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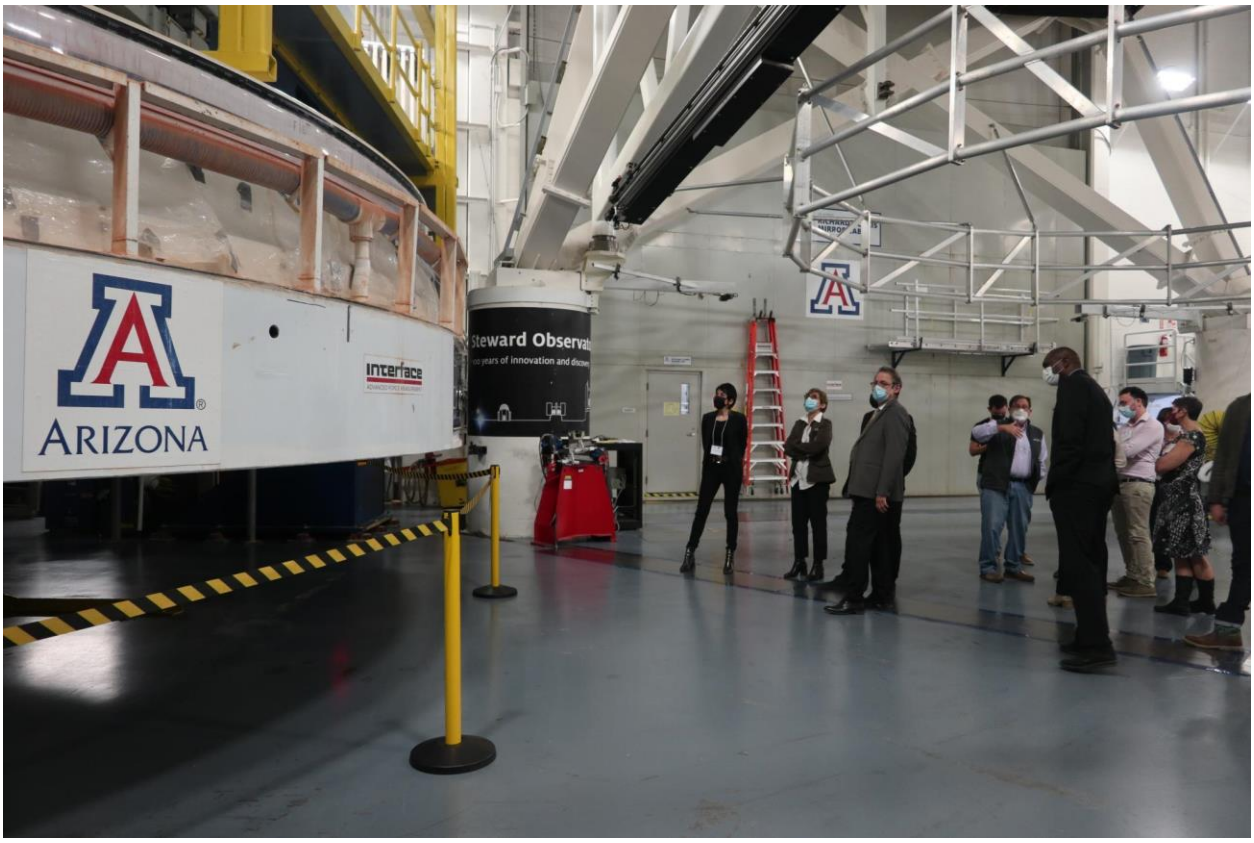
In Arizona, the First IRC of the CNRS is a Success

An important CNRS delegation traveled to Tucson, Arizona (United States), to discuss the next actions of the first CNRS International Research Center, inaugurated last year. New projects have been launched and the two partners have decided to strengthen the structuring of the collaboration around three major themes.

Based in Tucson, Arizona, the CNRS' first International Research Center (IRC) is celebrating its one year anniversary. For the occasion, a delegation from the organization traveled to the United States from February 28 to March 2, in order to take stock of existing collaborations and prepare future actions.



The CNRS delegation visited the Mirror Lab where the mirrors of giant telescopes are designed. © CNRS

The IRC between the CNRS and the University of Arizona (UoA) “is perfectly in line with the societal challenges in which the CNRS is committed[1]. It responds to the values to which we are attached, such as the place of science in society, open science, the place of women in science, and inclusiveness.” says Antoine Petit, President and CEO of the CNRS.

A Strategic Partnership to Perpetuate Numerous Collaborations

An IRC is a new institutional device which aims to establish an ambitious strategic dialogue between the CNRS and its academic partner to define their common interests and the collaborations allowing them to respond to them together, in the form of international research laboratories (IRL[2]), research projects (IRP), thematic networks (IRN), or other existing mechanisms or those to be developed. The first of its kind, the IRC "France-Arizona Institute for Global Grand Challenges" was inaugurated in April 2021. It aims to meet the major scientific challenges on the natural, social, and digital environment, and relies in particular on structures such as the IRL iGlobes[3], one of the 5 CNRS IRLs with the United States, and the “Pima County” International Human-Environment Observatory (see box).

The IRL iGlobes is a "very good example" of the program of the second term of Antoine Petit at the head of the CNRS, which has just begun. Bearing the motto "Fundamental research at the service of society", this program is based on the strengths of the CNRS, including its "remarkable set of international collaborations". The University of Arizona is indeed one of the best public universities in the United States. A world leader in environmental sciences, particularly in the study of deserts, hydrology and the management of water resources, it is also recognized in the fields of astronomy, data sciences and related issues. The University is also recognized for being a leader on border issues such as immigration and resource sharing. The collaborations between the CNRS and the University of Arizona are rich: in terms of joint publications over the period 2009-2019, the UoA is the 10th largest partner of the CNRS in the United States and the 6th largest university collaborator. The CNRS is also the first foreign partner of the UoA.

"This first IRC is very important for us because this type of partnership at the institutional level is part of the CNRS' international strategy, described in the 2019-2023 Objectives and Performance Contract signed between the CNRS and the State", confirms Alain Schuhl, Chief Scientific Officer, who was part of the delegation. The delegation was substantial, with representatives from governance, CNRS institutes, the Europe Department for Research and International Cooperation (DERCI), the Mission for Transversal and Interdisciplinary Initiatives (MiTi), and the presence of several scientists involved in ongoing projects. In addition to the UoA's specialty fields, there are indeed multiple collaborations in particle physics, optics and materials sciences (for example in the domains of medicine, space, telecommunications and lighting), and even in applied mathematics.

Alain Schuhl also stated that “this IRC is not just a catalog of collaborations: it is a partnership between our two research communities”. The partnership is monitored by a bilateral committee at the highest level of the two establishments.

Emergence of a New Scientific Community

The “PhD Joint Program” co-financed by the two institutions enriches the privileged partnership of new recruits. It was honored during this visit, with a scientific workshop bringing together the 6 projects chosen in April 2021 after a bipartite evaluation of 67 applications reflecting the volume and diversity of collaborations. These projects – on soil-plant interactions, the evolution of the universe, environmental

justice, green chemistry, ancient epidemics, and quantum optics – give rise to 12 PhD directed by a pair of project leaders in France and Arizona. All contributions were welcomed and contributed to the complementarity of this international cooperation. Following the stay, six new joint PhD projects, in fields involving 5 CNRS institutes – geosciences and hydrology, perception and environment, infectious diseases, atmospheric chemistry, and topological analysis and large-scale data – enter into the reinforcement of the activities associated with the IRC. Between 2021 and 2022, there are therefore a total of 12 bilateral projects, combining 24 theses, which provide the foundation for this partnership between the CNRS and the University of Arizona.

During the stay, the participants of the PhD Joint Program presented their research. © CNRS

In addition, five teams benefit from an International Emerging Action, which in 2022 is funded by the CNRS. They were also able to present their projects on language, energy management systems, quantum technologies, digital twins applied to the medical field, and the theory of computational argumentation applied to democratic debates. These projects are intended to explore new fields of research within the framework of this collaboration.

The trip was above all an opportunity to discuss the future of the IRC, both in terms of collaboration priorities and themes to be supported, as well as the necessary means (in particular existing collaboration tools or those to be developed) to be implemented.

What Comes Next?

Three priorities have thus far been decided: around water, carbon, and the pandemics of the future. “Water and carbon are subjects on which the CNRS already allocates numerous research resources, in particular with a division dedicated to water and the new exploratory “Priority Research Programs and Equipment” (PEPR) One Water – Eau, common good and FairCarbon – on the carbon cycle. On the subject of pandemics, we are very complementary: the CNRS is an expert in modelling, the UoA in medical sciences”, explains Alain Schuhl. On these three “mature” themes, projects will therefore be able to begin quickly and co-publications, still limited in number today, should multiply.

Calls for projects could also be launched on subjects, such as biology & health, optics, and quantum technologies, on which the two institutions have "a great complementarity but also work to do in order to work together effectively". Other themes of mutual interest will be developed in the future.

To support this "strong desire to work together", the CNRS management has also decided to adapt the governance of the IRC on the French side by appointing Gilles Pinay, research director at the CNRS and deputy scientific director at the Ecology and Environment Institute of the CNRS (INEE), to a position in the scientific direction of the IRC, in order to make the links between the researchers of the French units and the direction of the IRC in Tucson. This pair of directors will be accompanied by an Advisory Committee welcoming people from outside the CNRS and the UoA, in order to help identify programs and sources of funding. Working groups on the various scientific themes will quickly be set up and will present the results of their reflection during a return visit by a delegation from the University of Arizona in France.

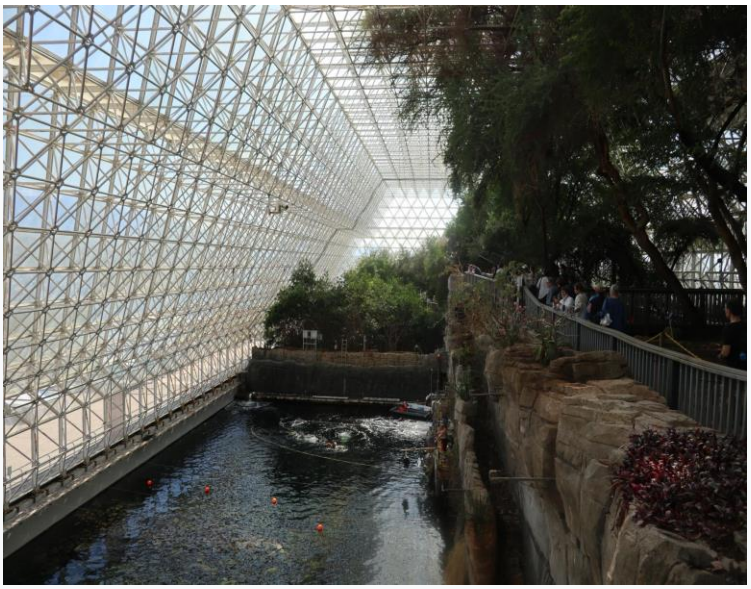
"During this stay, the exchanges were exciting and fruitful: the CNRS and the University of Arizona are giving themselves the means to collectively meet the challenges posed by the chosen areas", retains Alain Schuhl. "I am incredibly proud of our collaboration with the CNRS and of what we have already accomplished together", commented Robert C. Robbins, President of the UoA: "This partnership fits perfectly into the strategic project of our University , and we aim to make our France-Arizona Institute a model for the IRC network that the CNRS is developing around the world. I can't wait to see what we can accomplish together.”

New IRCs are indeed in preparation with “very prestigious institutions with which the CNRS wishes to work”, indicates Alain Schuhl. The first, for "transformational science and technology", will be signed on April 8 with Imperial College London and discussions are underway with the University of Tokyo.

Notes

1. Climate change, education inequalities, artificial intelligence, health and environment, territories of the future, energetic transition are the six societal challenges included in the Objectives and Performance Contract (2019-2023) that the CNRS signed with the State.
2. International Research Laboratory - The IRL correspond to international research facilities where research activities are conducted jointly around shared scientific axes.
3. Interdisciplinary and Global Environmental Studies (CNRS/ENS Paris Sciences et Lettres/University of Arizona).

iGlobes and Pima County: CNRS Environmental Research in Tucson



The Biosphere 2 infrastructure notably reproduces an "ocean" in a reduced model. © CNRS

The IRC between the CNRS and the University of Arizona covers many themes. In particular, it confirms two already structured collaborative actions, the International Research Laboratory iGlobes and the Observatory Homme-Milieu International (OHMI) “Pima County”.

iGlobes catalyzes innovative interdisciplinary research on global challenges related to the environment and natural resources, in particular the question of the relationship of populations to nature and its evolution, particularly in the face of the very large-scale exploitation of mining resources in the region and to the climatic upheaval to which the American Southwest is particularly exposed, with its arid climate. In this context, the IRL has access to an experimental tool unique in the world, the Biosphere 2 infrastructure of the University of Arizona. Located in Oracle, in the desert on the edge of the Santa Catalina Mountains, this closed ecological system, the largest ever built, allows experiments in very controlled conditions. A tropical forest, a desert, an ocean with a coral reef, a mangrove, a savannah and an agricultural land are reproduced in a reduced model. This model of a closed "mini-world" with limited resources makes it possible to question the fragility and resilience of the system that humans form in the biosphere.

iGlobes also brings together multidisciplinary teams from North and South America and Africa to promote new transcontinental research actions around major environmental challenges. The natural environment of the region makes iGlobes and the IRC interesting tools to help the CNRS in its multi-year cooperation plan with Africa.

Like the other OHMs in France or abroad, “Pima County” is a research facility dedicated to understanding entropized, artificialized (anthropoid-constructed) and complex ecosystems, in which humans interact directly with the geosphere and the biosphere. The research of this OHIM focuses on the interaction of multiple actors in the management of irreversible environmental transformations affecting the ecosystem of Sonora.