

## 2 RESEARCH UNITS

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## 2.1 CORE UNITS DESCRIPTION

### 2.1.1 UMR 6051 ARENES <http://www.crape.fr/>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>• Marie Curie Fellowship : 2010-2012 : Graeme Hayes (guest) Sylvie Ollitrault (local referee)</li> <li>• Indoor Air : public policies and policy players : 2012-2015 : Ademe programme (Sylvie Ollitrault/Jean Pierre Le Bourhis)</li> <li>• Partispace : Spaces and Style of participation <a href="http://partispace.eu">http://partispace.eu</a></li> <li>• European Network on Long-Term Care Quality and Cost-Effectiveness and Dependency Prevention : head LSE / local staff held by Claude Martin</li> </ul> <p>The Centre's research activity is both European and international. It enjoys the support of the European Commission, and is also a partner in the international programmes run by the European national research agencies (ANR's Open Research Area programme); as well as contributing to the intellectual life of several learned societies in social sciences, as the ECPR (European Consortium of Political Research) in political science, or ESPAnet (European Network for Social Policy Analysis).</p>
Key figures for the laboratory (2014-2018)
<p>The Centre comprises nearly 100 members of staff . The team consists of :</p> <ul style="list-style-type: none"> <li>• 4 CNRS research fellows,</li> <li>• 41 lecturers and 7 university professors,</li> <li>• 2 CNRS administrative staff.</li> <li>• 40 current PhD students and 7 post-doctoral researchers.</li> </ul>

The Centre, with the support of its supervisory bodies and the AERES [Higher Education Research and Teaching Assessment Agency], concentrate its research activity within three research teams during 2015–2020: (1) Health, management of risk and uncertainties; (2) Journalism and public space ; (3) Mobilization, citizenship and political life.

The research team structure is complemented by activities which cross research areas, typically seminars, but also research projects in fields which span teams. Building on previous projects which looked at emotion in politics or the dynamics of regionalisation, currently the most common areas for cross-team cooperation are around questions of methodology, of gender, or around the ways in which work and social activities are under threat.

With a strong base in Rennes at the centre of a regional network, Arènes is an integral part of the research framework in the West of France. It is closely involved with the [Maison des sciences de l'homme en Bretagne](#) (MSHB) which brings together researchers from the four universities in Brittany; plays an active role in the academic network « [M@rsouin](#) » which focuses on society and internet usage and in the IdA [Institut des Amériques](#); and collaborates on projects with colleagues from the Centre for Sociology at the University of Nantes.

The Environment, Sustainable Development, Political Ecology 's team focus research on four Topics :

- Sustainability, Consistency and Socio-ecological Transitions (Energy, climate change)
- Governance and Political Policies : controversies on risks, contamination
- Security, Environmental and Health Risks with EHESP (High National School of Public Health)
- Social and Political mobilizations : Environmental Justice, Social Movements, Political parties

Different research programs are conducted in an interdisciplinary perspective. Arènes is well known into the ECPR Networks on Green Politics and IPSA/AISP international organization.

**10 researchers of Arènes will be involved in RSEI on environmental politic actions.**

**2.1.2 UMR 0980 BAGAP / Biodiversité, Agroécologie et Aménagement du Paysage**

<http://www6.rennes.inra.fr/sad/>

Scientists of very high level or very high potential
* Jacques BAUDRY (DR), 67 ans, 149 publications, h index 32
* Claudine Thenail (CR), 51 ans, 52 publications
* Stéphanie Aviron (CR), 45 ans, 41 publications
* Alexandre Joannon (CR), 45 ans, 33 publications
* Audrey Aligner (CR), 35 ans, 26 publications
Key figures for the laboratory (2014-2018)
* 288 productions among which: 52 publications, 26 Invited Conferences, 59 communications at international symposium
* 1 ANR, 3 European grants
* 15 PhD (among which 6 are in progress)
Available equipment and infrastructure
Chloe2012 and APIland computers tools for landscape simulation and analysis available at <a href="https://www6.rennes.inra.fr/sad/Outils-Produits/Outils-informatiques/">https://www6.rennes.inra.fr/sad/Outils-Produits/Outils-informatiques/</a>

BAGAP (joint research unit INRA / AGROCAMPUS-OUEST / ESA) is a young interdisciplinary team grouping, in 2018, 26 people (7 research scientists, 6 lecturers, 2 engineers, 7 technical and administrative staff, 8 PhDs and 5 non-permanent employee). The research aim is to identify and evaluate the interactions between agriculture, landscape and biodiversity that help conciliate farming activities and ecological functions. The interactions between the organization of farming practices and ecological processes within landscape mosaics are studied; the processes of interest are those driving biodiversity dynamics and ecosystem services of biological regulation, production and provisioning. The practices of farm territory management (land use for production, land maintenance and field design), their organization by farmers at different scales, and their contributions to landscape heterogeneity are examined. The purpose of this research is to develop methods *e.g.*, to evaluate public action and support decision of both local stakeholders and farmers' advisers. In 2018 six scientists from AgrocampusOuest and ESA Angers have joined our team and broadened the scope of our research to ecology applied to peri-urban landscape and land planning activities.

**All the researchers of BAGAP who are currently involved in co-constructed projects is involved in RSEI.**

### 2.1.3 UMR 6211 CREM / Centre de Recherche en Economie et Management

<http://crem.univ-rennes1.fr/>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>* Olivier l'Haridon (Pr), age 47, 33 publications, Junior IUF, prix Descartes Huygens (2016)</li> <li>* David Masclet (DR), age 44, CNRS bronze medal, 49 publications,</li> <li>* Rozenn Perrigot, (Mcf), age 42, 47 publications, best paper award at the International Society of Franchising Conference (2015 et 2018).</li> <li>* Fabien Moizeau (Pr), age 46, 11 publications, junior IUF.</li> </ul>
Key figures for the laboratory (2011-2016)
<ul style="list-style-type: none"> <li>* 470 publications, 46 published in CNRS rank 1* journals and 101 in CNRS rank 2 journals.</li> <li>* 9 ANR contracts. 5 PICS, 5 chair</li> <li>* 340 seminars.</li> <li>* 200 invited researchers for research and teaching.</li> <li>* 190 papers at international conferences.</li> <li>* 68 defended PhD.</li> </ul>
Available equipment and infrastructure
LABEX-EM (Experimental Lab of the CREM, <a href="https://labexem-crem.univ-rennes1.fr/">https://labexem-crem.univ-rennes1.fr/</a> )

The Centre de Recherche en Economie et Management (CREM) research center is a joint research unit of the CNRS and 2 Universities (Caen and Rennes 1). It develops research in both economics and management. It is located on 3 sites: University of Caen Normandie, Department of Economics of the University of Rennes 1 and IGR-IAE of the University of Rennes 1. In June 2018, the research center is comprised of 113 researchers (2 DR CNRS, 1CR CNRS, 37 Professors, 73 Assistant Professors with 17 qualifications to supervise doctoral research, 92 PhD students and 7 people for the administrative staff). The research center has been rated A by the AERES in its 2015 report.

The main areas of research of the CREM members are: Social choice and public choice, / Experimental Economics, / Franchising and Marketing, / Digital Economics, / Finance and Macroeconomics.

**A renowned research center:** Some researchers are involved in the activities of scientific associations: Society for Social Choice and Welfare, European Public Choice Society, International Society for Franchising, Academy of Marketing Science. Some researchers serve or have served on the editorial board of scientific journals : Finance, Revue Economique, Journal of Behavioral and Experimental Economics, Review of Finance and Banking, Constitutional Political Economy, Public Choice.

The CREM has organized international conferences gathering at least 300 participants: the Annual Congress of European Public Choice Society (2012) and the Annual Congress of the Association Française de Sciences Economiques (2015).

**Available Equipment and Infrastructure:** The CREM research center hosts the LABEX-EM which is an experimental economics room with 22 computers, a mobile equipment with 20 laptops aimed to conduct field experiments, and 2 equipments for electroencephalograms. The LABEX-EM can be connected to a network of other experimental rooms located in other French research centers. On average, 8 experiments per year has been conducted to address issues in Industrial Economics, Personal Economics, Public Economics, Voting Theory and Marketing Science.

**12 members of the CREM will be involved in RSEI. Their fields of expertise are, among others, behavioural and experimental economics, decision theory under uncertainty, insurance economics, environmental and resource economics, inequality economics.**

### 2.1.4 UMR 6553 ECOBIO <http://ecobio.univ-rennes1.fr/>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>* Françoise Burel (DR) age 60, CNRS silver medal 2009, 83 publications in indexed journals, 1818 citations, h index = 32, member of the swedish academy of agriculture and forestry.</li> <li>* Philippe Vandenkoornhuys (PR), age 43, 25 publications, 3 highly cited papers (ISI), 2 papers within Faculty of 1000 (ranked 'must read'), publishing in top ranked journal IF&gt; 9: 3 sciences, 1 PNAS, 1 Ecology letter, Award from the AAAS (2002)</li> <li>* Claudia Wiegand (PR), age 46, 58 publications, h-index 23, recipient of UEB chair of agronomy and sustainable development, Associate Editor of Environmental Pollution journal</li> </ul>
Key figures for the laboratory (2014-2018)
<ul style="list-style-type: none"> <li>* 375 publications, with one third (30%) published in high profile journal (IF &gt; 4) and 7% published in the highest top ranked journal (IF &gt; 9, such as Science, PNAS, Ecology Letters, Ann. Rew., ...</li> <li>* 4 patents-47 invited talks</li> <li>* 11 ANR, 3 PICS, 1 IPEV, 2 international chairs , 1 chair of excellence from CNRS, 1 (LIA) associated international laboratory with IOWA (USA), 3 International programs and int. research groups.</li> <li>* 5 industrial contracts ; * 203 papers at international conferences; * 34 PhD supervisions.</li> </ul>
Available equipment and infrastructure
Environmental genomics platform. Experimental Ecology Centre (ECOLEX). Biogeochemistry centre. Optic and imaging centre. Radio-isotopes centre.

ECOBIO, UMR 6553 of the University of Rennes1 and CNRS, is a large multidisciplinary unit working in the field of continental Ecology, with a staff of 139 people [54 teacher-researchers/researchers), 31 ITA/ITRF (technical and administrative support staff), 2 visiting scientists, 34 PhDs, 8 post-docs, 10 ATER/CDD temporary employees]. Its core research is the understanding of Ecosystem functioning through the analysis of the biodiversity dynamics, from genes to landscapes.

Main research area analyses the response of biodiversity to climatic and landscapes changes at different spatio-temporal scales. More specifically, it addresses adaptation capacity and evolutive strategies, as well as the role the biodiversity plays in ecosystem functioning and ecological services provided to humankind (nutrient cycling, plant pollination, soil detoxification...).

ECOBIO international renown covers the field of *Landscape Ecology* (two recent CNRS Silver medal) and *integrative Ecology* (AERES Report, February 2011 **ranked A at overall, and A+ on the project**). In this domain, ECOBIO is involved and leads at the national level the EQUIPEX "Zone-atelier". ECOBIO is also a renown leader in *Ecology of stress and Ecotoxicology* (International Chair in 2010), *Ecology of invasive species* (LIA with the IOWA state University), *Environmental Microbial Ecology and Genomics* (leading IBISA Platform and Jacques Monod Int. Conferences in 2007 and 2011).

ECOBIO is also involved in the *Ecological engineering* applied research field, in terms of wetlands management (2 European programs) and remediation biotechnology (patents). Research within ECOBIO is thus in tune with crucial environmental concerns regarding climatic changes, landscape uses, environmental pollution, urbanization, and is connected with European public policies, Ecosystem restoration and Biodiversity conservation.

**32 Researchers from Ecobio, in 4 teams of the unit dealing with various aspects of landscape and ecology as well as ecological processes are involved in RSEI.**

**2.1.5 UMR ESE / Ecologie et Santé des Ecosystemes**

<http://www6.rennes.inra.fr/ese/>

Scientists of very high level or very high potential
* Didier Gascuel (PR), age 59, 75 publications, h index 32
* Olivier Le Pape (PR), age 50, 60 publications, h index 32
* Eric Petit (DR), age 47, 49 publications, h index 31
* Jean Marc Roussel (DR), 46 ans, 57 publications, h index 23
Key figures for the laboratory (2011-2016)
* 236 publications
* 26 invited conferences
* 195 communications (oral and posters) at international symposium
* 1 patent
* 6 ANR, 7 European grants (Interreg, ITN, FP7)
* 28 PhD (defended and in progress)

ESE UMR 0985 (joint research unit, INRA / AGROCAMPUS-OUEST) groups 60 people (9 professors and assistant professors, 7 research scientists, 8 engineers, 11 technical and administrative staff, and 19 non-permanent employees (PhDs and post-docs). Its research covers a vast disciplinary field of ecology, with special emphasis on marine and freshwater ecosystems, and processes occurring at large scales along continuums (ocean-freshwaters, freshwater-river catchment). Emphasis is placed on the following issues: (i) identifying human-derived factors of stress for ecosystems in a dynamic global environment; (ii) understanding how these factors affect ecological mechanisms and the responses of ecosystems; and (iii) proposing solutions for the sustainable management of natural resources and ecological services. Our activities aim to meet public expectations concerning the conservation of natural areas, biological resources, biodiversity and risks associated with pollution, biological invasions and climate change.

ESE is also in charge of the PEAR Platform which is devoted to animal breeding experimentation. It includes 800 m<sup>2</sup> halls for fisheries, 205 m<sup>2</sup> of greenhouses for amphibians growth experiments, a mesocosm plateau including 100 basins 0.5 to 30 m<sup>3</sup> and 30 ponds 100 to 1000 m<sup>2</sup> allowing aquatic ecosystem and agro-ecology investigations.

**21 researchers dealing with ecology of freshwater ecosystems are involved in RSEI second circle.**

### 2.1.6 UMR 6590 ESO / Espaces et SOcietes (Rennes) <http://eso.cnrs.fr/fr/index.html>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>• HP7 HERCULES Landscaping – partnership with Landscape research group (<b>Laurence Le Dû-Blayo</b>)</li> <li>• ANR Makara (2013-2017) “Societal responses to surface water quality changes” (France, 19<sup>th</sup>-20<sup>th</sup>) (<b>Emmanuelle Hellier, Nadia Dupont</b>, associate researcher <b>Alexandra Boccrossa</b>)</li> <li>• ANR Maris (2015-2019), Management and Risk analysis of an Invading plant Species (<b>Véronique Van Tilbeurgh, Philippe Boudes, Anne Atlan, Catherine Darrot</b>)</li> <li>• ANR JC REPPAVAL (2012-2015) – Representations of landscapes and nature in the small valleys of western France facing ecological restoration projects (<b>Nadia Dupont, Laurence Le Dû-Blayo</b>, associate researcher <b>Caroline Le Calvez</b>)</li> <li>• ACCEPT (2015-2018) – Social acceptability of intensive farming in France: mapping of controversies, citizen mobilizations and prospective study (<b>Véronique Van Tilbeurgh</b>)</li> <li>• ORA (Open research area of the social sciences) (2016-2018) - CITFAR - Citizen engagement in green urban space and urban farming initiatives: pioneers of social innovation contributing to health, wellbeing, participation and empowerment of urban citizens (<b>Philippe Boudes</b>)</li> </ul>
Key figures for the laboratory (2014-2018)
<p>401 articles in peer-reviewed and listed international or national journals (HCERES or other),            107 articles in other journals,            135 scientific works (including 87 in management), 377 chapters of scientific works,            155 popularization works and reviews (special issues), 108 study reports,            367 papers in international symposia (121 invited talks), 466 papers in national conferences.</p>

ESO is a joint research unit gathering 270 members: researchers, engineers and administrative staff from CNRS and academics, PhD students, engineers and administrative staff from the Universities of Angers, Caen, Le Mans, Nantes, Rennes 2 and Agrocampus Ouest. It belongs today to the top level social science research centres in France, combining several disciplines such as geography, land planning, urban studies, sociology, environmental psychology and territorial economy. ESO research programme is organised in four axes: Production, differentiation and sharing of space; Practices, experiences and representations of space; The spatialized construction of political action: between ordinary and institutional; Theories, interdisciplinary, methods.

ESO is developing an original scientific positioning on the following issues: new forms of inequality and social divisions in urban areas; Spatial mobility; Mobilizations and conflicts around spaces; Contexts and instruments of territorialized institutional action; Social and territorial solidarity as challenges for public action; Health, well-being, disability; Landscape; Agricultural changes, territorial resources and the new dynamics in rural areas; Socio-ecological transition; Gender and sexuality; Heritage, tourism and leisure; Strategies and territorial anchoring of companies, third places.

Its abundant scientific production is diversified and presented in quality media and the organization of 5 international scientific events (in 2012, 2014, 2015). ESO has scientific partnerships with 29 teams in Europe and 37 worldwide; 3/4 of its researchers have research work and publications at international level and the unit received many guest PhD students, post-doctorates and professors from abroad.

Sound experience of contractual research aims at responding both to the demands of scientific innovation and to social demand with the (co-)backing of more than a hundred international, national or regional research contracts since 2010, including 11 ANR and 5 European projects.

**11 researchers from ESO are fully involved in RSEI in projects related to social aspects of water and landscape management.**

### 2.1.7 UMR 6118 Géosciences Rennes <http://www.geosciences.univ-rennes1.fr/>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>* J.-P. Brun (PR Emeritus), tectonics, age 66: citation index 9500; H index, 58; senior member IUF.</li> <li>* P.R. Cobbold (DR Emeritus), tectonics, age 71: citation index 8000; H index, 48.</li> <li>* Ph. Davy (DR), hydrogeology and geomorphology, age 58: citation index, 6000; H index, 45.</li> <li>* K. Gallagher (PR), thermochronology, age 56: citation index 500 ; H index, 38.</li> <li>* D. Gapais (DR), tectonics, age 62: citation index 4000; H index, 37.</li> <li>* G. Gruau (DR), geochemistry, age 60: citation index 4000; H index, 36.</li> <li>* A. Dia (DR), geochemistry, age 55: citation index 2500; H index, 28.</li> <li>* Y. Lagabrielle (DR), tectonics, age 61, citation index 3500, H index 31.</li> <li>* M. Ballèvre (PR), petrology, age 59: citation index, 2300; H index 30.</li> <li>* D. Néraudeau (PR), palaeontology, age 54, citation index 2500, H index 28.</li> <li>* G. Dupont-Nivet (DR), palaeomagnetism, age 46, citation index 3000, 31 (ERC Magic)</li> <li>* O. Bour (PR), hydrogeology, age 53, citation index 3000, 29</li> <li>* T. Le Borgne (Phys), hydrology, age 38, citation index 2300, H index 29 (ERC Reactive fronts).</li> <li>* L. Longuevergne (DR), hydrogeophysics, age , CI 2600, H index 24</li> <li>* M. Davranche (PR), geochemistry, age 43, CI 1900, H-index 24 (IUF Junior, Bronze Medal CNRS).</li> <li>* P. Steer (MCF), Hydrogeomorphology, age 33, CI 550, H index 15, ERC FAESIBLE</li> </ul>
Key figures for the laboratory (2014-2018)
<ul style="list-style-type: none"> <li>* 698 ACL papers in peer-reviewed journals (ratio ACL articles/researchers of 2.8)</li> <li>* Equipex Critex</li> <li>* 3 ERC and 8 ANR Projects as PI</li> <li>* 3 international awards</li> </ul>

Géosciences Rennes (GR) built its scientific strength on the development of analogue experimental modeling aimed to model geological structures and lithospheric processes. Experimental and numerical modeling was then successfully developed to study geomorphological, hydrological and geochemical processes at Water/Soil/Rock/Biosphere interfaces (i.e. the Critical Zone). The specific skills developed in modeling are therefore in the heart of GR and as such are recognized by the scientific community. Géosciences Rennes is also largely involved in the National Observation Systems conducted by INSU in long-term hydrological geochemical or geodesic surveys such as ORE H+ (<http://hplus.ore.fr/>), ORE AgrHys ([http://www.inra.fr/ore\\_agrhys](http://www.inra.fr/ore_agrhys)) or RENAG network (<http://www.renag.fr/>). Géosciences Rennes is partly involved in an EQUIPEX project - called CRITEX - dedicated to challenging equipments for time- and space-linked exploration of the Critical Zone.

Géosciences Rennes includes today a total staff of about 130 members, notably 52 teaching and research people and 23 engineers/technicians. Other people are Ph.D (around 40) and post-docs.

As pointed out by the latest AERES evaluation, the scientific research conducted at Géosciences Rennes ranks at the best international level in many of the addressed issues, especially for **the water team recognized as “one of the best team in Europe”**. This is confirmed by **50-75 international Shanghai ranking**. This is not only assessed by a strong participation or leadership in national and international research projects, but also by a high level of publications (about 2,8 publications in peer-reviewed journals per year and researcher) in the best-ranked journals. The laboratory is also more and more involved in consulting and advising in a wide range of decision makers both in water resource management, nuclear waste storage, mining or petroleum investigation (VEOLIA, TOTAL, STATOIL, CHEVRON, AREVA, GDF, IFP, etc).

**The water team (16 core-researchers) is leader of the RSEI project. The geochemistry and sedimentology teams are also involved in the project.**

### 2.1.8 UMR 6262 IODE / Institut de l'Ouest : Droit et Europe

<http://www.iode.univ-rennes1.fr/>

#### Scientists of very high level or very high potential

- *European Integration* (dir. I. Bosse Platière): Chaire Unesco and GDRI CNRS on regional integrations (2010-2014) – Centre of excellence Jean Monnet (2005-2014- GIS Europe 2015)
- *Fundamental, social and heritage protection of persons*, (dir.S. Moisdon Chataigner) : International university Network of Bioethics
- ***Environment, Global Changes and Natural Resources***, (dir. A. Langlais). Chaire d'excellence CNRS-INEE (2009-2013) - Bronze medal of the CNRS (2014), Research Network Biodiscée Law, Biodiversity and Ecosystem Services(2012-2015) RTP CNRS INEE, 3 Grant for scientific installation from Rennes metropole.
- *Liability and security*, (dir. Philippe Pierre): GRERCA european group of responsibility and insurance Research, co-responsibility of the project "Profile" within CominLabs Labex, involvement in Equipex Matrice
- . Theory and History of legal systems (dir. S. Soleil)

The Western Institute: Law and Europe (IODE) is a Mixed Research Unit affiliated to the University of Rennes I and to the C.N.R.S. (INSH and INEE). It consists of 61 teachers-researchers (1 Chaire d'excellence CNRS-INEE 2009-2014), 3 researchers CNRS (2 CR and 1 DR, all specialist in environmental Law) and hosts 80 Ph.D students and has the support of 7 administrative employees. Pr Marion Delsol is the current director of the UMR.

**The Environment, Global Changes and Natural Resources** 's team consists of 12 researchers and 8 Ph. students. Involved in international (IUCN Academy of Environmental Law, IPBES) and European (Avosetta Group) and national networks (French Society for Environmental Law), the researchers focus their research on four topics:

- Sustainability, Consistency and Socio-ecological Transitions (agriculture, fisheries, energy and al);
- Normative Pluralism, Solidarity and Governance;
- Law, Environmental Sciences, Biodiversity and Ecosystems Services Dynamics;
- Security, Environmental and Health Risks.

Different research programs are conducted in an interdisciplinary perspective, especially with members of OSU of Rennes (ecological connectivity and agriculture activities Diva program, ZA Armorique CNRS, DIPEE CNRS INEE) and focused on emergency thematics as:

- **Ecosystem Services**: Research Network Biodiscée (RTP CNRS-INEE) Law, Biodiversity and Ecosystem Services (2012-2015), Project PEPS-CNRS Payments for environmental services in the light of the CAP (2012), Project Agriculture, compensation and agro-ecological transition ANR (201 Project Woodnet Biodiversa (2016-2019), Project SoilMan Biodiversa (2016-2019)..
- **Nanotechnology** (ANR Nanonorma 2009-2012: IODE was one of the key Partner of this project and was in charge of one of Work Package related to Nanotechnology and Environmental Risks)
- **Alternatives to Pesticides** (Alterphyto program - Ministry of ecology: Project Alterphyto: Legal Approaches on Alternatives Protections against Crop Pest (2013-2016)

**All the members of the Environmental team will be involved in the Environmental Intelligence project.**

### 2.1.9 UMR 6074 IRISA / Institut de Recherche en Informatique et Systèmes Aleatoires

<http://www.irisa.fr>

<b>Scientists of very high level or very high potential</b>
Jean-Marc Jézéquel (IRISA director), CNRS silver medal (2016), h index 43 Dominique Lavenier (GENSCALE team leader), CNRS bronze medal (1992), Cray prize (1996), h 24
<b>Key figures for the laboratory (2014-2018)</b>
40 research teams, involving in total 595 scientific members Members from ~50 countries ~1000 peer reviewed publications per year ~250 software products registered Specific cross-cutting axis on ecology & environment
<b>Available equipment and infrastructure</b>
GenOuest BioInformatics Platform

IRISA (Institut de recherche en informatique et systèmes aléatoires), is a joint research centre for Informatics, including Robotics, and Image and Signal Processing. With 750 people, 40 teams, 7 departments, 7 trustees (CNRS, ENS Rennes, Inria, INSA de Rennes, Institut-Mines-Télécom, Université de Bretagne Sud (UBS), Université de Rennes 1) and one partner (CentraleSupélec), IRISA forms a research cluster of excellence in the domain of Digital Sciences, with priorities in bioinformatics, software and system security, new software architectures (from IoT to Manycores and Cloud computing), and virtual reality.

IRISA has identified a number of cross-cutting axis, where active collaborations between teams bring synergy and critical mass to address wider socio-economic problems. Environment-Ecology and hydrology is one of these cross-cutting axis, where teams such as GENSCALE, DYLISS or LACODAM have extremely varied objectives, as for example to predict the dynamics of coastal systems or transfer of pollutants in underground circles, or know the adaptation of a specie to its environment. Their skills in modeling, bioinformatics, computer science and applied mathematics, produces very rich and interdisciplinary research. This axis helped IRISA established itself as an important member of the OSUR.

The objective of the **LACODAM** team is to considerably facilitate the process of making sense from large quantities of data, either for deriving new knowledge or for taking better actions. . LACODAM has an important activity in maintaining strong ties with industrials partners concerned with energy as well as public partners working on health, agriculture and environment.

The first objective of **GenScale** is the design of scalable, optimized and parallel algorithms for processing the mass of genomic data provided by today biotechnologies. GenScale is an interdisciplinary project, which requires strong links with the biology and the genomic scientific community. Collaborations with life science partners go through local, national or international common projects where our tools and methodologies are intensively tested and used.

The research domain of the bioinformatics **Dyliss** team is sequence analysis and systems biology. The main goal in biology is to characterize groups of genetic factors that control the phenotypic answer of non-model species when challenged by their environment. The team explores methods in the field of formal systems, more precisely in knowledge representation, constraints programming, multi-scale analysis of dynamical systems, and machine learning.

**45 Researchers from the 3 teams are involved in RSEI project with 12 core-researchers already involved in transdisciplinary projects.**

2.1.10 UMR 1085 IRSET / <http://www.irset.org/>

Scientists of very high level or very high potential
<p><b>(h-index &gt;30):</b></p> <ul style="list-style-type: none"> <li>- A. Laurence, age 56, 110 international publications, H index 32</li> <li>- G. Baffet, age 58, 106 international publications, H index 31</li> <li>- M.T. Dimanche-Boitrel, age 56, 80 international publications, H index 58</li> <li>-- O. Fardel, age 55, 207 international publications, H index 45</li> <li>- B. Jegou, age 67, 261 international publications, H index 52</li> <li>- D. Lagadic, age 56, 108 international publications, H index 36</li> <li>- D. Luce, age 59, 97 international publications, H index 44</li> <li>- I. Niedhammer, age 50, 105 international publications, H index 35</li> <li>- F. Pakdel, age 59, 110 international publications, H index 32</li> <li>- S. Michel, age 52, 119 international publications, H index 38</li> <li>- J.F. Viel, age 62, 145 international publications, H index 32</li> <li>- M. Primig, age 54, 70 international publications, H index 30</li> <li>- T. Vincent, age 54, 282 international publications, H index 46</li> </ul> <p>D. Lagadic-Gossmann: Elizabeth Taub prize (toxicology) by the French Aca. of Medicine (2013)</p> <ul style="list-style-type: none"> <li>- M. Primig: Inserm Atip-Avenir (2008-2012)</li> <li>- F. Smagulova: Inserm Atip-Avenir (2014-2018)</li> <li>- B. Jégou: Prix Charles Thibault of the GDR Repro Research Group (2015); Prix Salat-Baroux of the French Academy of Medecine (2017)...</li> </ul>
Key figures for the laboratory (2014-2019)
<p>As of January 2019, the Institute comprises <b>nearly 300 members of staff:</b></p> <ul style="list-style-type: none"> <li>- 10 Research Teams incl. 1 Inserm-Avenir1 team, 2 certified Technology platforms</li> <li>- 75 Researchers/Teaching-researchers, 36 Hospital practitioners, and 48 PhD students</li> <li>- 1 Chair of Excellence from Université Sorbonne Paris Cité</li> <li>- 121 technical and administrative staff</li> </ul> <p>1 team with the "FRM 2018" label. Over 800 publications (2014-2018). 18 ANR contracts 4 European H2020 projects in progress (ZIKAlliance, HBM4EU, Oberon, Freia). Tremplin Carnot AgriFood Transition</p>

Irset is a joint research unit of the Inserm institute, Rennes 1 University and the EHESP and CNRS. Its mission is to study the biological processes and the environmental factors (whether chemical, biological, physical, social and cultural, occupational, geographical or economic) that affect human health, and to help public health authorities make informed decisions on the basis of scientific data. The Institute was founded in 2009 and accredited by Inserm in 2012. It was assessed by the HCERES in 2016. Irset research teams work in a number of complementary areas such as molecular biology, genomics, bioinformatics, analytical chemistry, toxicology and epidemiology, and in various pathologies including cancer, liver and lung diseases, reproductive and developmental disorders, infectious diseases, work-related musculoskeletal disorders, etc..

**In RSEI, Irset (20 res. Involved) will develop transdisciplinary methods** to help unravel the complex interactions between environmental stressors and bio-psycho-social systems at the individual, community, and social-ecological systems levels, as those relate to personal health and population level disparities. The convergence of newly developed scientific methods and technologies (sensing, modeling...) with biomonitoring will continue to move the field toward more refined individual-level exposure assessments on large populations of humans, that are more relevant to and valuable in policymaking.

In parallel, Leres-Irset will develop methodologies to better understand the behavior and determinants of chemical and microbiological and/or emerging agents in waters and to characterize them in order to better assess human exposures and the potential related health impacts. In particular, the identification of hazards (emerging or not) relating to new land use planning practices and new water

uses in the city will be made feasible from the data which will be provided by the axes 1, 3 and 5 of the EUR project, paving the way to an holistic approach for water management in urban and rural areas.

### 2.1.11 UMR 6226 ISCR/Institut des sciences chimiques de Rennes <http://www.scienceschimiques.univ-rennes1.fr/>

Scientists of very high level or very high potential
<p>Among ISCR Scientists participating in RSEI :</p> <ul style="list-style-type: none"> <li>• P. Le Cloirec (PRCE ENSCR), 231 publications, 7920 citations, H index = 48</li> <li>• Szymczyk (PR UR1) 223 publications, 3608 citations, H index =33</li> <li>• Amrane (PR UR1), 337 publications, 4174 citation, H index = 32</li> <li>• K. Hanna (PR ENSCR), 61 publications, 1875 citations, H index = 23 , Junior IUF</li> <li>• D. Wolbert (PR ENSCR), 74 publications, 1200 citations, H index = 21</li> </ul>
Key figures for the laboratory (2014-2018)
<p>For the whole ISCR (210 scientists):</p> <ul style="list-style-type: none"> <li>• 2955 papers in peer reviewed journals, 2.8 articles /researcher.year</li> <li>• 9 patents,</li> <li>• 250 defended thesis</li> <li>• 10 international awards, 8 IUF members,</li> </ul> <p>For Chemistry and Process Engineering team participating in RSEI (14 scientists)</p> <ul style="list-style-type: none"> <li>• 342 papers in peer-reviewed journals - ~ 7 articles/researcher.year</li> <li>• 4 patents</li> <li>• 34 defended thesis</li> </ul> <p>international awards, 2 national awards, 1 IUF member</p>
Available equipment and infrastructure
<p>X-ray diffraction centre, Chromatographies, NMR Spectrometries, Microscopies, Elemental analysis, Mass spectrometry. Regional Centre for Physical Analysis. Organic trace pollutant analysis (UPLC-IMS-QToF, SPE-UPLC-MSMS, TDU-GC-MS, ...), Pilot-scale experimental units, ...</p>

This Institute, founded in January 1st, 2006, gathers together all the academic forces in chemistry at the Rennes site. At the beginning of 2017, it brings together more than 280 permanent staff, including approximately 140 assistant-professors and professors, 60 CNRS researchers and 80 engineers and technicians, at the Rennes Beaulieu, Rennes Villejean and Lannion IUT sites, leading to an overall workforce of more than 500 people.

Rennes has undeniable expertise for research and innovation is in line with the main orientations of the national research strategy, following three major axes associated with strong societal issues : (a) Molecules and Materials for Health, (b) Molecules and Materials for Optics and Electronics, (c) Chemistry and Engineering for Sustainable Development.

**The Chemistry and Process Engineering team (12 researchers), which is involved in RSEI**, is dedicated to the study and development of sustainable processes suited for pollution treatment and production in various fields including environment, food and chemical industries. In order to determine process performance the team also contributes to the development of analytical methodologies for trace pollutants evaluation and interfaces characterization. The team studies and develops physical, chemical and/or biological processes to remove or reduce mainly organic trace pollutants (VOC and odors in air, endocrine disruptors and pharmaceuticals in water resources, disinfection by-products in drinking waters, ... ) and to treat refractory and toxic compounds.

### 2.1.12 UMR 6554 LETG / Littoral, Environnement, Télédétection, Géomatique (Equipe Rennes) <http://letg.univ-nantes.fr/fr/>

Scientists of very high level or very high potential
* Laurence Hubert-Moy (PR), age 55, 50 publications, CNRS bronze medal
* Hervé Regnaud (PR), age 58, 76 publications, 9 invited talks, member of the IUF
* Vincent Dubreuil (PR), age 50, 72 publications, 16 invited talks
* Hervé Quenol (DR): age 45, 68 publications (1 PNAS), 29 invited talks
* Thomas Corpetti (DR): age 40, 28 publications, 4 invited talks
* Olivier Planchon (CR), age 47, 38 publications, 2 invited talks
Key figures for the laboratory (2014-2018)
* 155 publications / * 53 books and chapters / 27 invited talks,
* 10 international projects (2 INTERREG, 1 LIFE), 12 ANR, 2 FEDER, 1 PCRD,
* 20 industrial contracts / 88 papers at international conferences, * 13 PHD.

The LETG laboratory is part of a Joint Research Unit of the CNRS and 5 Universities (Nantes, Rennes 2, Brest, Caen and Angers) "Littoral Environnement Télédétection Géomatique" (UMR CNRS 6554 LETG). The UMR LETG, which was rated is organized in two research teams.

Established in Rennes, on the site of the University of Rennes 2, LETG-RENNES comprises 18 people skilled in physical geography and environmental issues, remote sensing and GIS. Main research at LETG-RENNES is carried out in the fields of Climatology and Remote Sensing. The research activities aim to produce, diffuse and develop knowledge and know-how on the interactions between natural environment and society, in order to evaluate the impacts of climate change on the natural resources and human activities and vice-versa.

LETG-RENNES research focuses on three inter-related issues: **Environmental remote sensing** that comprises the monitoring and modeling of land-cover and land-use dynamics with remote sensing data and the evaluation of new remote sensing sensors/platforms; **Analysis of climatic processes and their influence on land cover, farming practices** (e.g. vineyard distribution and characterization, pioneer fronts, urban climate); **Spatial modeling of risks and land-use conflicts in geosystems**.

LETG-RENNES staff extensively uses spatial information technology. Investigations are generally based on a combination of in situ field measurements (more than one hundred automatic weather stations), ground-based, aerial and satellite remote sensing techniques, digital image processing, GIS-based environmental models as well as geo-statistics and statistics.

**Partnership and networks.** LETG-RENNES is a member of the OSUR. The field research is mainly carried out in western France (mostly in Brittany), like in the Armorique LTER site in north-eastern Brittany, consisting in the long term monitoring of this agricultural site. ([www.caren.univ-rennes1.fr/pleine-fougeres](http://www.caren.univ-rennes1.fr/pleine-fougeres)). The researchers are involved in many scientific collaborations in South America (national GIS Institute of Americas), in Asia (with the LIAMA a Sino-French lab of Informatics, Automatics and Applied Mathematics), in North America (Canada), in New Zealand and in Africa. The researchers of LETG-RENNES-COSTEL are also involved in the European Zone Atelier / LTER networks, the European Excellence Network AlterNet ("A long-term Biodiversity, ecosystem and awareness Research Network"). LETG-RENNES has also developed many relationships with Space Agencies (CNES, ESA, INPE, CSA...), local authorities, regional and national environmental agencies. LETG-RENNES team is leading the management of the International Association of Climatology since 2000.

**All the members of LETG-Rennes (16 researchers) are involved in RSEI for the spatial and physical investigation of catchments.**

### 2.1.13 UR OPAALE / Optimisation des Procédés en Agriculture, Agroalimentaire et Environnement <http://www.irstea.fr/linstitut/nos-centres/rennes>

Scientists of high level or high potential
<ul style="list-style-type: none"> <li>* Eric Dufour (PR), 59 years old, 136 scientific publications, h index 43</li> <li>* Patrick Dabert (DR), 55 years old, 70 scientific publications, h index 26</li> <li>* Fabrice Béline (DR), 48 years old, 67 scientific publications, h index 28</li> <li>* Anne Marie Pourcher (DR), 56 years old, 50 scientific publications, h index 16</li> <li>* Anne Trémier (DR), 43 years old, 34 scientific publications, h index 12, Coordinator of H2020 DECISIVet</li> </ul>
Key figures for the laboratory (2014-2018)
<ul style="list-style-type: none"> <li>* 170 scientific publications</li> <li>* 8 invited International Conferences</li> <li>* 19 patents</li> <li>* 7 ANRs (4 coordinated), 5 European grants (1 coordinated), 2 BPI</li> <li>* 25 PhD; 11 HDR.</li> </ul>
Available equipment and infrastructure
<ul style="list-style-type: none"> <li>joint research team with Inria - Fluminance</li> <li>plateform PRISM (NMR spectroscopic and imaging methods)</li> <li>plateform APIVALE (valorisation processes for farming effluents and organic residues)</li> </ul>

The research unit OPAALE brings together 44 scientific and technical staff members in 4 research teams: i) IRM Food develops MRI and NMR techniques for real-time and non-destructive characterization of bioproducts along their transformation, ii) ACTA is studying aerualics to develop technologies allowing to control turbulent airflows in the absence of a solid barrier, iii) PANDOR studies and develops technologies for the recovery of energy, organic matter and nutrient from organic effluent and waste, and iv) SAFIR develops tools for environmental assessment and organization of waste management at the territorial level. The workforce is supplemented by an average of 20 temporary staff (PhD students / post-doctoral fellows / temporary staff).

**The research unit is involved in the Rennes School Environmental Intelligence project via its 2 teams working on the evaluation and optimization of effluents, waste and organic residues management and valorization.** The waste management systems are analyzed as a combination of organizational layouts (stakes and services) and technologies allowing the transformation of waste into products for efficient and green valorization. The main objectives are: i) to produce methodologies and to acquire data to evaluate the environmental and health impacts of the systems (LCA), and ii) to develop new technologies from the laboratory stage to the prototype stage on industrial sites (TRL 1 to 7), in order to propose strategies for optimization or breakthrough innovation promoting reduction of impacts and maximized value (organizational, technological and decision-making tools).

The scientific approach is multidisciplinary: process engineering, environmental analysis, geomatics, microbiology, chemistry, metrology, scientific instrumentation. The management systems for effluents and waste that are studied are mainly organized around the following processing steps: anaerobic digestion, composting, nutrient recycling, storage, microalgae cultivation, spreading.

**2.1.14 UMR 1069 SAS / Sol, Agro et Hydrosystemes, spatialisation**<http://www.rennes.inra.fr/umrsas>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>* Christophe Cudennec (PR), 50 ans, 70 publications, General Secretary of International Society of Hydrological Sciences</li> <li>* Patrick Durand (DR), 59 ans, 79 publications, h index 34</li> <li>* Christophe Flechard (CR), 49 ans, 61 publications, h index 37</li> <li>* Chantal Gascuel-Oudoux (DR), 61 ans, 75 publications, h index 30 MC Committee COST 869</li> <li>* Christian Walter (PR), 56 ans, 105 publications, h index 27, Academy of Agriculture</li> <li>* Hayo van der Werf, 61 ans, 135 publications, h index 40</li> </ul>
Key figures for the laboratory (2014-2018)
<ul style="list-style-type: none"> <li>* 253 publications</li> <li>* 30 Invited Conferences</li> <li>* 2 patents</li> <li>* 11 ANRs (4 coordinated). 4 European grants (2 coordinated)</li> <li>* 31 PhD.</li> </ul>
Available equipment and infrastructure
<p>ORE Aghys (part of SOERE RBV, equipex CRITEX) EFELE (part of SOERE PRO, ANAEEs)</p>

SAS UMR 1069 (joint research unit, INRA and AGROCAMPUS-OUEST) groups 80 people, including 13 professors and assistant professors, and 15 research scientists). Its research covers a large field of disciplines in soil science, hydrology, bioclimatology, and agronomy. The unit is focused on the interaction between agricultural activities and the environment (soil, atmosphere and water), processes occurring from fields, animal building, and landscape interfaces (wetlands, etc.) up to a large spectrum of scales, and agro-environmental impact assessments. Scaling processes and impacts in time and space constitute a great challenge.

Emphasis is placed on the following issues: (i) identifying processes that determine soil and water quality, with a special focus on C, N and P cycling, C storage in soil, the interaction between physical and chemical quality, and modeling them; (ii) understanding and modeling how agricultural activities disturb and impact environmental resources, including their response time and resilience; (iii) developing methods for environmental impact assessments of agricultural activities (Life Cycle Analysis, Integrated assessment Model), and guidelines for innovative agricultural systems regarding vulnerable environments and climate change.

The aim of this unit is to contribute toward the sustainable management of agricultural activities and the preservation of natural resources by developing operational tools and models for decision making.

**The unit is fully involved in RSEI with 18 researchers involved in projects devoted to agricultural catchment functioning and 10 core-researchers managing fully co-constructed projects for 2 decades.**

## 2.2 SECOND CIRCLE UNITS

### 2.2.1 UMR 6566 CReAAH / Centre de Recherches en Archéologie, Archéosciences, Histoire <http://www.creaah.univ-rennes1.fr/>

<b>Scientists of very high level or very high potential</b>
<ul style="list-style-type: none"> <li>* Catherine Dupont (CR CNRS), age 42, 131 publications, CNRS bronze medal, PES award.</li> <li>* Marie-Yvane Daire (DR CNRS), age 56, 203 publications.</li> <li>* Chantal Leroyer (MCC Researcher), age 57, 135 publications.</li> <li>* Aline Durand (PR, Univ. du Maine), age 55, 80 publications.</li> <li>* Vincent Bernard (CR CNRS), age 49, 133 publications, GMPCA award, young researcher city of Rennes prize, Public technology transfer Special jury Réseau Curie prize.</li> <li>* Grégor Marchand (DR CNRS), age 49, 125 publications, CNRS bronze medal, young researcher city of Rennes prize</li> </ul>
<b>Key figures for the laboratory (2014-2018)</b>
<ul style="list-style-type: none"> <li>* 2362 publications,</li> <li>* 49 invited talks; * 12 international conferences organized</li> <li>* 41 theses in progress.</li> </ul>
<b>Available equipment and infrastructure</b>
Laboratory of sedimentology, palynology, dendrochronology, anthracology.

CReAAH team (Centre de Recherche en Archéologie, Archéosciences, Histoire) is a multi-partnerships UMR (mixed research unit) 6566 of the CNRS (INEE - INSHS), University of Rennes 1, Rennes 2, Nantes, Le Mans, Ministère de la Culture (MCC), INRAP.

CReAAH includes today a total staff of about 148 members: 12 scientists from CNRS, 31 from INRAP, 18 from MCC and 32 from universities, 14 permanent technical staff (CNRS and Universities), 5 temporary employees and 36 PhD students work in it today.

The research undertaken within the UMR 6566 is multi-disciplinary and diachronic. Main topics we work on are human societies from the Palaeolithic to the Middle Age, palaeoenvironnement and archaeometry, with studies which relate to the following questions: human occupations and land-use, exploitation of the natural resources; impact of the global changes, interactions between human societies and environment at local and regional scales; evolution of the palaeo-landscapes, the palaeo-social ecological systems and the palaeo-biodiversity, cultural answers to the changes.

Our laboratory is greatly involved in the Environment LAB with the other labs for a multi-disciplinary research and for the formation of the students. The research tasks are based on the triptych: observation, description, analyze of the past human societies through their material culture, their relation with the environment, their lifestyles, their productions and their exchanges.

The scientific research conducted in the CReAAH ranks at high international level in many of the addressed issues and is nowadays identified as one of the best at national level in the domains of archaeology and archaeosciences. This is not only assessed by a strong participation or leadership in national (an average of 12/year during the last 5 years) and international research projects (9 between 2010 and 2015), but also by the quantitative and qualitative level of publications, nevertheless the lack of signification of IF in our domains.

**8 researchers that investigate past human influences on landscapes and water resources are involved in RSEI second circle.**

## 2.2.2 UMR 1349 IGEPP / INSTITUT DE GENETIQUE ENVIRONNEMENT ET PROTECTION DES PLANTES <http://www6.rennes.inra.fr/igepp>

<b>Scientists of very high level or very high potential</b>
<ul style="list-style-type: none"> <li>* 11 DR, 7 PR, 14 CR, 16 MC, 9 IR</li> <li>* H index: 9 &gt;20, 4 &gt;30 and 1 &gt;40 (Web of Science)</li> <li>* Laurier Scientific INRA for the Brassica Group (2015), Laurier INRA Appui à la recherche TR (2013), Palmes Académiques (2014), 2 international awards.</li> </ul>
<b>Key figures for the laboratory (2014-2018)</b>
<ul style="list-style-type: none"> <li>* 525 publications, of which 337 published in rank 1 journals and 104 papers in rank 2 journals (1 Nature Genetics, 2 Science, 2 PNAS, 3 PLOS Pathogens..., one publication within Faculty of 1000).</li> <li>* 845 communications (oral and poster), 108 invited international conferences</li> <li>* 25 ANR contracts, 3 PIC, 5 PIA (of which Rapsodyn in leadership)</li> <li>* 15 European contracts, 1 international contract; * 188 industrial contracts</li> <li>* 238 invited researchers for research and teaching.</li> <li>* 54 PhD; * 7 patents, 4 varieties registered; * 19 organized congress</li> </ul>
<b>Available equipment and infrastructure</b>
<ul style="list-style-type: none"> <li>Center of Genetic Resources Bracysol</li> <li>Metabolic profiling and metabolomics platform (P2M2)</li> <li>Bioinformatics Platform for Agroecosystem's Arthropods (BIPAA) and IGEPP GOGEP</li> <li>Greenhouses and Climatic chambers NS1, NS2</li> </ul>

The « Institute for Genetics, Environment and Plant Protection » (IGEPP), is a joint research unit (Unité Mixte de Recherche-UMR) between one research institution, INRA, and two higher education institutions, Agrocampus Ouest and the University of Rennes 1. IGEPP is a multi-sites unit, located at INRA Le Rheu (most of IGEPP staff), INRA Ploudaniel (in western Brittany), as well as Rennes University Campus, Agrocampus Ouest Rennes-site and Agrocampus Ouest Angers-site. IGEPP has a total staff of about 270 members: 49 research scientists, professors, assistant professors, 56 engineers, 97 technical and administrative staff, 17 MAD, 34 non permanent employees, and 25 PhD students. The objectives of IGEPP are to **describe, understand and predict the functioning of plants, their associated organisms and the agroecosystems, in order to contribute to the development of new methods to control plant health and protect them against biotic and abiotic stresses, while maintaining biodiversity and health of agroecosystems.** The term “associated organisms” covers species and species communities of pests, pathogens and natural enemies (beneficial), microbiote in interaction among them, with plants and with the environment. Our studies are performed at different scales from organism (from the molecule to the community), to spatial (e.g. Petri dishes, culture chambers, greenhouses, agricultural parcel, fields, agroecosystems) and temporal (from the minute of cell reaction to evolution time) organization.

Research conducted at IGEPP is of a high standing level as stated by HCERES. The main context is the solving of contemporary difficulties for a successful agronomy, to ensure quality and quantity of crop production, while taking into account society's expectation on environment and health. This challenge is linked to objectives of the successive French governments for the reduction of inputs (including pesticides and nitrogen) in agroecosystems. In that context, IGEPP tackles issues on **agroecology and predictive biology** to answer European and national requirements, while producing an excellent science.

**Two team including 20 researchers are involved in RSEI.**

### 2.2.3 UMR 6251 IPR / Institut de Physique de Rennes <http://www.ipr.univ-rennes1.fr/>

Scientists of very high level or very high potential
<ul style="list-style-type: none"> <li>* Gérard le Caër, age 71, 215 publications, CNRS Bronze medal 1975, CNRS Silver medal 1988, Rist price (1977) Réaumur medal (1991) of the 'Société Française de Métallurgie et de Matériaux » h 34</li> <li>* Alexandre Valance, age 47, 70 publications (including 9 Phys. Rev Lett, 1 Nature Material), Branly award 2005, Guinier award of the "société française de Physique" h 22</li> <li>* Daniel Bideau, age 74, 130 publications, Branly award 1990, foreign member of Royal Norwegian Society of Sciences and Letters, h 35</li> <li>* Renaud Delannay, age 57, 68 publications including 6 Phys. Rev. Lett, 2 Nature Material, h 25</li> <li>* Luc Oger, age 58, 56 publications</li> <li>* Janine Emile, age 50, 67 publications</li> <li>* Sean McNamara, age 50, 29 publications, four of them have been cited more than 100 times.</li> <li>* Axelle Amon, age 40, 6 Phys Rev Lett</li> <li>* Laurent Courbin, age 41, 1 nature, 1 nat.mat., 6 Phys Rev Lett</li> <li>* Benjamin Dollet, age 39, 4 Phys Rev Lett, 4 J. Fluid Mech, 4 J.Acoust.Soc.Am.</li> <li>* J. Crassous, 50 ans, 40 publications, 7 Phys Rev Lett, 1 Nature</li> <li>* P. Panizza, 51 ans, 57 publications</li> <li>* I. Cantat, age 44, 48 publications, ERC Consolidated Grant (2017-), 10 Phys Rev Lett, IUF junior.</li> <li>* V. Vié, age 45, 38 publications</li> <li>* Ian Sims, age 54, 81 publications, h-index=31, articles as corresponding author in Science (2), Phys. Rev. Letts (1), Nature Chemistry (1), EU Marie Curie Chair 2004-7, ERC Advan. Grant (2016).</li> <li>* Jean-Luc Le Garrec, age 46, 47 publications, 2 PRL, 1 JPC Letters, 2 Carbon</li> <li>* André Canosa, age 52, 67 publications, Prix Européen Descartes 2000, 1 Science, 1 Nat. Chem., 1 Phys Rev Lett, 1 Astrophys. J. Suppl. Ser.</li> <li>* Robert Georges, age 52, 48 publications</li> <li>* Sophie Carles, age 47, 28 publications including 1 PRL and 1 Chem Rev</li> </ul>
Key figures for the two teams involved in the project (2014-2018)
<ul style="list-style-type: none"> <li>* 318 publications in international peer-reviewed journals including Nature, Nature Materials, Science, Physical Review Letters, J. of Fluid Mechanics, J. of Geophysical Research, PNAS, Angew. Chem. Int. Ed // * 19 ANR, 104 invited talks</li> </ul>

The IPR is a joint lab of the University of Rennes 1 and of the CNRS. It has been ranked A by the AERES. This lab is composed of six research groups and includes 35 administrative and technical staff, 75 faculty staff as well as around 50 PhD students and post-docs. Three of these groups are associated to RSEI, and have developed strong relationships with Geosciences and Ecobio.

**The department of Soft Matter** involves 13 researchers. This team is internationally recognized for its skills in multiphase flows at small scale (droplet traffic, foam, free interface hydrodynamics ...), slow dynamics of heterogeneous media (avalanches precursors...), self-organized materials.

**The department of Divided Matter** is formed by 10 faculty staff. The group works on granular systems (slow compaction, sediment transport, granular flows) and transport in porous medium (experiments and modeling). The activities of the group are at the frontier between physics, mechanics, and geophysics. It is one of the world's leading research groups on these topics.

**These two teams interact with Geosciences, ISCR, IRISA and Ecobio laboratories and belong to the second circle of RSEI.**

## 2.2.4 UMR 1348 PEGASE/ Physiologie, Environnement et Génétique pour l'Animal et les Systèmes d'Élevage <http://www.rennes.inra.fr/pegase>

Scientists of very high level or very high potential
* Luc DELABY (IR), 58 ans, 130 publications, H-index 25
* Remy DELAGARDE (IR), 49 ans, 64 publications, H-index 16
* Jean-Yves DOORMAD (IR), 60 ans, 122 publications, H-index 30
* Philippe FAVERDIN (DR), 62 ans, 84 publications, H-index 21
* Nathalie LE FLOC'H (DR), 49 ans, 65 publications, H-index 17
* Marie-Christine MEUNIER-SALAÜN (IR), 61 ans, 69 publications, H-index 20
* Jean-Louis PEYRAUD (DR), 62 ans, 161 publications, H-index 28
* Armelle PRUNIER (DR), 61 ans, 125 publications, H-index 33
* Jaap VAN MILGEN (IR), 58 ans, 129 publications, H-index 26
Key figures for the laboratory (2014-2018)
* 497 peer-review publications
* 95 Invited presentations
* 17 ANR project (6 coordinated),
* 10 European projects: 1 FP6, 7 FP7 (1 coordinated), and 2 H2020 (1 coordinated)
* 34 PhD defenses
Available equipment and infrastructure
Experimental facilities for dairy production
Experimental facilities for pig production

The INRA-Agrocampus Ouest Pegase research unit employs 115 permanent staff, 45 of which have a research mission (i.e., scientists, engineers and faculty). The unit hosts on a continuous basis approximately 25 PhD-students and post-docs. The scientific scope of the unit is to conduct research to understand and to predict how the animal and animal production systems interact with the environment (in its broadest sense) and to propose levers that contribute to making animal production more sustainable. We contribute to education and training in these areas with a focus on animal welfare, production efficiency, animal product quality, and the competitiveness, working conditions and environmental impact of animal production. Our research can be characterized by a diversity in levels of approach, biological functions, disciplines, research approaches, and livestock species. Pegase has access to experimental facilities that allow measuring traits on individual animals, pilot facilities for measurements on groups of animals and their environment, and large-scale facilities for pig and dairy production. Pegase is also frequently involved in expertise and foresight studies commissioned by national authorities such as on "Nitrogen flows associated with livestock farming", "Food losses and waste", and "High-performance agriculture", testifying the diversity in our expertise on these topics.

**Four of the seven research teams of Pegase (14 researchers) will contribute to RSEI**, with a broad expertise on livestock production systems and a focus on agro-ecology. We contribute by assessing the impact of animal production on the environment by evaluating levers by which resource efficiency can be improved (e.g., N and P), by quantifying nutrient cycles in livestock production systems, and by developing integrated approaches to valorize organic waste streams (e.g., the Apivale project). A better understanding of animal behavior and of the adaptation capacity of the animal are important aspects to further develop livestock production in an agro-ecological context.

## 2.2.5 UMR SMART / Structures et Marchés Agricoles, Ressources et Territoires

[www.rennes.inra.fr/smart/](http://www.rennes.inra.fr/smart/)

Scientists of very high level or very high potential
*Alain Carpentier (DR), 50 ans, 72 publications, Associate Prof. ENSAI (Rennes, 10 years) and Agrocampus Ouest (Rennes, 4 years), h index 14
*Pierre Dupraz (DR), 51 ans, 39 publications, Deputy Head of the Social Sciences Department of INRA, h index 17
*Carl Gagné (DR), 44 ans, 56 publications, Associate Prof. Univ. Laval (Québec, Canada), h index 17
*Alexandre Gohin (DR), 44 ans, 63 publications, h index 18
*Laure Latruffe (DR), 41 ans, 62 publications, h index 22
*Chantal Le Mouel (DR), 53 ans, 81 publications, President of the European Association of Agricultural Economists, Former Deputy Head of the Social Sciences Department of INRA, h index 16
Key figures for the laboratory (2014-2018)
* 181 publications (top 2% out of 2100 research institutions in agricultural economics)
* 42 Invited Conferences
* 7 European grants and 1 Marie Curie. 3 ANR
* 15 PhD

SMART UMR 1302 (joint research unit, INRA and AGROCAMPUS-OUEST) groups 52 permanent staff: 14 full-time researchers, 14 associate/full professors, 3 research analysts, 6 research assistants, and 15 technicians and assistants. Compared to other research units in social sciences, SMART LERECO is well endowed with research support staff. This illustrates our strategy to conserve our capacity to exploit multiple sources of data, and to maintain a rich and diverse array of scientific and socioeconomic partnerships. The economic analysis and the evaluation of public policies applied to agriculture, the food industry, and the environment constitute the core of the scientific project of the SMART-LERECO. We develop modeling and quantitative methods in connection with public and private decision-makers. The development of theoretical and analytical frameworks for ecosystem service management is the major challenge of our present investigations in agricultural and industrial economics.

Emphasis is placed on the following topics: i) Farmers' economic behavior and public policies, ii) Markets, agriculture and development, iii) Firm strategies of agri-food industry, iv) organization and performances of agri-food value chains.

An important activity is to produce high-quality counseling and expertise reports, based on the results of our research work validated by our peers. We participate on a regular basis to the economic and policy debate of international institutions, such as the European Commission, the European Parliament, and the Organization for Economic Cooperation and Development (OECD). We are also consulted by a wide variety of national (French) institutions, including the Ministry of Agriculture, Environment and Ecology, Economy and Finance, the French Development Agency (AFD), the Agency for Environment and Energy Control/Management (ADEME), the Association of French Regions (ARF), and professional agricultural organizations.

**8 of SMART UMR members involved in research projects dealing with farmers' production choices and value chain organization will be involved in RSEI.**

## 2.3 OSUR – UNIT OF SERVICES

<https://osur.univ-rennes1.fr/>

### Available equipment and infrastructure

- \* Analytical platform and Groundwater dating platform
- \* Environmental Genomics platform
- \* Experimental facilities BUFFON

The OSUR - one of the 26 OSU of the INSU CNRS - is a consortium of 4 disciplinary research Units and a service unit: UMS (Unité Mixte de Services) and ten associated teams. This observatory is also a department of the University of Rennes 1. The OSUR includes today a total staff of about 430 researchers from various disciplines geology, geochemistry, hydrology, physics, biology, archaeology, climatology, geography, agronomy. Their fundamental research programs have a common focus on understanding environmental system complexity. It is fully embedded within the current environmental challenges such as the impact of diffuse pollution on water quality in watersheds, the response of biodiversity under environmental stresses and human activities, the quantification of groundwater and mineral resources and the evaluation of the consequences of deep waste disposal, the durability of agricultural systems, the consequence of landscape mutation, on water, soil and biodiversity, global change from local to global scale, environmental genomics, adaptation and evolution.

One of the main mission of the OSUR is to manage long term observatories: i.e. the ORE H+ a network of 4 hydrogeological sites, the Zone Atelier (LTER) "Armorique" dedicated to landscapes, land-use change and biodiversity, the Zone Atelier "Antarctique et subantarctique" focusing on arctic and subantarctic environments (global change), the ORE AgrHys related to agro-hydrological systems.

OSUR is organized in technical services and scientific platforms:

- **Services:** administration staff; communication and scientific information (MULTICOM); support to observation systems (S3O);
- **Scientific platforms:** analytical platform (CCA); environmental genomics (GEn); dating technics and instruments for earth sciences, hydrology and archaeology (CONDATÉ); Observatory of Virtual environment (LOVE) which regroups the numerical data management, software development for hydrogeological modeling (H<sub>2</sub>OLAB), and visualization tools platform.

Another important mission of the OSUR concerns education. It constitutes an "inner school" of the university de Rennes 1, OSUR is in charge of a bachelor diploma in Earth sciences, and 2 masters in "Environmental and Earth Sciences" and "Biodiversity, Ecology and Environment". OSUR is also strongly engaged in e-learning through ENVAM (a numerical platform dedicated to environment and planning courses).

OSUR holds also a well-recognized role of expertise in groundwater, mining and oil resources, water quality, agricultural landscapes management, biodiversity and cultural heritage conservation and is involved in applied research and technology transfers towards national public authorities, various national or international agencies as well as private companies and public. Its expertise are multipurpose : scientific expertise in several environmental systems (agricultural watersheds; groundwater, mining and oil resources, biodiversity and landscapes); numerous techniques used and developed (rock, soil or water, chemical analysis on rock, numerical simulations, geophysical logging, piezometers, geographical information systems, experimental laboratories, phytotoxic devices, remote sensing); also communication for scientific information and learning.

## 2.4 LABORATORIES CONTRIBUTION

Table next page presents the research units contribution to the second circle (white lines) and core-research (green lines). The number of researchers and professors are distinguished. Various research indicators are also presented.