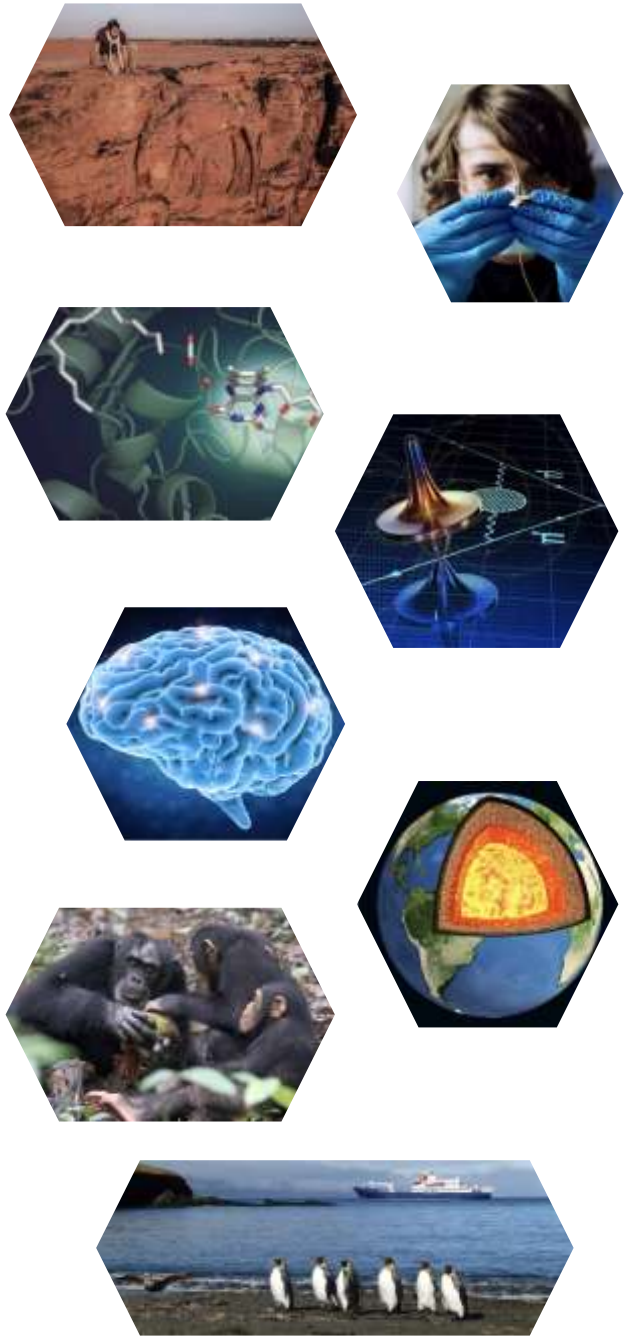
INTERNATIONAL RESEARCH CENTER CNRS – USP

High-Level Meeting, January 2025

Liviu NICU and Fernando MENEZES



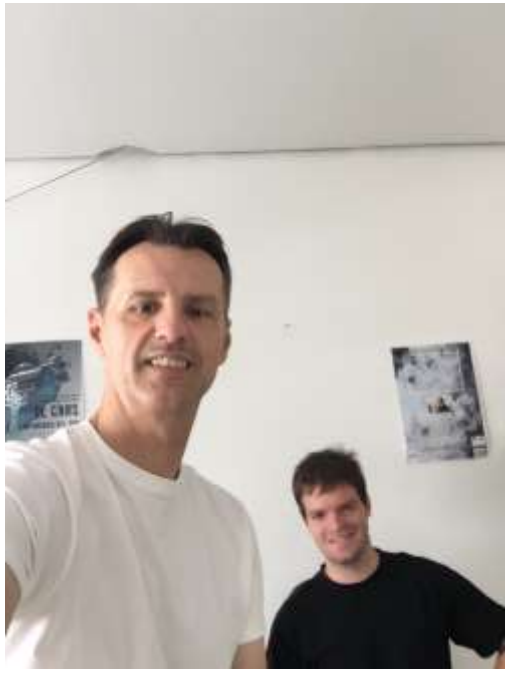
CNRS “SOUTH AMERICA” BUREAU TEAM

Situated at the ”Maison du CNRS” on São Paulo University - Butantã Campus **since August 2024**

Team Brazil : Pascal Singer and Liviu Nicu

Team Paris : Solène Marié and Antonia Alcaraz-Pardo

Territory covered : South America



CNRS LABORATORIES AND REPRESENTATIVE OFFICES THROUGHOUT THE WORLD

- Team up with the best talents / attract talents
- Address global challenges together
- Train the next generation of scientists
- Through co-constructed and sustainable partnerships
- Leverage funding opportunities with partners (EU included)

« Perform basic research at the highest international level »

Antoine Petit
CEO

PLAN

- GLOSSARY: CNRS' international collaboration toolbox
- MOTIVATION/GENESIS: the CNRS-USP strategic partnership through an International Research Center
- ARCHITECTURE: disciplinary pillars
- INTEGRATED VISION: where should we be in 2030?

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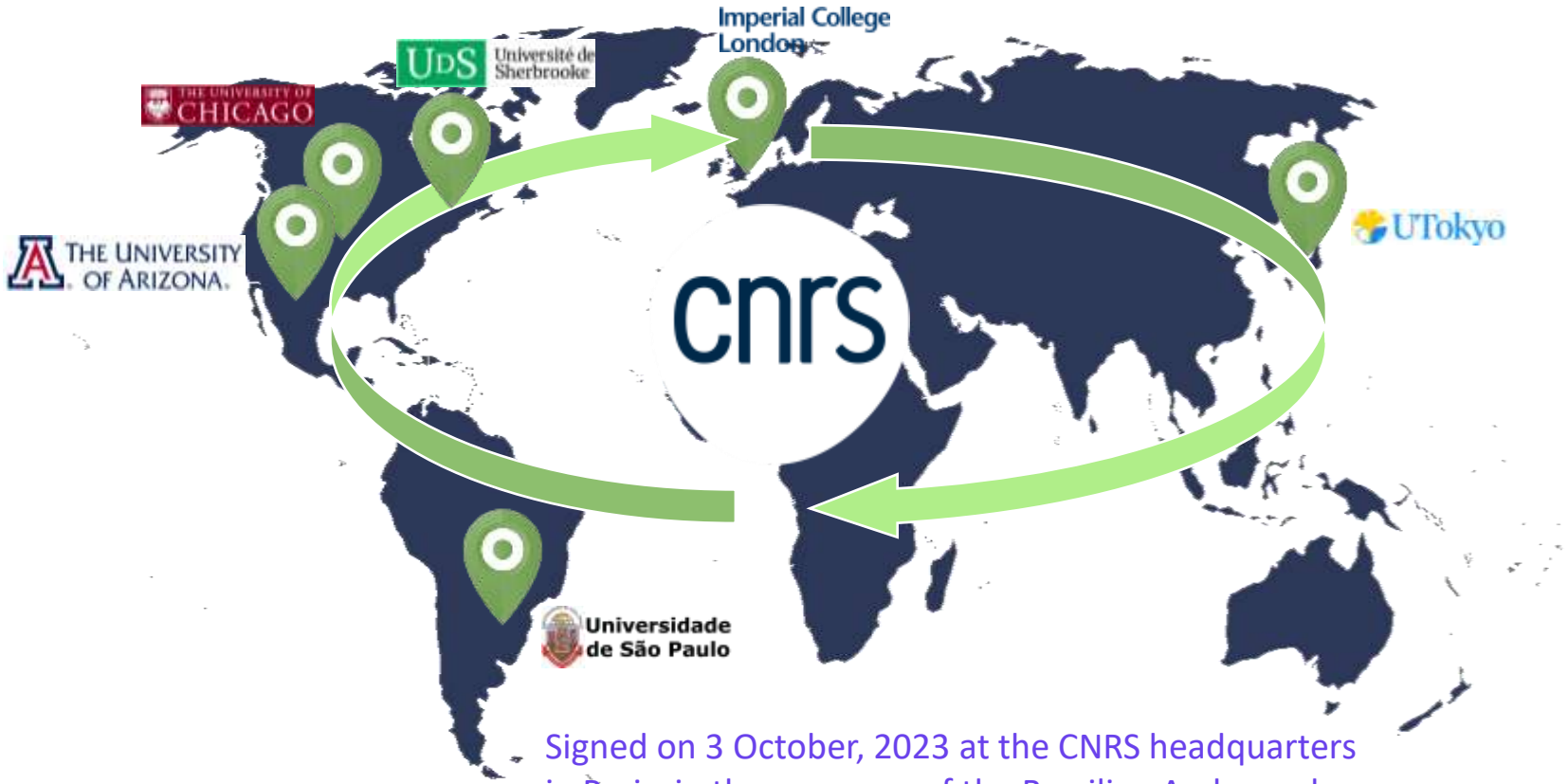
CNRS INTERNATIONAL COLLABORATION TOOLS (seed support)

Exploring	Consolidating		Structuring	Training	Institutional
International Emerging Actions (IEA)	**International Research Networks (IRN)**	**International Research Projects (IRP)**	**International Research Laboratories (IRL)**	**Joint PhD programs**	**International Research Centres (IRC)**
2 years **PI-to-PI**	5 years **Multi-team** **Multi-institutions**	5 years **Team-to-team**	5 years **Physical presence abroad**	3 years **1 PhD @ FR** **1 PhD @ partner** **1 joint topic**	**Broad spectrum of collaborations** **Interdisciplinarity**
10 -14 k€/2 years	50 – 75 k€/5 years		75 – 100 k€/5 years		
Bottom-up approach			**Team/lab approach**		**Institutional approach**

Perform fundamental research
At the highest international level

6 International Research Centers with selected partners



Signed on 3 October, 2023 at the CNRS headquarters in Paris, in the presence of the Brazilian Ambassador to France, Mr. Ricardo Neiva Tavares

- Strengthened cooperation featuring **institutional strategic dialogue** & **joint scientific steering**
- Based on already **existing significant set of collaborations**
- Promote **interdisciplinarity**

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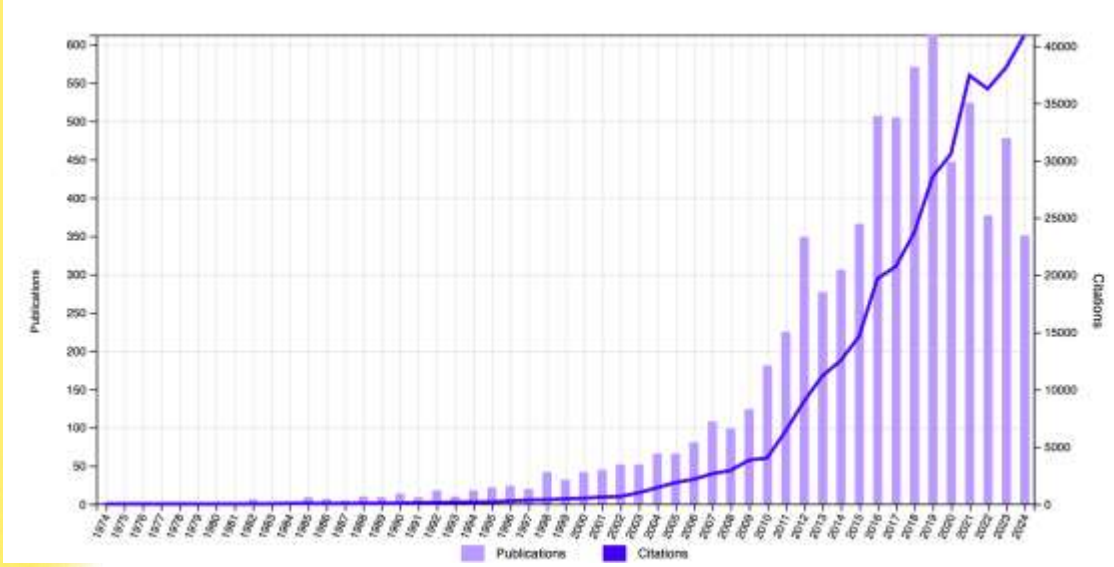
A strong base of cooperation

DISCIPLINES SAMPLING AMONG THE 250 SUB-THEMES (WEB OF SCIENCE FIELDS) OF CNRS-USP CO-PUBLICATIONS (2017-2022)

Discipline	Articles
Astronomy & Astrophysics	575
Physics, Particles & Fields	573
Ecology & Environment	312
Physics, Nuclear	266
Immunology	158
Physics, Multidisciplinary	111
Human and Social Sciences	*60*
…	…

Source : WoS-Incites ; traitement CNRS-Derci



With flagship papers

165 **PHYSIOLOGY OF SEDENTARY BEHAVIOR** — 66 Citations, 407 References

143 **Accumulation of amyloid precursor protein C-terminal fragments triggers mitochondrial structure, function, and mitophagy defects in Alzheimer's disease models and human brains** — 148 Citations, 88 References

65 **Carbon Corrosion in Proton-Exchange Membrane Fuel Cells: Effect of the Carbon Structure, the Degradation Protocol, and the Gas Atmosphere** — 334 Citations, 71 References

102 **Tissue-resident FOLR2$^+$ macrophages associate with CD8$^+$ T cell infiltration in human breast cancer** — 229 Citations, 83 References

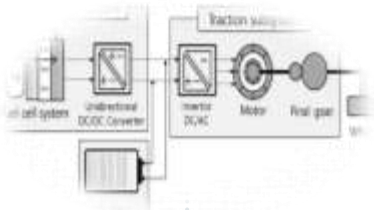
13 **Improved allometric models to estimate the aboveground biomass of tropical trees** — 1,720 Citations, 89 References

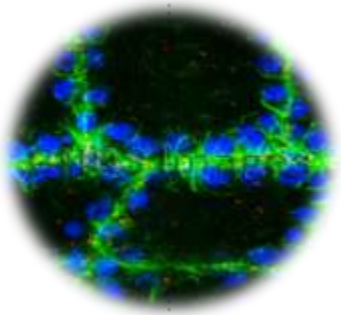
128 **Reconciliation of quantum local master equations with thermodynamics** — 184 Citations, 108 References

8 International Research Projects and Networks @ USP

2024 – 2028

Engineering
Modelling/design of electrical components and systems
International Network
G2ELab/USP/UFMG/UFSC



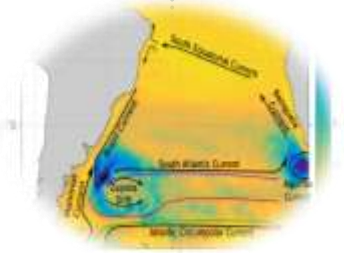


2024 - 2028

Biological Sciences
Pediatric adrenocortical tumors
International Network
IPMC/Faculdade de Medicina USP/IPP

2023 - 2027

Earth Sciences and Astronomy
Drivers of past changes in South Atlantic Circulation
International Project
LOCEAN Paris/USP



2024 - 2028

Biological Sciences
Molecular signatures of L-DOPA-induced dyskinesia
International Project
Inst. Cerveau/Faculdade de Medicina USP Ribeirão Preto

8 International Research Projects and Networks @ USP

2021 - 2025

Humanities & social Sciences
Archives-Medias-Images-Societies
International Project
LRHRA Lyon/Escola de Comunicação USP

2022 - 2026

Humanities & social Sciences
Passions, Actions and Reactions in the Antic World
International Project
Centre Leon Robin Paris/FFLCH USP

2022 - 2026

Humanities & social Sciences
Latin America Contributions to a Common Right
International Project
Centre Malher Paris/ Centro de Pesquisa de Direito Sanitário USP

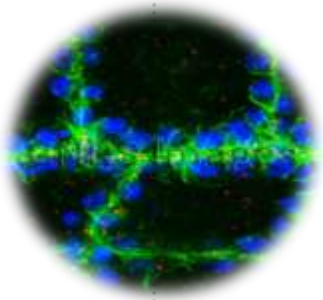
2022 - 2026

Ecology and Environmental Sciences
Diversity and biotechnology of Marine Algae
International Network
LBIMM Roscoff/USP

2 International Research Laboratories @ USP

2024 - 2029

Humanities & social Sciences
Worlds in Transition
International Lab
CNRS/USP (São Paulo)



2024 - 2029

Biological Sciences
Immune Health
International Lab
CNRS/USP (Ribeirão Preto)

IRC *TRANSITIONS* CNRS-USP

Décembre 2022 — **Janvier 2023** — **Mars 2023** — **Juillet 2023** — **Septembre 2023** — **Octobre 2023** — **Décembre 2023** — **Janvier 2024** — **Mars 2024**

PLAN

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ARCHITECTURE OF THE IRC CNRS-USP

GOVERNANCE OF THE IRC

Presidents | Steering Committee | Advisory Committee

— CNRS

Antoine Petit

President and CEO
of the CNRS

— Sao Paulo University

Carlos G. Carlotti Junior

Rector
of the University of São Paulo

Steering Committee
Advisory Committee
— CNRS team
— CNRS
Pablo
Molecular
d Executive
for Science
on at the
Chicago
icardo
owski
d former
member of the Brazilian
Supreme Court and
Minister of Justice of Brazil
Univ
Government of the State
of São Paulo and former
Minister for Science and
Technology of Brazil

IRC " Transitions
- Operational Readiness Levels -

Operational Readiness Level

SCIENCES HUMAINES & SOCIALES

IRL "Worlds in transition

- Contemporary societal issues (social inequalities, democracy) on both sides of the Atlantic

SCIENCES INFORMATIQUES

Techno-Human Systems (THUS) of the Future

- autonomous systems (supply chains, megalopolis management...) integrating humans

PHYSIQUE

Quantum technologies

- From material to system

TERRE & UNIVERS

Oceanography

- Climate and coastal ecosystems in the South Atlantic and Antarctic

BIOLOGIE

IRL "Immune Health

- Regulation of immune responses

ÉCOLOGIE & ENVIRONNEMENT

Extreme events/Socio-ecosystems under stress

- Multi-scale approaches to socio-ecological challenges

ÉCOLOGIE & ENVIRONNEMENT

Decarbonized agriculture

- CO sequestration techniques$_2$ in the soil-plant system

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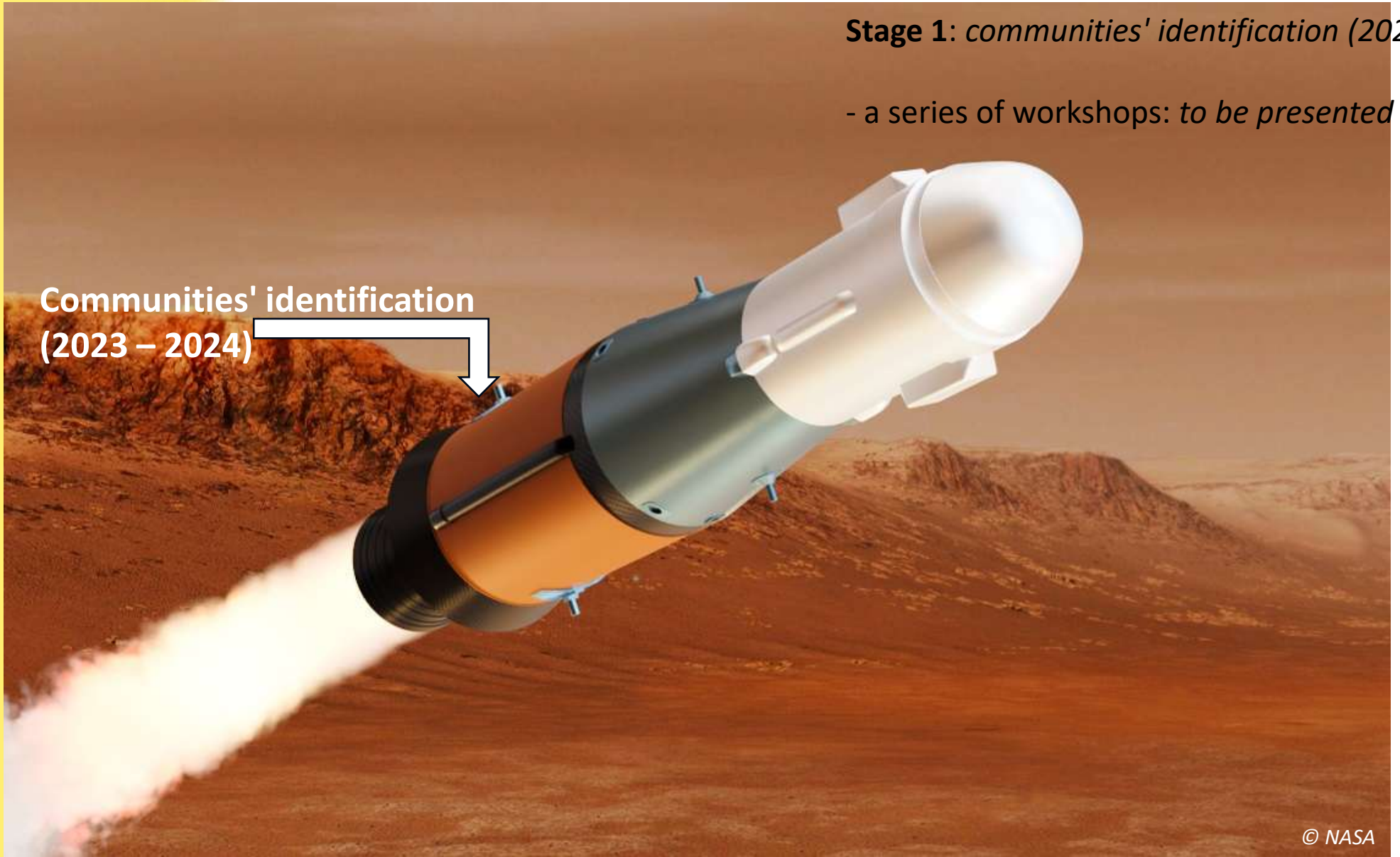
THE IRC EVOLUTION: A THREE-STAGES ROCKET

Stage 1: *communities' identification (2023 – 2024)*

- a series of workshops: *to be presented by colleagues*



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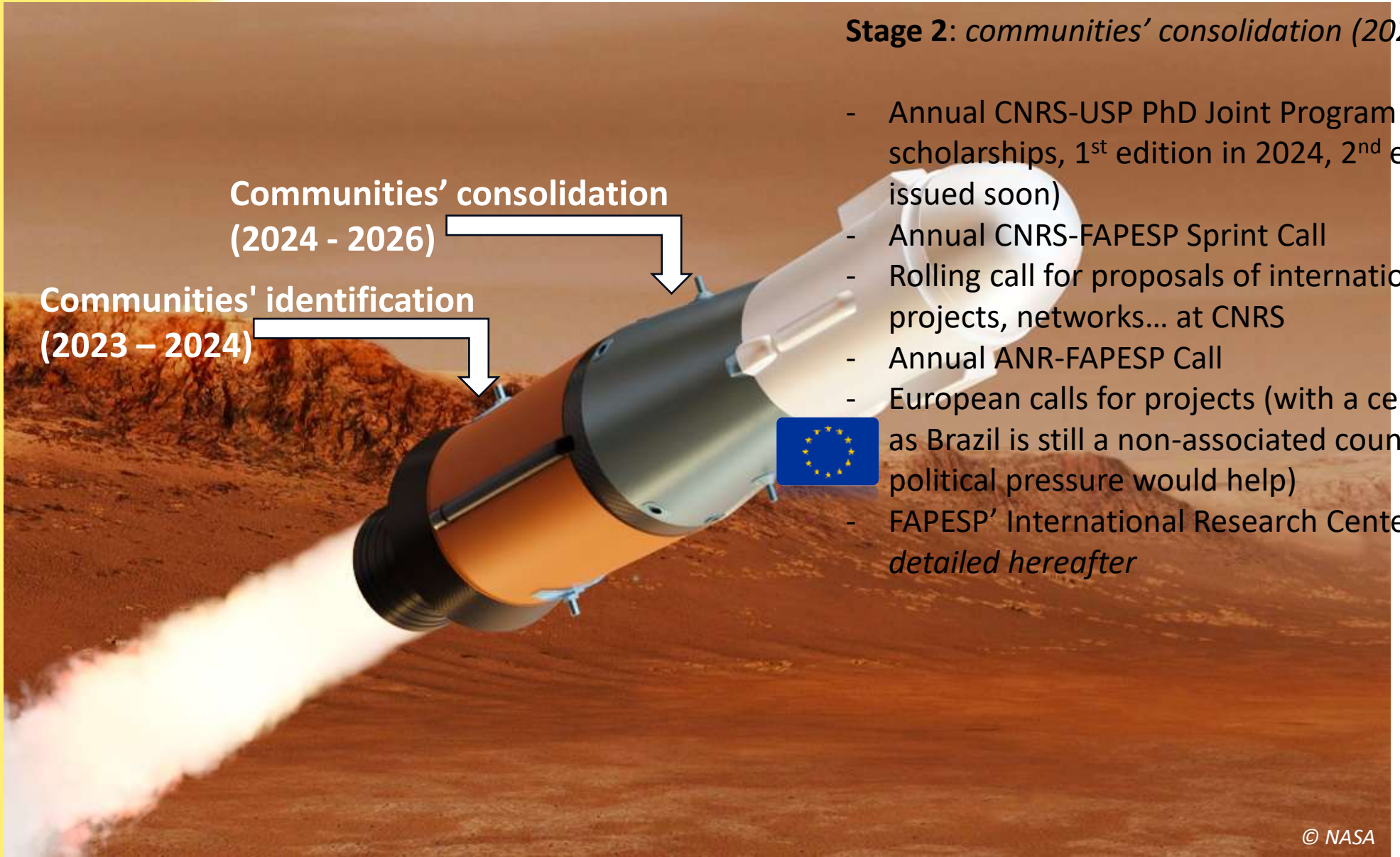
THE IRC EVOLUTION: A THREE-STAGES ROCKET



Stage 2: *communities' consolidation (2024 – 2026)*

- Annual CNRS-USP PhD Joint Program (10 PhD scholarships, 1st edition in 2024, 2nd edition to be issued soon)
- Annual CNRS-FAPESP Sprint Call
- Rolling call for proposals of international research projects, networks… at CNRS
- Annual ANR-FAPESP Call
- European calls for projects (with a certain limitation as Brazil is still a non-associated country… some political pressure would help)
- FAPESP' International Research Center Call : *to be detailed hereafter*

© NASA

Stage 2: communities' consolidation (2024 – 2026)
- Focus on FAPESP CIP Call -

MR$ 30 for researchers affiliated to an IRL within the scope of the IRC

- **Welcome package**
- **Registration at USP to be eligible to various types of financial support**

- USP-FAPESP-CNRS Agreement
- Signed 27 March 2024

Stage 2: communities' consolidation (2024 – 2026)

FAPESP CIP Call

For researchers affiliated to an IRL within the scope of the IRC

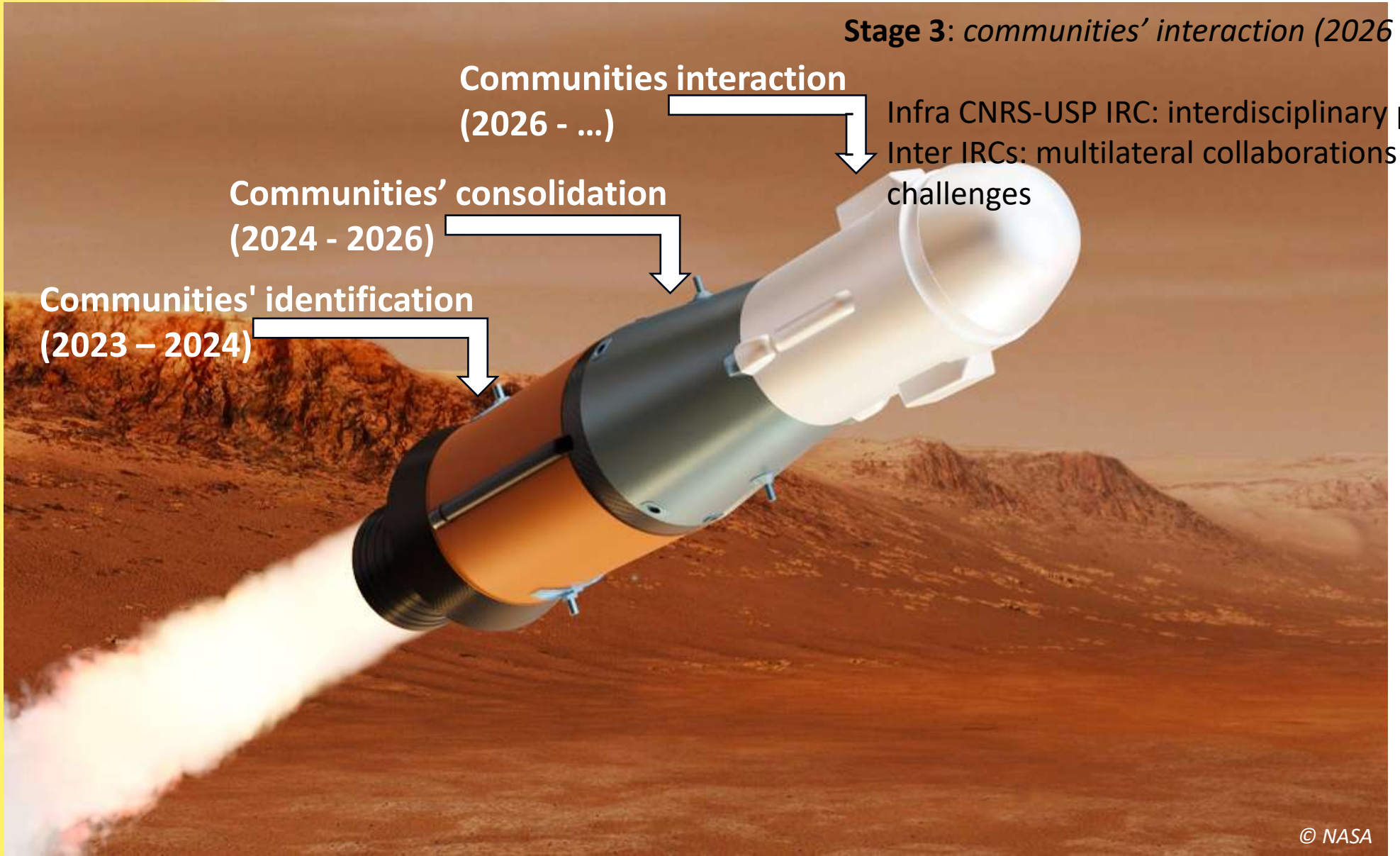
- Welcome package
- Registration at USP to be eligible to various types of financial support

+

CNRS support (IRC, IRL, IRP, IRN, joint PhD's)

PhD's, postdocs, equipment, workshops…

THE IRC EVOLUTION: A THREE-STAGES ROCKET



Stage 3: *communities' interaction (2026 – …)*

Infra CNRS-USP IRC: interdisciplinary projects
Inter IRCs: multilateral collaborations on common challenges

© NASA

Stage 3 : communities interaction (2026 - ….)
- Inter-pillar projects to come -

Sustainable Urban Ecosystems (Environment, Humanities and Computer Sciences)

- How megacities balance biodiversity, carbon sequestration and pollution reduction while ensuring socio-economic inclusivity?

Resilient Agricultural Landscapes for Climate Mitigation (Agro, Environment and Humanities)

- How studying land-use patterns, socio-economic perceptions impacts and public perceptions could help design adaptive agricultural practices that support climate resilience?

Ethics and Regulation of Quantum and AI Technologies (Quantum Techs, Computer Sciences and Humanities)

- What regulatory frameworks and ethical guidelines for responsible deployment of these technologies?

Marine Biodiversity and Climate Resilience in Coastal Ecosystems (Oceanography, Environment and Biology)

- What methods to analyze species adaptation, ecological modelling of marine habitats and what environmental metrics to understand how coastal and marine life withstand environmental shifts?

Human Health Impacts of Marine Pollution and Ecosystems Degradation (Biology, Humanities and Oceanography)

- How marine pollution affects both ecosystem health and human populations?

Sustainable Urban Ecosystems – State of the Art

Leading Research Centers

- MIT (Senseable City Lab), Stanford (Urban Resilience Initiative), ETH Zurich, U. College of London (Bartlett School of Planning), TU Delft…

Key focus Areas

- Integrating *ecology-environment, social sciences, and computer sciences*
- Balancing *biodiversity*, *carbon sequestration* and *pollution reduction* in dense urban environments
- Employing *computational modelling* (AI, big data) and *multi-disciplinary frameworks* to inform policy

In 2050, there will be 48 megapolises in the world, concentrating more than 15% of the whole population. (STATISTA Website)

Research Gaps & Opportunities

- *Comparative studies* on mega-cities in different climatic and socio-economic contexts
- *Scalable solutions* for inclusive urban planning, green space optimization, and public health environment

Sustainable Urban Ecosystems – Added Value of the CNRS-USP Colaboration

Strengths of CNRS

- Excellence in *interdisciplinary research*
- Advanced *high-performance computing* infrastructure and robust *international networks*

Strengths of USP

- **Deep expertise** in mega-city dynamics (São Paulo)
- *Field-based studies* of urban ecology, biodiversity, and social inclusion in tropical environments

Synergies & Impact

- *Joint comparative research* bridging European and Latin American cities
- Creation of *international research labs* under CNRS/ANR-FAPESP/European programs
- *Real-world policy impact*: developing and testing *data-driven,* sustainable urban planning models

Stage 3 : communities interaction (2026 - ….)
- Fostering a New Generation of Scientific Leaders -

By 2026: Launch of "CNRS-USP IRC PhD Students Day"

- First cohort of *CNRS-USP PhD Joint Program* winners present their research
- *Annual event* repeated to welcome new PhD students
- Gradual development of the "*CNRS-USP IRC Community*" – *interdisciplinary, forward - thinking*

Expanding the "IRC" Spirit

- Inclusion of *post-docs conducting research in CNRS-USP International Research Labs*
- *Young Researchers* involved through annual calls for proposals under the FAPESP CIP Program

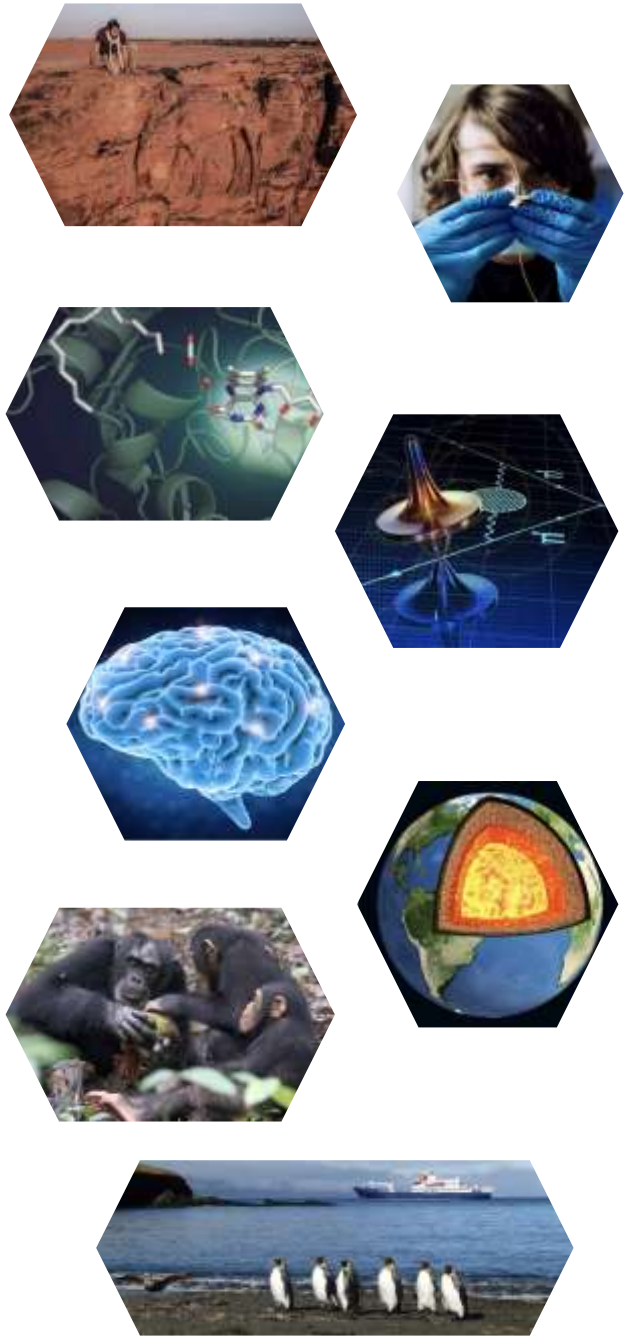
Long-term vision

- Create a dynamic network of emerging scientists
- *Promote interdisciplinary collaboration* and long-term scientific projection
- Sustain *gradual support mechanisms* (events, calls, mentorship) to nurture next-generation scientific leaders

INTERNATIONAL RESEARCH CENTER CNRS – USP

High-Level Meeting, January 2025

Liviu NICU and Fernando MENEZES



Stage 2 : EU-Brazil Scientific and Technological Cooperation

Framework Agreement:
- Signed in 2004, in force since 2007, and renewed for five years in 2022.

Key Areas of Collaboration:
- Marine research
- Information and communication technologies (ICT)
- Health
- Transport
- Environment

Funding Mechanisms:
- Co-funding mechanisms established by Brazil to facilitate participation in Horizon Europe projects.

Notable Joint Initiatives:
- Belém Statement (2017) on cooperation in Atlantic research and innovation.
- Copernicus Cooperation Arrangement (2018) for Earth observation and monitoring.

Latest Joint Steering Committee Meeting:
- Held on December 12, 2023, in Brasília, focusing on green and digital transitions, global health, and other strategic areas.

Opportunities for Brazilian Researchers:
- Participation in Marie Skłodowska-Curie Actions.
- Collaboration with teams funded by the European Research Council (ERC).

Ongoing Projects:
- Over 350 joint projects in fields such as marine research, ICT, health, transport, and environment.

Stage 2 : CIP Call

FAPESP Call : 2025 – 2030

R$ 30 million for PhD and post-doc scholarships, young researchers' programs, lab equipment, etc…

Eligibility: IRC' membership (so far, possible only via IRL membership…) + USP based personnel

Rolling call process

Evaluation steps: (1) USP Rector (and ad-hoc experts committee); (2) CNRS Science Directorate; (3) FAPESP Scientific Direction approval

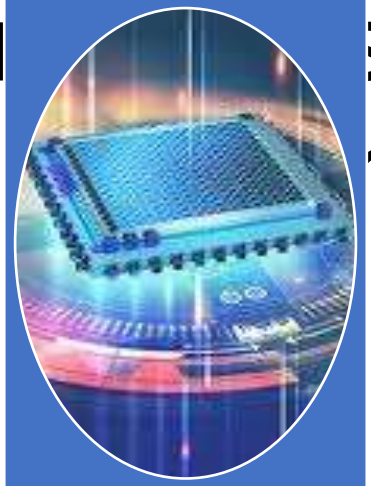
Objective: shorten analysis delays (< 2 months)

Humanities

- Cross Mobility Program
- 3 PhD

Biology

- Laboratory equipment
- 5 PhD
- 2 Post-docs
- 3 technicians



Quantum/ Engineering

- 4 PhD
- 2 Post-docs
- Laboratory equipment
- Software licenses
- 3 technicians

Environment

- 3 PhD
- 2 Post-docs
- Workshops funding

Computing

- 4 PhD
- 2 Post-docs
- Software licenses
- Workshops funding

Agro/ decarbonization

- 3 PhD
- 2 post-docs
- Workshops funding

Oceanography

- 3 PhD
- 2 post-docs
- Workshops funding

International Research Center CNRS - USP

STATE OF SÃO PAULO - R&I key figures

Population: 44 million

GDP: 1/3 of national GDP

SP R&D investment: €2 billion (2020), €2.2 billion (2024)…

Aeronautics, automotive, agri-food...

FIVE MAJOR AREAS OF RESEARCH AT USP

Biofuels/bioenergy

- undisputed leader in ***biofuel production and research***, p nced technologies for the production of second-generation biofue

Biotech/bioprocesses

- a major player in ***precision agriculture*** research. Agricult e crop yields and resistance (USP - 32ème /451 in QS World U Ran

Renewable energies

- Brazil has developed solid expertise in ***hydroelectricity a*** producers of hydroelectric power (USP - 75ème /522 in QS V

Civil engineering

- Brazil is at the forefront of research into ***high-performance conc*** ***advanced numerical modeling techniques*** to simulate the behav civil infrastructure and sustainable buildings (USP - 38ème /240 in Q

Environmental engineering

- the use of ***microorganisms to degrade environmental pollut*** expertise (USP - 44ème /522 in QS World U Rankings 2024).