing (12%)** and **Imaging (10%)** highlight internal disparities and the bloc's **dependence on China's leadership** in high-tech climate research.

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Conclusion remarks

Current landscape

- Promising space for foresight applications in AI × climate nexus (sustainability, climate change, renewable energy, resilience, adaptation)
- Established research groups in AI and climate rarely interface directly with foresight
- **High potential for future interdisciplinary collaborations**

Strategic role for CGEE Foresight Hub

- Convening & Mobilization
- Connect AI researchers ↔ climate scientists ↔ foresight experts
- Fostering Collaboration
- Enable cross-cutting initiatives with impact on STI public policy
- Breaking Silos
- Bridge isolated research domains to unlock synergies

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Thank you

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