

BIO ECONOMY

TOURISM

ENERGY

DIGITAL AND ICT

HEALTH

SOCIAL SCIENCES



ALL THE ACTORS OF

# RESEARCH DEVELOPMENT INNOVATION

IN REUNION ISLAND

DIRECTORY

# 2016





# REUNION ISLAND...

In the heart of the Indian Ocean, Reunion brings together some of the planet's greatest challenges over 2,500 km<sup>2</sup> :

- How can we fulfil the needs of a rapidly growing population without endangering the ecosystems and biodiversity that we all rely on ?
- How can we cope with the impact of climate change and the depletion of fossil fuels and materials ?
- How can we prevent and treat the health risks caused by increased globalisation ?
- How can we develop individual and collective abilities and strive towards prosperity for all ?

Apart from the concerns they raise, these issues represent tremendous opportunities as they will one day involve all the earth's territories. Through foresight and a bold approach, reducing vulnerability can become a driver for businesses and jobs. This is precisely the shared objective of the Smart Specialisation Strategy (S3) : making Reunion the hub of tropical excellence ; a European platform able to develop solutions tailored to the needs of a rapidly expanding area.

This ambition relies on dynamic research and innovation including :

- Public institutions that are purposefully committed
- Platforms of research excellence
- Research centres with specialised laboratories integrated with large regional and global networks
- Professional associations and clusters, innovation vectors
- Support and development of tools for the economy and knowledge

In total, more than sixty organisations are participating daily in the construction of the territory of tomorrow. Together, let's innovate Reunion.

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# PART 1

## MULTIDISCIPLINARY R&D





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**IRD**

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*Development Research Institut*  
*Statuts : EPST (Public Establishment for Technology and Science)*



## RESEARCH ACTIVITIES

### Research subjects

The IRD (Development Research Institute) is a French research body that responds to international development issues along with its southern partners. Improving sanitary conditions involves the development of societies, and preserving the environment and resources are the cornerstones of its mission to reach its Millennium Development Goals.

A French public establishment for science and technology, the IRD is under the joint supervision of the Ministry for Research and the Ministry for Foreign Affairs. It organises its international activity from its headquarters in Marseille and its two mainland centres in Montpellier and Bondy.

Thanks to its inter-partnership research, training and innovation work, it is present in over 50 countries, in Africa, on the Mediterranean basin, in Asia, Latin America and in the overseas territories. Founded on interdisciplinarity principles, the joint projects address matters that are important in the South : tropical and lifestyle diseases, links between health and the environment, climate change, water resources, food safety, tropical and Mediterranean ecosystems, natural hazards, poverty, social vulnerability and inequality, migration, and changes to the labour market, etc.

Now part of the IRD, the interinstitutional research agency for development is a scientific mobilising force that aims to unite French research organisations and universities to work alongside the Southern countries.

### Major research programmes

See websites

## PUBLICATIONS

### Average number of annual publication

### Major publications over last 5 years (reviewed by reading panel between 2010 and 2014)

Results of the research conducted by the IRD are published as articles on scientific journals but also as publications, cards and

communications during conferences, etc. Each year, IRD researchers publish over 1,000 articles in internationally renowned journals ; almost 2,000 articles are published every year if the output of the IRD's joint research units is taken into account. Within the social sciences, around 250 articles per year and 300 contributions to scientific publications reproduce the work of the IRD's research teams.

## EXPERTISE

The Directorate for the Promotion of the South (DVS) helps implement 3 kinds of expertise on request : collegial expertise (multidisciplinary, wide thematic scope, related to public policy issues) institutional expertise and consultancy, engaging the responsibility of research establishments, private expertise and consultancy conducted on its behalf by researchers.

Within the DVS, the expertise and consultancy service supports, consolidates and develops this activity for establishments and is responsible for examining dossiers relating to the other relevant scientific services (Staff Directorate, Directorate of Finance, Legal Services).

See details for IRD in Reunion : <http://www.la-reunion.ird.fr/recherche-et-missions/valorisation-de-la-recherche>

### Technical platforms and advanced equipment

Two platforms of Reunion : SEAS-OI (Satellite Imagery and Remote Sensing for the Indian Ocean) and CRVOI (Research and Monitoring Centre for Emerging Diseases of the Indian Ocean)

See more details on the IRD website for Reunion : <http://www.la-reunion.ird.fr/recherche-et-missions/plateformes-partagees>

## COLLABORATION

See the IRD website for Reunion : <http://www.la-reunion.ird.fr/nos-partenaires/les-partenaires-de-la-representation-ird-de-la-reunion-en-2012-2013>

## PATENTS AND LICENCES

See details of the IRD's patents in Reunion : <http://www.la-reunion.ird.fr/recherche-et-missions/valorisation-de-la-recherche>



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## LA REUNION UNIVERSITY

➔ [www.univ-reunion.fr](http://www.univ-reunion.fr) ➔ [www.recherche.univ-reunion.fr](http://www.recherche.univ-reunion.fr)

Statuts : *Public Scientific, Cultural and Professional Organisation (EPSCP)*



*As the only French and European university in the Indian Ocean, situated in an Overseas Region (RUP) of the Southern Hemisphere, the University of Reunion occupies a unique geo-strategic position. The organisation is deeply rooted in the Island's socio-economic fabric. Due to its geographical positioning and the knowledge it has of the terrain, the University is at the forefront of regional co-development within the South-West region of the Indian Ocean. With high-performance scientific and technological platforms, it is part of the international research landscape.*

*The University of Reunion is a public scientific, cultural and professional organisation (EPSCP) that is multidisciplinary in nature and features a health division. It is situated on the Moufia Campus as well as 6 other sites (north, west and south), with a total of 120,000 m<sup>2</sup> of university premises. This includes 5 UFRS (university departments), 1 IUT (University Institute of Technology), 1 School of Engineering (ESIROI), 1 CFA (Apprentice Training Centre), 1 Institut Confucius, 2 graduate schools, 3 research federations and 21 approved research units, including 9 Joint Research Units. It has around 14,000 students. It has a budget of €125 M (SE, ANR (National Research Agency), ERDF, the Region, etc.) for 2015.*

### RESEARCH ACTIVITIES

#### Research subjects :

Research is structured into 3 major areas :

- Knowledge of Indian Ocean societies
- Observation, dynamics and development of natural environments
- Biosafety in tropical environments. These transversal research areas are part of a multidisciplinary approach that covers the issues, challenges and potential of the specific environment.

The University is carrying out fundamental and applied research :  
The University is doing this around the following scientific areas :

- Biodiversity and bio-resources ;
- Climate change ;
- The digital economy ;
- Energy, the environment and sustainable development in insular and intertropical environments ;
- Risk prevention ;
- Health and well-being ;
- Societies - Cultures - Heritage.

#### European research programmes

RUN-Emerge (€2,017,067.86 - FP7)  
 LIFE+ Pétrels (€904,480 - Life +)  
 TASCAR (€399,918.00 - H2020)  
 ARISE 2 (€110,000 - H2020)  
 ENVRI PLUS (€ 9,584 - H2020)

#### Federated research units and facilities

21 approved research units bringing together the researchers of the University of Reunion, including 9 Joint Research Units (CNRS (National Centre for Scientific Research), CIRAD (Agricultural Research for Development), INSERM (National Institute for Health and Medical Research), IRD (Development Research Institute), Météo France, IPGP (Paris Institute for Earth Physics). In addition to various collaborations with French researchers, solid links have also been formed with European and foreign research centres, particularly in the Indian Ocean area.

These research units are grouped together under three federated research facilities that marry the University of Reunion's three major research areas :

At the University of Reunion, research training is provided by two graduate schools : l'Ecole Doctorale de Sciences, Technologies et Santé (the Graduate School of Sciences, Technology and Health, or ED STS) and l'Ecole Doctorale des Sciences Humaines et Sociales (the Graduate School of Human and Social Sciences, or ED SHS).

Every 2 years, the Research Hub organises «Doctorials», seminars to help prepare graduates/doctorates to enter the professional world after submission of their thesis.

The Research Hub also organises «la Fête de la Science», a science festival that is part of the Salon Régional de la Jeunesse (Regional Youth Exhibition). This event is an opportunity for researchers from the University to meet members of the public and to share scientific culture.

### Major publications over last 5 years (reviewed by reading panel between 2010 and 2014)

Not applicable

## THE RESEARCH HUB

In order to ensure the implementation of scientific policy and the development of research at the University of Reunion, the research hub's principal objectives are :

- The management of the organisations central to the establishment (Academic Council, Research Commission).
- The management of the University's research units and federated facilities.
- The coordination of the research component of the governing contract.
- The dissemination of regional, national and European scientific and technical information (calls for projects, grants, bourses, etc.).
- The management of both of the University's graduate schools.
- The development of research conducted by a shared dedicated service with the Consortium de Valorisation Thématique (Thematic Promotion Consortium, or CVT)
- Assistance with and management of Horizon 2020 European projects thanks to the Cellule Europe (the Europe Committee, cf p. 86) shared with the agency Nexa.

## EXPERTISE

The University delivers its expertise in strategic and technological observation in the following areas:

- HEALTH
- NUTRITION - FOOD - COSMETICS
- AGRONOMY - AGRI-SCIENCES
- BIODIVERSITY
- ENVIRONMENT
- NATURAL HAZARDS
- ENERGY
- IT
- HUMAN AND SOCIAL SCIENCES

### Technical platforms and advanced equipment

The University has various research facilities and advanced technological tools that it shares with :

- The only overseas cyclotron in the field of health, the Indian Ocean Reunion Cyclotron (CYROI)
- The Reunion Observatory of Sciences of the Universe (OSU-R), an approved laboratory for atmospheric physics, which includes the Reunion Observatory of Atmospheric Physics in Maïdo (OPAR)

- An observation station «Satellite-Assisted Environmental Surveillance in the Indian Ocean» (SEAS-OI)
- 3P, the Hub for the Protection of Plants, within the area of terrestrial biodiversity
- The Volcanological Observatory of Piton de la Fournaise
- Its computer centre.

## COLLABORATION

The University of Reunion is the only European university in this part of the world. As such, it is rooted within the European space for higher education and research and fully participates in the international exchange programmes ERASMUS, CREPUQ (Canada) and ISEP (United States). The University of Reunion's international strategy has five aims :

1. To better install the University of Reunion within the European Space for Research ;
2. To promote the emergence of a network of researchers within the Indian Ocean area ;
- 3 To increase incoming and outgoing student mobility ;
4. To bring together European projects and international laboratories ;
5. To strengthen educational and scientific cooperation.

This policy is driven in conjunction with local authorities, state services (prefecture, local education authorities, diplomatic posts), research organisations, the European Union, the Indian Ocean Commission (COI), and the University Agency for French-speaking Countries (AUF).

The University of Reunion is a member of the Network of Excellence for the Island Territories (RETI - a multilateral agreement signed in July 2010). This federation brings together 26 different establishments located throughout the islands : 5 French universities, 14 additional European universities, including all universities of the Outermost Regions, and 7 international universities from the Indian Ocean area, the Atlantic region, the Caribbean and Asia.

The University works alongside experts from the Indian Ocean Commission (bringing together 5 states : France/Reunion, Comoros, Madagascar, Mauritius and Seychelles) with the aim of establishing cooperation with our partners of the Indian Ocean area, in collaboration with local research organisations (CIRAD, IRD, IFREMER, Météo France, etc.).

## PATENTS AND LICENCES

6 patents to date :

- Extraction process via micro-wave heat
- Extraction technique via steam distillation
- Microwave extraction of volatile natural substances
- Information transmission process
- Optimisation process of memory resources
- A synchronised emission device for ultra-high frequency waves (MAGNETRON)

1 operating licence

Creation of 2 companies

For 2015 :

- 33 developments agreements including 10 services contracts for €110,395.18.
- 5 services contracts under negotiation for €216,000.



# PART 2

## KNOWLEDGE PRODUCERS



Bioeconomy



Human and Social Sciences



Digital



Health



Energy





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## CBNM

➔ [www.cbnm.org](http://www.cbnm.org)

### *National Botanical Conservatory Mascarin*

*Statuts : Law 1901 association created on 16 September 1986.*

*Accreditation territories : Reunion, Mayotte and the Scattered Island*



### POSITION WITHIN THE INNOVATION CHAIN

Nature : Dissemination

Sectors : Environment - Biodiversity - Network management

### ASSIGNMENT

- Observation of Flora and Habitats - Applied to territor
- Conservation of Flora and Habitats - Applied to management of endangered species and biological invasions
- Education and presentation on Flora and Habitats with institutional partners and the general public

### NETWORKS AND COLLABORATION

- Institutional partner
- associations
- businesses

### STRUCTURE OF THE BOARD

- Authorities (Regional Council/Departmental Council/City Hall)
- Scientific and technical partners
- Founding members and members
- Permanent guests



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## NATIONAL PARK

→ [www.pnrun.espaces-naturels.fr](http://www.pnrun.espaces-naturels.fr)

Statuts : **Public Administrative Establishment.**



### RESEARCH ACTIVITIES

#### Research subject

Affiliated with the Ministry for Ecology, the National Park of Reunion is not a research facility, however it does regularly contribute to research.

Main theme of research contribution :

Conservation biology

#### Major research programmes

- Improvement of knowledge for habitat restoration (particularly semi-dry habitats)
- Improvement of knowledge for species conservation :
  - Animals (endemic birds in particular)
  - Vegetables (endangered species).

### PUBLICATIONS

#### Average number of annual publication

Major publications over last 5 years (reviewed by reading panel between 2010 and 2014)

- BARET S. et al., 2012. Une méthodologie concertée pour la sauvegarde des plantes menacées de l'île de La Réunion. Revue d'Ecologie Terre et Vie) Suppl 11 : 85-100.
- BARET S. et al., 2012 Threats to Paradise ? Plant invasions in Protected Areas of the Western Indian Ocean Islands. In L.C.

Foxcrofts et al. (eds), Plant Invasions in Protected Areas : Patterns, Problems and Challenges, Invading Nature - Springer Series in Invasion Ecology 7.

### EXPERTISE

- Conservation of natural heritage
- Understanding of heritage and landscape

#### Technical platforms and advanced equipment

Not applicable

### COLLABORATION

University of Reunion  
 Facilities with conservation programmes for natural heritage and tropical Insular environments  
 Specialist facilities for understanding heritage and landscapes

#### ► Desire to collaborate

Partners of heritage conservation of the South-West region of the Indian Ocean and insular environments in general

#### Patents and licences.

Not applicable



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## UMR PVBMT

➔ [www.umar-pvbmt.cirad.fr](http://www.umar-pvbmt.cirad.fr)

*Joint Research Unit for Plant Communities and Biological Invaders in Tropical Environments.*

*Statuts : Joint Research Unit.*

*Joint Research Unit in association with CIRAD (Agricultural Research for Development), the University of Reunion and a team linked to INRA (Science and Impact Research Centres). Premises in Reunion.*



### RESEARCH ACTIVITIES

#### Research subjects.

The UMR is involved in : research, transfer and teaching and training on the subject of tropical agriculture and natural ecosystems. The UMR PVBMT (Joint Research Unit for Plant Communities and Biological Invaders in Tropical Environments) is structured into 3 fields of research.

#### Major research programmes

- Genomics and epidemiology of emerging pathogens
- Diversity and sustainable use of genetic plant resources in the tropics
- Ecological dynamics in insular environments

Study models used : 2 genera of bacteria (*Xanthomonas* et *Ralstonia*), 1 family of virus (begomovirus), 2 insect families (Tephritidae et Aleurodidae) et 3 genera of cultivated plant (*Vanilla*, *Coffea*, *Solanum*)

### PUBLICATIONS

#### Average number of annual publications

55 international publications a year

#### Major publications over last 5 years

- Arrieta-Ortiz M.L., Rodríguez-R L.M., Pérez-Quintero A.L., Poulin L., Díaz A.C., Arias Rojas N., Trujillo C., Restrepo Benavides M., Bart R., Boch J., Boureau T., Darrasse A., David P., Dugé de Bernonville T., Fontanilla P., Gagnevin L., Guérin F., Jacques M.A., Lauber E., Lefeuvre P., Medina C., Medina E., Montenegro N., Munoz A., Noel L.D., Ortiz Quiñones J.F., Osorio D., Pardo C., Patil P.B.,

Poussier S., Pruvost O., Robène-Soustrade I., Ryan R.P., Tabima J., Urrego Morales O.G., Vernière C., Carrère S., Verdier V., Szurek B., Restrepo S., López C., Koebnik R., Bernal A. 2013. Genomic survey of pathogenicity determinants and VNTR markers in the cassava bacterial pathogen *Xanthomonas axonopodis* pv. *manihotis* strain CI0151. *PLoS One*, 8 (11) : e79704 (18 p.). <http://dx.doi.org/10.1371/journal.pone.0079704> (IF 3.534)

- Badiou-Bénéteau A., Benneveau A., Gélet F., Delatte H., Becker N., Brunet J.L., Reynaud B., Belzunces L. 2013. Honeybee biomarkers as promising tools to monitor environmental quality. *Environment International*, 60 : 31-41. <http://dx.doi.org/10.1016/j.envint.2013.07.002> (IF 5.664)
- Bernard-Verdier M., Flores O., Navas M.L., Garnier E. 2013. Partitioning phylogenetic and functional diversity into alpha and beta components along an environmental gradient in a Mediterranean rangeland. *Journal of Vegetation Science*, 24 : 877-889 <http://dx.doi.org/10.1111/jvs.12048> (IF 3.372)
- Born C., Alvarez N., McKey D., Ossari S., Wickings E.J., Hossaert-McKey M., Chevallier M.-H. 2011. Insights into the biogeographical history of the Lower Guinea Forest Domain : evidence for the role of refugia in the intraspecific differentiation of *Aucoumea klaineana*. *Molecular Ecology*, 20 (1) : 131-142. <http://dx.doi.org/10.1111/j.1365-294X.2010.04919.x> (IF 5.840)
- Brillouet J.-M., Verdeil J.-L., Odoux E., Lartaud M., Grisoni M., Conéjéro G. 2014. Phenol homeostasis is ensured in vanilla fruit by storage under solid form in a new chloroplast-derived organelle, the phenyloplast. *Journal of Experimental Botany*, 65 (9) : 2427-2435. <http://jxb.oxfordjournals.org/content/65/9/2427.abstract> (IF 5.794)
- Cornuault J., Warren B.H., Bertrand J.A.M., Mila B., Thebaud C., Heeb P. 2013. Timing and Number of Colonizations but Not Diversification Rates Affect Diversity Patterns in Hemsporidian Lineages on a Remote Oceanic Archipelago. *American Naturalist*, 182 (6) : 820-833. IF = 4.454 (IF 4.454)
- COUPAT-GOUTALAND, B et al. *Ralstonia solanacearum* Virulence



Increased following large interstrain gene transfers by natural transformation. *Molecular Plant-Microbe Interactions*. 2011. 24 (4) : 497-505. <http://dx.doi.org/10.1094/mpmi-09-10-0197> (IF 4.455)

- DELATTE, H et al. Evidence of habitat structuring *Aedes albopictus* populations in Réunion Island : consequences for control. *PLoS Neglected Tropical Diseases*. 2013. 7 (3) : e2111 (10 p.) <http://dx.doi.org/10.1371/journal.pntd.0002111> (IF 4.489)
- WICKER, E et al. Contrasting recombination patterns and demographic histories of the plant pathogen *Ralstonia solanacearum* inferred from MLSA. *ISME Journal*. 2012. 6 : 961-974. <http://dx.doi.org/10.1038/ismej.2011.16> (IF 9.267)

## EXPERTISE

- Conservation, exploitation of genetic resources

### Technical platforms and advanced equipment

The Hub for the Protection of Plants (3P) : a platform for advanced research into plant experimentation covering an area of 3,000 m<sup>2</sup> with three main laboratories (the plant health laboratory, the pathology and molecular genetics laboratory and the terrestrial ecology laboratory with IPM (Integrated Pest Management)), an NS3 quarantine area, a biological resource centre and a document resource centre. The hub is approved by GIS-IBISA (Biology, Health and Agronomy Infrastructures-Scientific Interest Group).

3P is certified to store and handle quarantine plant organisms and genetically modified organisms. The laboratories have level 2 or 3 confinement.

Major equipment : sequencer, real-time or quantitative PCR, electrophoresis controllers/pipetting/nucleic acid extraction, gradient thermal cyclers, climate chambers, electropermeabilization, flight tunnel, climatic chambers, Z-motorised microscopes and ultramacroscopes, -80 ° C secured by CO<sub>2</sub>, etc.

[http://reunion-mayotte.cirad.fr/en/research\\_in\\_partnership/collective\\_research\\_tools/plant\\_protection\\_platform\\_3p](http://reunion-mayotte.cirad.fr/en/research_in_partnership/collective_research_tools/plant_protection_platform_3p)

A potential of 20 Ha of farming terrain across the stations of CIRAD (Ligne-Paradis, Bassin Plat, Bassin Martin et la Mare), 1,500 m<sup>2</sup> of polycarbonate greenhouses and 600 square metres of insect-proof shaded tunnels.

## COLLABORATION

### ► National scientific community :

- Academic : INRA (Science and Impact Research Centres) (several research units), IRD (Development Research Institute), CNRS (National Centre for Scientific Research), MNHN (Reunion Museum of Natural History), IFREMER (French Research Institute for Exploitation of the Sea) and several universities (eg Lyon, Montpellier, Toulouse), CIRAD (Agricultural Research for Development) (several research units)
- Foundations : Institut Pasteur (health research institute)
- National Agencies : ANSES (French Agency for Food, Environmental and Occupational Health and Safety)/Plant Health Laboratory
- NGOs, professional organisations and private companies : IUCN, ARMEFLHOR (Reunion Association for the Modernisation of the Fruit Tree, Garden Market and Horticultural Economies), FDGDON (Departmental Federation for Defence Groups Against Harmful Organisms), FARRE (forum for environmentally friendly farming), ARDA (Reunion Association for Aquacultural Development), GDS (Reunion health safeguarding organisation), Vilmorin, Syngenta, eRcane (organisation for sugar cane resource development), CERF (research and training test centre for sugar cane), SEOR (Reunion Society for Ornithological Studies), GLOBICE (Local Group for the Observation and Identification of Cetaceans), two young innovative companies (eKool and VitroRun), etc.

### ► Regional scientific community

Madagascar (FOFIFA (National Centre for Rural Development Research), FIFAMANOR (Agricultural Development Project), University of Tananarive, CTHA (Antananarivo Horticultural Technical Centre), Plant Protection Service), Mauritius (University of Mauritius, FAREI, Ministry of Agro Industry), Comoros (INRAPE (National Research Institute for Agriculture, Fishing and the Environment), University of Comoros), Seychelles (Seychelles University, Nature Seychelles, Seychelles Agricultural Agency), Zanzibar/Tanzania (IITA, Ministry of Agriculture and Natural Resources), part of a regional program : enlargement and sustainability of the Regional Programme for Plant Protection (EPRPV) (<http://www.agriculture-biodiversite-oi.org/>) and South Africa (SASRI, several universities : Kwazulu Natal, Durban, Stellenbosch, Cape Town)

### ► International Scientific Community

- Europe : Spain (IRTA University of Lleida, MNCN Madrid), Belgium (University of Leuven, Tervuren, Liège), Netherlands (National Botanical Garden, universities L54 of Wageningen and Leiden), UK (NHM, universities of Cambridge and East Anglia), Denmark (University of Copenhagen) and Switzerland (University of Zurich).
- Africa : Burkina Faso (INERA (Institute for the Environment and Agricultural Research)), Cameroon (IRAD (Institute of Agricultural Research for Development)), Central African Republic (University of Bangui), Ivory Coast (University of Cocody), Kenya (IITA, CIP), Tanzania (Sokoine University, IITA), Mali (IPR, University of Bamako), Ethiopia (EIAR), Iran (NIGEB), Togo (University of Lomé), Angola (University of Luanda) and Niger (Niamey University).
- America : Mexico (University of Vera Cruz), Brazil (Federal University of Sao Carlos), USA (California State University, University of Wisconsin, Virginia Tech, United States Department of Agriculture (USDA) Hawaii), Trinidad (University of West Indies)
- Asia and Oceania : Australia (Commonwealth Scientific and Industrial Research Organisation (CSIRO), University of Queensland), New Zealand (University of Auckland), Vietnam (Vietnam Southern Fruit Research Institute - SOFRI)  
CGIAR : IITA, CIAT, CIP

### ► Desire to collaborate

Open to the Indian Ocean (eg China, India) and Europe

## PATENTS AND LICENCES

- 2002 Test de détection de *Xanthomonas axonopodis* pv *Diffenbachiae* (Brevet) 02 15279 Cirad Robène-Soustrade I., Laurent P., Gagnevin L
- 2003 Nieuwe middelen voor het aantonen van *Xanthomonas axonopodis* sp. *Dieffenbachiae*. (Brevet) 1024929 Cirad Robène-Soustrade I., Laurent P., Gagnevin L
- 2009 Test de détection de *Xanthomonas axonopodis* pv *allii* (Brevet) 09 05053 Cirad Robène-Soustrade I., Pruvost O, Legrand D
- 2010 Brevet : test de détection de *Xanthomonas axonopodis* pv *allii* 09 05053 Cirad. Inventeurs : Robène-Soustrade I., Pruvost O, Legrand D., 2009. Extension
- PCT/IB2010/054774 en 2010 puis dépôt brevet européen en 2012 n° 10774284.3 Un brevet sur le test de diagnostic de la bactériose)
- Des logiciels (EPG-SOFT , Olga, Arborun, Advent-OI, PI@ntnet OI...)
- Deux certificats d'obtention végétale (Aubergine «Bringelle rond» et Ail «Ti Rouge»
- Inscription de 5 variétés de légumes au catalogue officiel





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## APLAMEDOM

➔ [www.aplamedom.org](http://www.aplamedom.org)

*Association for the Aromatic and Medicinal Plants of Reunion*

*Statuts : Law 1901 association.*



### RESEARCH ACTIVITIES

#### Research subjects

- Better knowledge of aromatic and medicinal plants traditionally used in Reunion.
- Ethnobotanical studies, chemical and pharmacological characterisation.

#### Major research programmes

- PAM RIVAL (Aromatic and Medicinal Plants of Development and Innovation Research) - a better understanding of Reunion's plant biodiversity (2014-2015)
- Writing monographs for official recognition by the ANSM (French National Agency of Medicine and Health Product Safety) of the medicinal plants of Reunion - entry of 19 plants from Reunion into the French pharmacopoeia (FEEDER funds 2012-2015)
- ATEM - Traditional herbal substances for diabetes : ethno-metabolomic approach (CYROI (bio-innovation health research)/ APLAMEDOM (Association for the Aromatic and Medicinal Plants of Reunion)/University of Reunion)

### PUBLICATIONS

- Zerboz péi - Pratiques et utilisations des tisanes à l'île de La Réunion. APLAMEDOM, éditions Azalées, 2011 ;
- Actes du colloque - 7ème Colloque International sur les Plantes Aromatiques et Médicinales des régions d'Outre-mer. Edition APLAMEDOM, Saint-Denis, La Réunion, 2013.

### EXPERTISE

#### Services -Examples

- Ethnobotanical studies
- Phytochemistry : chemical characterisation of plant extract

- Support for development projects

#### Technical platforms and advanced equipment

APLAMEDOM is located on the technological platform of CYROI and boasts a range of analytical chemistry equipment (HPLC, NMR, MS).

### COLLABORATION

#### ► Public or private partnerships (local, regional, national, international)

- CYROI
- University of Reunion : LCSNSA Lab (natural substances and food science chemistry lab), GEICO (study group for chronic inflammation and obesity), UMR PVBMT (Joint Research Unit for Plant Communities and Biological Invaders in Tropical Environments)
- Bourbon extract compan
- Reunion Eco-Ex Compan
- Reunion National Park, CBNM (National Botanical Conservatory Mascarin), ONF (National Forestry Office)
- ADPAPAM (Association for the Development, Defence and Promotion of Aromatic and Medicinal Papam Plants), ARMEFLHOR (Reunion Association for the Modernisation of the Fruit Tree, Garden Market and Horticultural Economies)

#### ► National

- French Society of Enthopharmacology
- University of Nice
- PAM (Aromatic and Medicinal Plants) Overseas Associations Network

#### Desire to collaborate

Pharmacological, toxicological, development studies.



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## LCSNSA

→ [www.laboratoires.univ-reunion.fr/lcsnsa](http://www.laboratoires.univ-reunion.fr/lcsnsa)

### University Chemistry Lab for Natural Substances and Food Sciences

Statut : EEA (Host Team) 2212



## RESEARCH ACTIVITIES

### Research subject

- Characterisation and development of terrestrial and marine biodiversity (plants, marine invertebrates, micro-organisms)
- Research into natural molecules for (1) pharmacology and cosmetics (2) perfumery (3) ecology and the environment (4) food
- Conservation and protection of terrestrial and marine biodiversity through chemotaxonomic studies.
- Development of agricultural products and industrial co-products through chemistry and microbiology.
- Characterisation and development of food colouring derived from micro-algae or micro-organisms.
- Modelling of spectroscopic properties of natural substances.

### Major research programmes

- Activités Thérapeutiques, Cosmétologiques et Nutraceutiques de Molécules issues de la Biodiversité terrestre, marine et microbienne de la zone Sud-Ouest de l'Océan Indien (BIOMOL TCN) (therapeutic, cosmetic and nutraceutical use of molecules derived from terrestrial, marine and microbial biodiversity of the South-West area of the Indian Ocean).
- New sources of molecules with colouring and flavouring properties
- Development of an on-line process for determining the colour of brown sugars.
- Invertébrés marins benthiques de Polynésie, Martinique et Réunion : interactions et évaluation de la chimiodiversité pour un usage durable de la biodiversité (POMARE) (benthic marine invertebrates from Polynesia, Martinique and Reunion : interactions and evaluation of the chemodiversity for sustainable use of biodiversity).
- Ecological tropical anti-fouling coating (BIOPAINTRON)
- Vinasse Diesel : bio-transformation of biodistillery vinasses biodiesel using adapted oleaginous yeast (DIVINAS).
- Natural colourant molecules derived from the marine fungal biodiversity of Reunion : optimisation of the production and extraction of pigments produced by biotechnology (COLORMAR).

- Development of an innovation eco-extraction technique of lipids from oleaginous grains (LipSeedOil). Food and non-food bioproducts derived from sugar cane. Sustainable production of natural biocides from two Piperaceae in Reunion (Biopiper).
- Tools And Strategies to access to original bioactive compounds from Cultivation of Marine invertebrates and associated symbionts (TASCMAR)

## PUBLICATIONS

48 publications in peer-reviewed journals and 6 book chapters or books between 2010 and 2014

## EXPERTISE

- Analysis of secondary metabolites from plants, marine organisms and micro-organisms.
- Culture of micro-organisms.
- Modelling of molecular structures and their chemical and spectroscopic properties (circular dichroism, NMR, etc.).

## Technical platforms and advanced equipment

- High Performance Liquid Chromatograph/UV/fluorometre/Corona (HPLC), Medium Pressure Liquid Chromatography/UV (UV-MPLC) ;
- Liquid Chromatograph/Mass Spectrometer (LC-MS), Gaschromatographs (GC) ;
- Gaseous Chromatograph/Mass Spectrometers (GC-MS), ASE 300 Extractor ;
- Infrared (IR) Spectrophotometer, spectrofluorometer, microplate reader/Ultraviolet (UV) Spectrophotometer
- Microwave ovens, ultrasound tanks and probe, laminar flow hood, fermenter, colorimeter, sphygmomanometer, Micro-osmometer, CO2 oven, Incubator, texturometer, viscometer.
- Molecular modelling software and stations (Gaussian, etc.)

## COLLABORATION

### ► local

- IUT GB (IUT = University Institute of Technology)
- GB = Biological Engineering
- ESIROI (Reunion School of Engineering)
- UMR CIRAD (Joint Research Unit of Agricultural Research for Development) (PVBMT (Plant Communities and Biological Invaders in Tropical Environments))
- QUALISUD (Food Quality Organisation)
- UMR DETROI (Joint Research Unit for Diabetes and Treatment for the Indian Ocean)
- LE2P (Laboratory For Energy, Electricity And Processes)
- ARVAM (Agency for Marine Research and Development)
- APLAMEDOM (Association for the Aromatic and Medicinal Plants of Reunion)
- CYROI (bio-innovation health research organisation).

### ► Indian Ocean area

- University of Antananarivo
- CIRAD Madagascar
- Fisheries and Marine Sciences Institute of Tulear (IHSM, Madagascar)
- Chemistry Department of the Faculty of Sciences of Mauritius
- New Caledonian Agronomic Institute

### ► National

- Institute of Chemistry and Natural Substances of Gif-sur-Yvette : UMR 7138 for Oceanic Insular Ecosystems
- IRD (Development Research Institute)
- French Polynesia
- Lab. of Biological Systems and Process Engineering
- INSA (National Institute of Applied Sciences)
- Toulouse ; Agri-Industrial Chemical Lab
- ENSIACET, Toulouse

### ► Europe

- APARAH Uni
- Rega Institute
- Department of Virology in Chemotherapy
- Université Catholique de Louvain
- Belgium ; Laboratory of Pharmacognosy at the Interfaculty Centre for Research on Medication, University of Liège
- Belgium ; School of Pharmacy, University of Genoa
- Switzerland ; Netherlands ((1) Department of Marine Zoology, Netherlands Centre for Biodiversity Naturalis (NCBN) ; (2) Division of Pharmacognosy, Metabolomics Division, Biology Institute, University of Leiden).

### ► International outside of Europe

- Israel (School of Chemistry, Sackler Faculty of Exact Science, School of Marine Biology, Sackler Faculty of Medicine)
- South Korea (Division of Biotechnology, Advanced Institute of Environmental and Bioscience, College of Environmental and Bioresource Sciences, Chonbuk National University, Iksan, Jeonbuk, South Korea)
- India (Department of Environmental Sciences, Bharthiar University, Coimbatore, Tamil Nadu, India).
- Malaysia (Department of Chemistry & Institute of Bioproduct Development, Universiti Teknologi Malaysia, Johor).



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## UMR QUALISUD

→ [www.umar-qualisud.cirad.fr](http://www.umar-qualisud.cirad.fr)

*Joint Research Unit for Food Quality*



### RESEARCH ACTIVITIES

#### Research subjects

QUALISUD (food quality organisation) carries out scientific studies aimed at analysing, understanding and optimising food composition processes throughout the processing chain.

The core of QUALISUD research is the life cycle of food, starting with raw agricultural materials up to the way it feels on the palate and any health effects. Throughout the cycle, any associated microbiological and chemical risks are assessed.

Research at the UMR (Joint Research Unit) QUALISUD is structured around six scientific aims :

- Impact of methods on matrix relations and sensory quality
- Post-harvest loss limitation through special treatment of fresh fruit
- Bioguidage of methods for the optimisation of functional properties of food
- Prevention of microbial hazards and mycotoxins by biological and technological treatments
- Control of fermentation of solid foods through the study of transfers and reaction kinetics
- Designing sustainable methods through a multi-criteria approach

#### Major research programmes

Visit the QUALISUD site : <http://umar-qualisud.cirad.fr/>

### PUBLICATIONS

- Eq 1 : Hue C., Gunata Z., Bergounhou A., Assemat S., Boulanger R., Sauvage F.X., Davrieux F., 2014. Near infrared spectroscopy as a new tool to determine cocoa fermentation levels through ammonia nitrogen quantification. *Food Chemistry*, 148, 240-245. doi : 10.1016/j.foodchem.2013.10.00
- Eq 2 : Durand N., El Sheikh M.A., Suarez Quiroz M.L., Gonzales-Rios O., Nganou Donkeng N., Fontana-Tachon A., Montet D., 2013. Application of PCR-DGGE to the study of dynamics and biodiversity of yeasts and potentially OTA producing fungi during coffee processing. *Food control*, 34 (2) : 466-471. <http://dx.doi.org/10.1016/j.foodcont.2013.05.017>
- Eq 3 : Maldonado Alvarado P., Grosmaire L., Dufour D., Giraldo Toro A., Sánchez T., Calle F., Moreno Santander M.A., Ceballos H., Delarbre J.L., Tran T., 2013. "Combined effect of fermentation, sun-drying and genotype on breadmaking ability of sour cassava starch". *Carbohydrate Polymers*, 98 (1), 1137-1146. doi : 10.1016/j.carbpol.2013.07.012
- Eq 4 : Léchaudel M., Lopez-Lauri F., Vidal V., Sallanon H., Joas J., 2013. Response of the physiological parameters of mango fruit (transpiration, water relations and antioxidant system) to its light and temperature environment. *Journal of Plant Physiology*, 170, 6, 567-576. doi : 10.1016/j.jplph.2012.11.009
- Eq 5 : Poulaert M., Gunata Z., During A., Reboul E., Laurent C., Gaillet S., Dhuique-Mayer C., 2014. Hesperidin increases intestinal  $\beta$ -carotene 15-15' mono-oxygenase 1 (BCMO1) activity in Mongolian gerbils (*Meriones unguiculatus*) fed with  $\beta$ -carotene-free diet. *Food Chemistry*, Sep 15, 159, 477-485. doi : 10.1016/j.foodchem.2014.03.018.

## EXPERTISE

### ► Technical and scientific expertise

Technical and scientific assessments conducted on behalf of different backers or international projects (European Union, FAO) or private companies include the following :

- Fruit and vegetable technology.
- Processing coffee and cocoa.
- Processing of roots and tubers (cassava, yam and other tropical tubers).
- Post-harvest technology for tropical cereals · Rice (trading and semi-industrial processing unit) · Dry cereals (automated processing of fonio, millets and sorghum).
- Drying of processed farming produce (fruit crisps, rolled cereal products).
- Processing of meat products.
- Utilisation of coconut products.
- Quality management through industry channels.
- Food safety.

### Analytical expertise

Expertises analytiques sur café vert et/ou torréfié

- Chemical analysis : caffeine, sugar, fat, ochratoxin a content
- Quality control analysis : organoleptic testing, diverse research

### ► Chemical analysis of mycotoxins

The UMR QUALISUD has a mycotoxin analysis laboratory (ochratoxins, aflatoxins, fumonisin) that uses international reference methods validated through inter-laboratory testing. This laboratory backs partnership projects developed by CIRAD (Agricultural Research for Development) in the field of mycotoxin and provides services, especially to manufacturers. It also organises training on reference methods for quick detection of mycotoxins with partners from the South.

## COLLABORATION

Coopération internationale : Centro Nacional de Ciencia y Tecnología de Alimentos (Costa Rica), Faculté des Sciences Agronomiques de l'Université Abomey Calavi (Bénin), Escola Superior Biotecnologia (Portugal), Institut Polytechnique de Hanoï (Viêtnam), CGIARD-CIAT Cali (Colombie), Université Cheick Anta Diop, Dakar (Sénégal), etc.



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## ANSES

➔ [www.anses.fr](http://www.anses.fr)

*French Agency for Food, Environmental and Occupational Health and Safety, Laboratory for plant health : Unit for tropical destructive and pathogenic agents.*



### AREAS OF RESEARCH

The unit applies research to the development of analysis methods of harmful quarantine organisms, confirmatory testing, running a network of approved laboratories by carrying out Inter-laboratory Proficiency Testing and training, and expertise managed by ANSES.

### INFRASTRUCTURES AND RESEARCH PLATFORMS

Specialised laboratory under COFRAC (French Accreditation Committee) accreditation, integrated with the 3P Hub (Platform for the Protection of Plants) and benefiting from all the equipment and services of the 3P research platform including an NS3 quarantine facility.

### VALORISATION

Development of methods of detection :

- Banana virus (ELISA) using serology with molecular biology techniques (PCR, QPCR) : banana bunchy top virus, banana streak virus
- Banana bacteria : *Ralstonia solanacearum* (strains known as Moko)
- Anthurium bacteriosis : *Xanthomonas axonopodis* pv *dieffenbachiae*
- Bacteria causing the Huanglongbing disease of the citrus fruit (*Candidatus Liberibacter asiaticus*)
- Laboratory accredited by COFRAC according to standard 17025
- Contribution to expertise from ANSES
- Several scientific publications



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## ARMEFLHOR

→ [www.armeflhor.fr](http://www.armeflhor.fr)

*Reunion Association for the Modernisation of the Fruit Tree, Garden Market and Horticultural Economies*  
 Statuts : *Institut technique.*



### RESEARCH ACTIVITIES

#### Research subjects

- Experimentation with fruit and vegetable crops (sheltered, open air and seedbeds) and horticulture (strawberries, papam etc.).
- Experimentation with post-harvest
- Organic farming and protection methods for tropical crops

#### Major research programmes

Les RITA, Réseaux d'Innovation et de Transfert Agricole, ont été mis en place fin 2011 pour accompagner le développement local des productions de diversification animale et végétale dans les DOM. L'animateur référent du réseau à La Réunion est l'ARMEFLHOR.

RITA, Innovation and Agricultural Transfer Networks, were set up in 2011 to accompany the local development of animal and plant diversification in Overseas Territories. The contact for the network in Reunion is ARMEFLHOR (Reunion Association for the Modernisation of the Fruit, Vegetable and Horticultural Economies).

### EXPERTISE

#### Technical platforms and advanced equipment

An experimental centre covering a 6.5 hectare area including : 3,700 m<sup>2</sup> of greenhouses, 900 m<sup>2</sup> of technical and administrative buildings and all the agricultural equipment required to run the station.

### COLLABORATION

#### ► Local

- Location : Reunion Chamber of Agriculture, FDGDON (Departmental Federation for Defence Groups Against Harmful Organisms), the university, Qualitropic (Tropical Bio-economy Hub), Agricultural Schools, CIRAD (Agricultural Research for Development), ACTA (Institutional Network for Animal and Plant Industries), CIREF (Varietal innovation of strawberries & soft fruits for industry professionals), INRA (Science and Impact Research Centres)

#### ► National

- ITEIPMAI (Interprofessional Technical Institute of Perfume-producing, Aromatic and Medicinal Plants), ASTREDHOR (National Association for Experimental and Exhibition Facilities in Horticulture) (mainland France) IO zone countries of the Valorisation Sud thematic promotion consortium.





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## CIRAD

→ [www.reunion-mayotte.cirad.fr](http://www.reunion-mayotte.cirad.fr)

### Agricultural Research for Development

Statuts : **EPIC.**



## RESEARCH ACTIVITIES

### Research subjects

Cooperation by way of research around a regional platform for agronomic research for development, PRERAD. The aim of the scientific and technical platform PRERAD is to strengthen its visitor and research facilities in order to help achieve agronomic research excellence by uniting partners situated in Reunion and the countries of the Indian Ocean through common projects. This will involve developing partnerships between CIRAD (an Agricultural Research for Development organisation) and the teaching and research teams of the Indian Ocean in order to work as part of a network on various common subjects. Additionally, to be able to welcome teams (for stays of variable lengths), or to support them throughout various assignments, to strengthen their research and to use teaching and research to offer training, as and when it is needed, to the community of researchers and technicians as part of partnership mechanisms within the PRERAD platform by building on synergies with private companies.

The subjects involve :

- Human and animal health in the Indian Ocean zone (One Health-10)
- Biological invaders and plant health
- Co-design of quality agri-food systems
- Services and impact of agricultural activity in tropical environments
- Forestry and biodiversity

### Major research programmes

- Conserving and enhancing the biodiversity of terrestrial island ecosystems by developing sustainable agriculture adapted to global changes
- Safeguarding human and animal health throughout the natural ecosystems of the Indian Ocean and securing the development of sustainable agriculture adapted to insular constraints
- How to design more sustainable agri-food systems where the added value comes from the quality of the products and methods of production
- Assessing positive and negative impact and ecosystemic services, such as agricultural production and environmental services, agricultural activities across the country and rationalising the adaptation of agri systems to global changes

## PUBLICATIONS

- Major publications over last 5 years (reviewed by reading panel between 2010 and 2014)
- Development of real-time RT-PCR for the detection of low concentrations of Rift Valley fever virus. Maquart M., Temmam S., Héraud J.M., Leparç-Goffart I., Cetre-Sossah C., Dellagi K., Cardinale E., Pascalis H. 2014. Journal of virological methods, 195 : 92-99 ;

- Epizootic haemorrhagic disease virus in Reunion Island : Evidence for the circulation of a new serotype and associated risk factors. Cetre-Sossah C., Roger F., Sailleau C., Rieau L., Zientara S., Breard E., Viarouge C., Beral M., Esnault O., Cardinale E. 2014. *Veterinary microbiology*, 170 (3-4) : 383-390
- Evaluation of candidate systems for mass trapping against *Ceratitis* spp. on Réunion island. Quilici S., Schmitt C. 2014. *Pest management science*, 70 (3) : 448-453
- Frequency-dependent assistance as a way out of competitive exclusion between two strains of an emerging virus. Péréfarres F., Thébaud G., Lefeuvre P., Chiroleu F., Rimbaud L., Hoareau M., Reynaud B., Lett J.M. 2014. *Proceedings of the Royal Society. Biological Sciences*, 281 (1781) : 9 p.
- Morphological and histological impacts of the laurina mutation on fructification and seed characteristics in *Coffea arabica* L. Adler S., Verdeil J.L., Lartaud M., Fock-Bastide I., Joët T., Conejero G., Noirat M. 2014. *Trees - Structure and Function*, 28 (2) : 585-595
- Non-destructive prediction of color and pigment contents in mango peel. Nordey T., Joas J., Davrieux F., Génard M., Lechaudel M. 2014. *Scientia Horticulturae*, 171 : 37-44;
- Predicting the altitudinal distribution of an introduced phytophagous insect against an invasive alien plant from laboratory controlled experiments: case of *Cibdela janthina* (Hymenoptera:Argidae) and *Rubus alceifolius* (Rosaceae) in Réunion. Mathieu A., Dumont Y., Chiroleu F., Duyck P.F., Flores O., Lebreton G., Reynaud B., Quilici S. 2014. *Biocontrol*, 59 (4) : 461-471;
- Regulation of galactomannan biosynthesis in coffee seeds. Joët T., Laffargue A., Salmons J., Doubeau S., Descroix F., Bertrand B., Lashermes P., Dussert S. 2014. *Journal of Experimental Botany*, 65 (1) : 323-33
- Returning Organic Residues to Agricultural Land (RORAL) - Fuelling the follow-the-technology approach. Wassenaar T., Doelsch E., Feder F., Guerrin F., Paillat J.M., Thuriès L., Saint Macary H. 2014. *Agricultural systems*, 124 : 60-69.

## EXPERTISE

### Services - Examples

The specializations of CIRAD researchers in Reunion range from general agronomy, genetics, geography, sociology and statistics. These skills can be solicited in the context of collective expertise or consultancy expertise. CIRAD also offers agronomic analytical services. Products range from plant-based materials under European standards for seed and incubatory companies, analytical laboratory diagnostic methods for plant diseases, agri-food equipment or procedures for the agri-food industries, or databases and software for agricultural industries.

### Technical platforms and advanced equipment

The Platform for the Protection of Plants (3P) covers 3,000 square metres with three main laboratories, a security level 3 quarantine (NS3) and a biological resource centre (CRB Vatel). 3P is associated with CIRAD experimental stations in a cultivated environment (20 ha) and in a natural environment with the University of Reunion. The CIRAD agri-food laboratory in Saint Pierre carries out physico-chemical, chromatographic and microbiological analyses as part of agri-food research. The plant ecophysiology and biochemistry laboratory, based at the CIRAD station in Bassin-Plat in Saint Pierre works alongside the agri-food laboratory. CIRAD's agronomic analytical laboratory, located in La Bretagne in Saint-Denis, analyses around 2,500 and 4,000 samples per year, or 30,000 to 40,000 determinations, half of which is for agronomic research.

## COLLABORATION

Many (150 partners in the IO zone). Examples : public partners :

### ►Public partners

- Local : University of Reunion (UMR PVBMT (Joint Research Unit for Plant Communities and Biological Invaders in Tropical Environments), mainly LCSNA (Chemistry Lab for Natural Substances and Food Sciences)), ANSES (French Agency for Food, Environmental and Occupational Health and Safety), ARMEFLHOR (Reunion Association for the Modernisation of the Fruit Tree, Market Garden and Horticultural Economies) and FDGDON (Departmental Federation for Defence Groups Against Harmful Organisms) (UMT SPAT (Joint Research Unit for Plant Health and Agro-ecological Production in Tropical Environments)), AROPFL (Reunion Association of Fruit and Vegetable Producers), CRITT (Regional Centre for Innovation and Technology Transfer) the Chamber of Agriculture, Reunion National Park, GDS (Reunion health safeguarding organisation), Reunion University Hospital Centre, GDS 974, LVD (Reunion Departmental Veterinary Laboratory), DAAF (Reunion Directorate for Food, Agriculture and Forestry) ;
- National : INRA (Science and Impact Research Centres), IRD (Development Research Institute), SupAGRO (National Institute of Further Education in Agricultural Science), Montpellier University 2, CNRS (National Centre for Scientific Research) (UMR BGPI (Joint Research Unit for Biology and Genetics of Plant-Pathogen Interactions), CBGP (Centre for Biology and Population Management), CEFE (French Ecology Research Centre), AGAP (Genetic Improvement and Adaptation of Tropical and Mediterranean Plants), IEES Paris (Institute of Ecology and Environmental Sciences), IPME (Plant, Microorganism and Environment Interactions), LIPM (Laboratory of Plant-Microbe Interactions), GAFI (Genetics and Improvement of Fruit and Vegetables)), GEVES (French Variety and Seed Study and Control Group), ITSAP (Technical and Scientific Institute of Beekeeping and Pollination).
- International : FIFAMANOR (Agricultural Development Project), FOFIFA (National Centre for Rural Development Research), University of Antananarivo (Madagascar), INRAPE (National Research Institute for Agriculture, Fishing and the Environment) (Comores), SAA (Seychelles Agricultural Agency), University of Maurice and AREU (Agricultural Research Extension Unit), University of Cape Town (South Africa), Veterinary and Public Health Services for the Countries of the Indian Ocean, FOFIFA-DRZV (National Centre for Rural Development Research-Department for Animal and Veterinary Research), Institut Pasteur (health research institute) of Madagascar, IITA (International Institute of Tropical Agriculture) (Tanzania), University of Ouagadougou, INERA (Institute for the Environment and Agricultural Research) (Burkina Faso), University of Bangui (Central Africa), Museum of Tervuren (Belgium), IFP and Indian Institute of Spices Research (India), Izmir Institute of Technology (Turkey), University of Wisconsin, Virginia Tech (USA).

### ►Private partners

Farmers, Avipôle, Sicalait, Sicarevia, CILAM (Dairy Companies of the Mascarene Islands), Crête d'Or, Vivea, Tereos OI, Veolia Eau, CINOR (North Reunion Intercommunity Organisation), John Creag Venter Institute, ARYSTA Life Science, Fages, Cooperative Bourbon Pointu, Flhorys, Vitrorun, AB7 Industries, Quali plante, Chatel, Provanille, Technisem (Cameroon), East West Seeds (Thailand).

### Desire to collaborate

Confirmed and unrestricted, particularly with private companies (confidentiality agreements possible).

## PATENTS AND LICENCES:

CIRAD is a stakeholder in the «Valorisation Sud» thematic (CVT) promotion consortium, which brings together the IRD (Development Research Institute), the Institut Pasteur (health research institute), and French overseas universities.



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## ERCANE

➔ [www.ercane.re](http://www.ercane.re)

*Developing sugar cane resources*  
*Statuts : (GIE) Economic Interest Group*



### RESEARCH ACTIVITIES

#### Research subjects

- Varietal creation : adapting to diverse agroclimatic conditions
- Industrial automation : installation and maintenance of digital control-monitoring systems
- Sugar process : optimising the process
- Green chemistry : for further development of sugar cane
- Cultural techniques : adapting to local conditions

#### Major research programmes

Research and training test centre for sugar cane (eg CERF)

### EXPERTISE

- Brand : R variety
- Crystallisation devices, research monitoring, expert systems produced by CERF
- New methods of analysis (removal of chemicals, simplification of methods, etc.)
- Automation of sugar processes, distillation, energy production
- Manufacture of specific sensors
- Development of guidance and technical instructions for producers
- Training
- Exporting knowledge and international collaborations
- Industrial automation laboratory : test bench allowing development of process automation programmes and testing of them before

use (potentiometer sensors, switches and a central AC800F unit connected to control stations).

#### Technical platforms and advanced equipment

- Industrial innovation and processes : materials commonly found in industrial laboratories (polarimeter, refractometer) and also : Dionex ICS 3000 HPIC high performance ion chromatography), Waters' Alliance HPLC System (high performance liquid chromatography), Foss NIR (near infrared spectroscopy), Image analyser, water activity meter, flow hood
- For the bio-refinery : green chemistry and microbiology laboratory, Industrial laminar automation laboratory for microbiological analysis, Sorbonne for organic chemistry
- Hybridisation and varietal selection : two hybridisation greenhouses equipped with timers and a microaspiration system, complete chain analysis of sugar cane



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## RNMR

➔ [www.reservemarinereunion.fr](http://www.reservemarinereunion.fr)

*Scientific and technical assistance with environmental management*  
 Statut : **Groupement d'Intérêt Public (GIP)**.



### RESEARCH ACTIVITIES

#### Assignment

The mission of the Reunion Natural Marine Reserve is the conservation of reefs and their related ecosystems (sandy sea floors, sea grass beds, rocky sea floors). In order to reconcile human activity with reef preservation, the Marine Reserve is responsible for applying rules of practice enacted by State Services (police). It also acquires new knowledge on the marine environment for better management (scientific missions) and public awareness (awareness-raising missions).

#### Area

Ecology, Biology, Environmental Management, Conservation

### SERVICES TO PROJECT DEVELOPERS

#### Scientific assistance

Our team is made up of biologists specialising in the ichthyology, benthology and ecology of reef environments, bringing their knowledge and expertise to these areas. We are also linked to an entire network of experts that we can mobilise when needed.

#### Technical and logistical assistance

The Reserve has human and material resources to carry out sea and coastal work that are available to project developers. The team consists of class 1b professional divers who, as well as diving, provide technical assistance on board and ensure safety. The Reserve has a boat and all necessary professional diving equipment (diving and safety equipment).

#### Project coordination and networking

As a Public Interest Group (GIP), the Marine Reserve coordinates scientific projects and manages European funding. It is part of many scientific networks and thus provides project networking with local, national or international influence.

### NETWORKS AND COLLABORATION

#### Scientific and technical network

##### ► International

- WIOMSA, PAREGO (Heritage, Resources and Governance for Eastern and Southern Africa and the Indian Ocean), COI (Indian Ocean Commission) National and local ; IFRECOR (French Coral Reef Initiative), the Network for Invasive Exotic Species, Technical Committee for Natural Hazards, GIML TCO (West Coast Territory Integrated Sea and Coastal Management)

#### Management networks

##### ► Local et national

- IAMP Forum (managers' forum for protected marine areas), Association RNF (Natural Reserves of France), AMPS of the South-West Indian Ocean

### STRUCTURE OF THE BOARD

The Board of the Marine Reserve is made up of State Services representatives (Prefect, DEAL (Reunion Directorate for Development, Accommodation and the Environment)) from the Regional Council (who is Vice-President), the County Council, the municipalities of Saint-Paul, Trois Bassins and Saint Leu and the intermunicipal TCO, as well as Reunion National Park, and the user representative of the staff GIP. It meets several times throughout the year under the chairmanship of the Prefect or their representative to make decisions regarding the management of the Marine Reserve. The members of the GIP make financial contributions towards the management of that GIP.



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## UMR ENTROPIE

➔ [www.umer-entropie.ird.nc](http://www.umer-entropie.ird.nc)

*Joint Research Unit for the biocomplexity of coral reef ecosystems in the Indo-Pacific*

Statuts : **UMR (Joint Research Unit)**



### RESEARCH ACTIVITIES

#### Research subjects

The UMR ENTROPIE (Joint Research Unit for the Biocomplexity of Coral Reefs Ecosystems in the Indo-Pacific) is under the administrative supervision of the University of Reunion, the National Centre for Scientific Research (CNRS) and the Development Research Institute (IRD). The UMR has two main locations, Noumea in New Caledonia and Reunion.

- Diversity, evolutionary processes and life history traits of organisms ;
- Dynamics, vulnerability and resilience of ecosystem ;
- Use, development and management of marine and tropical insular resources and ecosystems.

#### Major research programmes

LABEX Corail, FEDER Biodiversité, LIFE+ Petrels, DCE, FEP.

### PUBLICATIONS

- Le Corre M, Jaeger A, Pinet P, Kappes MA, Weimerskirch H, Catry T, Ramos J, Russell J, Shah N, Jaquemet S (2012) Tracking seabirds to identify potential marine protected areas in the tropical Indian Ocean. *Biological Conservation* 156 : 83-93. Pinet P, Jaeger, A., Cordier, E., Patin, G, Le Corre M (2011) Celestial moderation of tropical seabird behavior. *PLoS One* 6(11) e27663. doi : 10.1371/journal.pone.0027663.
- Bruggemann JH, Rodier M, Guillaume MMM, Andréfouët S, Arfi R, Cinner JE, Pichon M, Ramahatratra F, Rasoamanendrika FMA, Zinke J, McClanahan TR (2012) Wicked social-ecological problems forcing unprecedented change on the latitudinal margins of coral reefs : the case of southwest Madagascar. *Ecology and Society* 17(4) : 47 doi.org/10.5751/ES-05300-170447
- Kolasinski J, Rogers K, Cuét P, Barry B, Frouin P (2011) Source of particulate organic matter at the ecosystem scale : a stable

isotope and trace element study in a tropical coral reef. *Marine Ecology Progress Series* 443 : 77-93.

- Hubert N, Meyer C, Bruggemann JH, Guérin F, Komono R, Espiau B, Causse R, Williams JT, Planes S (2012)
- Cryptic diversity in Indo-Pacific coral-reef fishes revealed by DNA barcoding provides new support to the centre of overlap hypothesis *PLOS ONE* 7(3) : e28987. doi : 10.1371/journal.pone.0028987

### EXPERTISE

Marine chemistry, molecular biology, trophic biology, animal telemetry, spatial analysis, modelling

#### Technical platforms and advanced equipment

Technical platforms for marine chemistry and molecular biology

### COLLABORATION

Mayotte Marine Park, Reunion Natural Marine Reserve, Reunion National Park, DEAL (Reunion Directorate for Development, Accommodation and the Environment), Coastline Conservatory, IFREMER (French Research Institute for Exploitation of the Sea), IRD (Development Research Institute), research units (Biotope, ARVAM (Agency for Marine Research and Development)), associations (Hydrô Réunion (Reunion Association for the Development of Aquaculture), SEOR (Reunion Society for Ornithological Studies), Kélonia (aquarium), GLOBICE (Local Group for the Observation and Identification of Cetaceans)), WIOMSA, ICS, Pew Environment Group, various overseas universities (USA, South Africa, Australia), etc.)

#### ► Desire to collaborate

Yes : marine and coastline areas, marine biodiversity development, conservation, growth, financial relief.



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## UMR MARBEC

➔ [www.umd-marbec.fr](http://www.umd-marbec.fr)

*Joint Research Unit for the Exploitation and Conservation of Marine Biodiversity*

*Statuts : The Joint Research Unit (UMR) in association with the IRD (Development Research Institute), CNRS (National Centre for Scientific Research), IFREMER (French Research Institute for Exploitation of the Sea) and the University of Montpellier II. Main premises in Sète (area code 34 -Hérault).*



### RESEARCH ACTIVITIES

The UMR MARBEC (Marine Biodiversity, Exploitation and Conservation) was created on 1 January 2015. It is under the supervision of the IRD, IFREMER, the University of Montpellier and the CNRS.

MARBEC is one of France's largest laboratories to be working in marine biodiversity with around 230 individuals, including 80 researchers and lecturer/researchers.

The unit has premises in Sète, Montpellier and Palavas-les-flots, as well as in the Indian Ocean, in Reunion, and in Asia, Africa and South America.

It studies the marine biodiversity of lagoons, inshore and offshore ecosystems, mainly Mediterranean and tropical. Research focuses on different levels of integration, from molecular, individual, populational and community aspects to the various uses this biodiversity has for humans.

It has three primary objectives :

- Describing marine biodiversity, understanding the dynamics and function of marine ecosystems ;
- Analysing the impact of anthropic pressure on these ecosystems and developing responses to global change scenarios ;
- Reconciling exploitation (particularly fishing and aquaculture) with conservation, and meeting societal expectations (expertise, innovation, clean-up).

Its research activity is structured into 8 scientific areas :

- Evolutionary ecology and adaptation ;
- Individuals, populations and habitats ;

- Dynamics and functioning of communities.
- Micro-organisms and interactions with macro-organisms.
- Contaminants : solutions.
- Sustainable aquaculture.
- Multi-purpose coastal systems.
- Ecosystemic approach to fishing.

Main action or projects in Reunion : SWIOFP, FP7-MADE, PROSPER, ASCLME, MESOBIO, CHARC, BIOREQ, RSS...

### COLLABORATION

#### ► Non-mainland locations

- Seychelles Fishing Authority (SFA), Victoria, Seychelles
- Instituto del Mar del Perú (IMARPE), Lima, Per
- University of Reunion, Campus du Moufia, Saint-Denis, Reunion
- Hydro-Réunion, Le Port, Reunion
- University of Cape Town (UCT), Cape Town, South Africa
- Oceanology Research Centre (CRO) - Abidjan - Ivory Coast
- Institute of Biotechnology - Vietnam Academy of Science and Technology
- (IBT) - Hanoi - Nha Trang - Vietnam
- Labep-Ao-Ifan - Ucad - Dakar - Senegal
- Faculty of Science de Bizerte - Tunis - Tunisia
- Central Research Institute for Aquaculture (CRIA) - Jakarta - Indonesia

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**IFREMER**

➔ [www.ifremer.fr/lareunion](http://www.ifremer.fr/lareunion)

*French Research Institute for Exploitation of the Sea*

*Statuts : EPIC.*



## RESEARCH ACTIVITIES

### Fields of expertise

- Fisheries, the environment and biodiversity
- With the support of IFREMER (French Research Institute for Exploitation of the Sea) teams : Aquaculture and Renewable Marine Energy (EMR)

### Major research programmes

- ▶ Acquiring data and knowledge on the marine environment and contributing to the development of observational and surveillance activity

#### Fisheries and Biodiversity :

- Fishery Information System (SIH)/National Network of Continual Observation of Fishery Resources and Associated Practices in place in Reunion since 2006 ;
- The energy and connectivity of the population : large open-sea animals (IOSSS Espadon and GERMON projects) and Coastal Resources (ANCRE - DMX2 project) ;
- Marine megafauna : Indian Ocean turtles (DYMITILE - PNA Tortues project)

#### Environment :

- Implementation of the DCE (Water Framework Directive) in Reunion : typology and mapping of bodies of water/definition of different tracking methods of the surveillance control network (RCS)/Updating inventory (BON ETAT - BON ETAT II project) ;
- Mapping of benthic habitats : hyperspectral imaging (SPECTRHABENT-OI and HYScores projects) ;

- Hydrodynamic modelling : modelling platform across Reunion (HYDRORUN project) ;
- ▶ Managing and summarising this data and knowledge in order to make them available through the development and/or provision of tools according to general principles of standardisation, sharing and security

#### Fisheries and Biodiversity :

- Atlas of Longline Fishing : history since the 1950's on swordfish fishing and catching ; annual growth since 1994 of Reunion fleet activity ;
- BD TORSOOI : Database of marine turtles of the South-West Indian Ocean ;
- Awareness and outreach literature : «Turtles and Islands» «publication».

#### Environment :

- Technical DCE booklets : instructional literature and methods for implementing the RCS of the DCE ;
- QUADRIDGE information system : reference database for coastal waters and its SURVAL data provision tool ;
- SEXTANT information system : reference marine geographical data infrastructure (ATLAS POLMAR, REMATA) ;
- Atlas Hyperspectral : results of treatment on Reunion reef platforms.

## PUBLICATIONS

- 2 to 5 rank A publications per year and 5 to 10 scientific and technical reports

The scientific production of the IFREMER of the DOI (Indian Ocean Delegation) : publications, reports, speeches, conferences and expertise/

opinions available at the following address : <http://wwz.ifremer.fr/lareunion/Bibliographie>.

## EXPERTISE

### Mission

- Developing opinions, expertise or helping with decisions in order to contribute to sustainable development of maritime activities relating to fisheries and biodiversity

### Fisheries and Biodiversity :

- Assisting in the development of management techniques for shared fishing resources ;
- Participation in working groups within the Indian Ocean Tuna Commission (CTOI).

### Environment :

- Technical support for the Reunion and Mayotte Basin with implementation of the DCE ;
- Liaisons with the Water and Nature InterService Mission (MISEN) ;
- Integrated Sea and Coastal Management (GIML), pilot project from the Reunion TCD (West Coast Territory).

### Technical platforms and advanced equipment

- 1 laboratory dedicated to genetic analysis ;
- 1 laboratory for processing samples (biometrics, sampling, etc.) ;
- 1 imagery laboratory, including for otoliths.

## COLLABORATION

### ► Local, National

- Ifremer :
  - City teams (almost 1,400 people) ;
  - Overseas teams (almost 1,400 people) for shared issues ;
- State Services : Reunion and Mayotte prefectures and TAAF (the French Southern and Antarctic Lands), ARS-OI (Indian Ocean Health Agency), DEAL (Reunion Directorate for Development, Accommodation and the Environment) for Reunion and Mayotte, DMSOI (Directorate for the Sea for the South Indian Ocean Area), etc
- Research bodies and those representing the profession :
  - National : AAMP (Agency for the Protection of the Marine Environment), BRGM (geological and mining research organisation), IRD (Development Research Institute)
  - Local : AQUAMAY (Association for Aquacultural Development of Mayotte), ARDA (Reunion Association for Aquacultural Development), ARVAM (Agency for Marine Research and Development), CRPMEM (Regional Committee of Maritime Fisheries and Marine Farming), GLOBICE (Local Group of Observation and Identification of Cetaceans), Kélonia (Reunion aquarium), PNMM (Mayotte Natural Marine Park), RNMR (Reunion Marine Natural Reserve), the Universities of Reunion and Mayotte, etc.
- Public establishments and authorities :
  - National : ONEMA (National Office for Water and Aquatic Environments) ;
  - Local : Regional Council, Reunion Office for Water, etc.

### ► Foreign partners

- South Africa,
- Australia,
- Comores,
- Madagascar,
- Mozambique,
- Oman,
- Seychelles...





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## BRGM

➔ [www.brgm.fr](http://www.brgm.fr)

### Geological and Mining Research

Statuts : EPIC.



### RESEARCH ACTIVITIES

#### Research subjects

- Hydrogeology ;
- Natural hazards (landslides, floods) ;
- Coastal (erosion, marine submersion) ;
- Environment.

#### Major research programmes

- MVTerre 2 - The problem of large-scale landslides
- REUN\_EM - programme of airborne geophysics of the Island of Reunion

### PUBLICATIONS

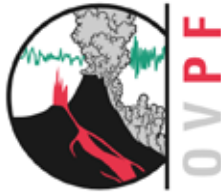
- Average number of annual publications : 3
- Belle, P., Aunay, B., Bernardie, S., Grandjean, G., Ladouche, B., Mazué, R., Join, J.-L., 2013. The application of an innovative inverse model for understanding and predicting landslide movements (Salazie cirque landslides, Reunion Island). Landslides 1-13. doi : 10.1007/s10346-013-0393-5
- Belle, P., Aunay, B., Ladouche B., Lachassagne, P., Join, J.-L. Impact of superficial soil properties and climate on the dynamics of deep-seated landslides. Journal of Hydrology.
- High-resolution conceptual hydrogeological model of complex basaltic volcanic islands : a Mayotte, Comoros, case study. Patrick Lachassagne, Bertrand Aunay, Nicolas Frissant, Maud Guilbert and Arnauld Malard. Terra Nova, Vol 26, No. 4, 307-321

### EXPERTISE

Technical expertise in crisis situations.

### COLLABORATION

- Regional Council
- General Council
- Municipalities,
- State Services



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## OVPF

➔ [www.ipgp.fr/pages/030308.php](http://www.ipgp.fr/pages/030308.php)

### *Volcanological Observatory*



### RESEARCH ACTIVITIES

#### Research subjects

- Research into volcanic eruption phenomena
- Studies and development of eruption warnings
- Monitoring of geochemical changes of eruptive products
- Development and testing of predictive eruption instruments
- Geology of the land
- Prediction and monitoring of eruptions for civil protection

### EXPERTISE

- Monitoring and information for civil protection
- Awareness and training in educational establishment



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## UMR LACY

➔ [www.lacy.univ-reunion.fr](http://www.lacy.univ-reunion.fr)

### *Joint Research Unit for the Atmosphere and Cyclones*

*Statuts : The Laboratory for Atmosphere and Cyclones (LACY) is a tripartite joint research unit (University of Reunion, CNRS (National Centre for Scientific Research) and Météo-France).*



## RESEARCH ACTIVITIES

### Research subjects

The UMR studies the tropical stratosphere and the tropospheric dynamics and physico-chemistry of oceanic environments under the influence of the African continent, and the dynamics of tropical cyclones and their interactions with their environment.

This involves a contribution to the development of digital methods for predicting tropical cyclones in the South-West Indian Ocean.

### Major research programmes

- Dynamics and movement in the tropical stratosphere, meridian exchanges and trend
- Dynamics and movement in the tropical stratosphere, stratospheric-tropospheric exchange
- Cyclone modelling

## EXPERTISE

### Technical platforms and advanced equipment

- Maïdo observation station (under construction)
- Various digital tools (kinetic trajectory code, digital atmospheric prediction model)

## COLLABORATION

- LATMOS, Laboratory of Aerology, CNRM-GAME, National Centre for Scientific Research-Laboratory for Climate and Environmental Sciences (Gif on Yvette), Laboratory of Atmospheric Optics (Lille), Belgian Institute of Space Aeronomy
- International : ARSAIO (Atmospheric Research in Southern Africa and Indian Ocean) International Research Association (CNRS-NRF South Africa), Department of Space, Andhra Pradesh, India, University of KwaZulu-Natal, South Africa, Goddard Space Flight Center (Atmospheric Chemistry and Dynamics Branch, NASA GSFC)



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## OSU-RÉUNION

➔ [www.osur.univ-reunion.fr](http://www.osur.univ-reunion.fr)

### Reunion Observatory of Sciences of the Universe

*Statuts : Part of the University of Reunion and the Mixed Services Unit (UMS 3365), CNRS (National Centre for Scientific Research and the University of Reunion)*



## RESEARCH ACTIVITIES

### Research subjects

- Atmosphere :
  - Monitoring and composition of the atmosphere (reactive trace and greenhouse gases, aerosols, the stratospheric ozone layer), analysis of climatic trends and impacts ;
  - Study of atmospheric processes (atmospheric water cycle, tropospheric-stratospheric exchanges, large-scale transport of pollutants, etc.) and analysis of their representation in numerical predictive models ;
  - Study of tropical cyclones (intensification processes and trajectories).
- Lithosphere :
  - Hydrology of drainage basins of volcanic massifs ;
  - Seismology (applications for volcanology and the detection of cyclonic and southern swells) ;
  - Internal geophysics of volcanic massifs (applications for landslides, erosion and magmatic transfers)
- Biosphere :
  - Forest ecology, taxonomy, eco-physiology and climate monitoring, and invasive exotic species.
- Tropical marine ecology :
  - Tropical migratory marine megafauna, regional reef biodiversity, monitoring habitats of the Indian Ocean area and changes due to climate change. Coastal : coastline monitoring, coastline erosion in back-reef lagoon areas.

### Major research programmes

- Panache volcanique : project STRAP (Synergie Transdisciplinaire pour Répondre aux Aléas liés aux Panaches volcaniques, project ANR 2015-2018).
- Cyclone risks : project RenovRisk-Transferts : Innovative and integrated research on natural risks associated with tropical cyclones. Cyclone hazards on the workshop area «Maïdo - Coast - Lagoon». Submitted to the ERDF 2015-2019 call for projects.
- Ocean-Atmosphere : Project to study the physical processes of ocean-atmosphere coupling in the South West Indian Ocean (SOOI), through modelling and observation. Research Federation Project OMNCG (Observations of Natural Media and Global Change) de l'OSU-R.
- Volcanology and marine biodiversity : Project CLEM : Consequences of lava on the marine environment : focus on the 2007 lava flow, Project of Federation OMNCG of the OSU-R.
- Biosphere-Atmosphere : project FARCE : Forest AeRosols Clouds interactions at Réunion Island. Project of Federation OMNCG of OSU-R.

## PUBLICATIONS

- Tulet, P. and Villeneuve, N., Large scale modeling of the transport, chemical transformation and mass budget of the sulfur emitted during the April 2007 eruption of Piton de la Fournaise, Atmos. Chem. Phys., 11, 4533-4546, doi : 10.5194 /acp-11-4533-2011. Durand et al., Modeling the lava heat flux during severe effusive volcanic eruption : a important impact on surface air quality, J. Geophys.

Res., 119, 20,11729-11742, 2014. Falter, J., Lowe, R., Atkinson, M., Cuét, P., 2012.

- Durand et al., Modeling the lava heat flux during severe effusive volcanic eruption : a important impact on surface air quality. J. Geophys. Res., 119, 20,11729-11742, 2014.
- Falter, J., Lowe, R., Atkinson, M., Cuét, P., 2012 – Seasonal coupling and de-coupling of net calcification rates from coral reef metabolism and carbonate chemistry at Ningaloo Reef, Western Australia. Journal of Geophysical Research, 117, C05003, doi : 10.1029/2011JC007268
- Baray et al., Maïdo observatory : a new high-altitude station facility at Reunion Island (21° S, 55° E) for long-term atmospheric remote sensing and in situ measurements. Atmospheric Measurement Techniques, 2013, 6 (10), pp.2865-2877.
- Comte J.-C., Join J.-L., Banton O., Nicolini E., 2014 «Modelling the response of fresh groundwater to climate and vegetation changes in coral islands». Hydrogeol J. 20 juillet 2014. Vol. 22, n°8, p. 1905-1920.

## EXPERTISE

### Missions

OSU-Reunion aims to act as a Federation between its various laboratories, teams and observation stations. It includes, for example, one of the three multidisciplinary research federations of the University of Reunion, the OMNCG Federation (Observatory for Natural Environments and Global Changes).

The second mission is to ensure the operation of observation stations. Thanks to support from the UMS3365, it ensures the operation of the OPAR (Reunion Observatory of Atmospheric Physics) and assists with the operation of tropical forestry stations, marine reef, and the Rivière des Pluies drainage basin. The OSU-R supports the SNO (National Observation Services) approved by the INSU-CNRS (National Institute of Sciences of the Universe-National Centre for Scientific Research), some of which are established internationally. For example, the SNO'S or international networks NDAAC (Network of Detection of Atmospheric Composition Changes), AERONET (Aerosols Robotic Network), CLAP (Climate Relevant Aerosols Properties from near surface observations), ICOS (Integrated Carbon Observation System), GAW/WMO (Global Atmospheric Watching/World Meteorological Observations) and DyLiTC (Coastal, Littoral and Coast Line Dynamics).

The OSU-R is in line with the national strategy for building research infrastructures of the Alliance Allenvi (Ministry for Research) and as such supports 3 SOERE (Observation and Experimental Systems for Long-Term Environmental Research) : «ATMO» «Networks of Drainage Basins» and «Coast Line». SNO and SOERE are the building blocks of these national research infrastructures (eg INFRA ATMO for the atmosphere) candidates themselves for the European roadmap ESFRI (European Strategy Forum for Research Infrastructures) via their insertion into H2020 European projects (eg ACTRIS, Aerosols, Clouds, Trace Gases Research InfraStructure).

### Technical platforms and advanced equipment :

- Maïdo Atmospheric Observatory. Collection of instruments lidars (vertical temperature, wind, water vapour and ozone profiles), radiometers, spectrometers (partial and total atmospheric columns of reactive trace and greenhouse gases), in-situ ambient air mass analysers (optical and chemical properties of aerosols, reactive

and greenhouse gases), atmospheric electrical activity sensors, GPS station, cameras for cloud cover ;

- ERORUN hydrological station of the Rivière des Pluies drainage basin. Three hydrological flow measurement stations and 3 meteorological stations ;
- Reef marine station of Saint Gilles. Monitoring of geophysical and biological parameters in the lagoon ;
- Mare-Longue forestry station in Saint-Philippe. Observation equipment for forest ecology, taxonomy, eco-physiology and climatic parameters.

## COLLABORATION

### ► Several laboratories of the INSU-CNRS :

- LATMOS (Laboratory of Atmosphere, Environment, and Spatial Observation) <http://www.latmos.ipsl.fr/>
- LSCE (Laboratory of Climate and Environmental Sciences) <http://www.lsce.ipsl.fr/>
- LMD (Laboratory of Dynamic Meteorology) <http://www.lmd.jussieu.fr/>
- LISA (Interuniversity Laboratory of Atmospheric Systems) <http://www.lisa.univ-paris12.fr/>
- SIRTA (Atmospheric Remote Sensing Research Site) <http://sirta.ipsl.polytechnique.fr>
- Aerology Laboratory <http://www.aero.obs-mip.fr>
- National Centre for Meteorological Research (CNRM, Toulouse) <http://www.cnrm.meteo.fr/>
- Laboratory of Atmospheric Optics (LOA, Lille) <http://www-loa.univ-lille1.fr/>
- Belgian Institute of Space Aeronomy (IASB, Brussels) <http://www.aeronomie.be> ;
- Laboratory for the Oceanic Domains (Université de Bretagne Occidentale, Council for Scientific and Industrial) Research (CSIR, Pretoria, Council for Scientific and Industrial) Research (VSI, Pretoria, South Africa) <http://www.csir.co.za/>

### ► Desire to collaborate

The OSU-R (Reunion Observatory of Sciences of the Universe) is the partner for the European project H2020 ENVRIplus (Environmental Research Infrastructures Providing Shared Solutions for Sciences and Society) during which OSU-R observation station will be open to provide transnational access for multidisciplinary research by other European teams that may benefit from existing research infrastructures at the University of Reunion.

## PATENTS AND LICENCES

Patent OMER7-A : Digital educational tool for the study of atmospheric pollution and its causes and consequences (CNES (National Centre for Space Studies) and CNRS (National Centre for Scientific Research), Robert Delmas.





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## UMR LGSR

→ [www.geosciencesreunion.fr](http://www.geosciencesreunion.fr)

### Joint Research Unit for Reunion Geoscience

*Statuts : The Joint Research Unit in association with the University of Reunion, CNRS (National Centre for Scientific Research) and Météo-France.*



## RESEARCH ACTIVITIES

### Research subjects

- Volcanology
- Magmatology and petrology
- Hydrothermalism
- Dynamics of mudslides
- Regional tectonic interactions - volcanism
- Volcanic system tectonics
- Hydrogeology & hydrogeochemistry
- Destabilisation - erosion - sedimentation in volcanic island areas
- Magmatic degassing
- Dynamics and deformation in hot spots and mountain ranges
- Seismology applied to the study of waves
- Seismic imaging and seismic hot spot analysis of local seismicity
- Microfracturing and magmatic spread

### Major research programmes

The Reunion Laboratory for Geosciences was opened in 1984 alongside the University of Reunion. Its activity, initially limited to sedimentology in coastal marine areas (genesis, evolution, protection of coral reefs and related sediments) was extended to include two new areas of research, which are now predominant : volcanology (structure, history, function, risks and the dismantling of shield volcanoes), imagery, profound Earth dynamics and the Reunion hotspot (seismology), hydrology (water cycle in volcanic, insular and tropical environments, drainage basin instruments in tropical climates).

Since July 2005, the laboratory members have joined the team studying the Geology of Volcanic Systems within the UMR (Joint Research Unit) 7154 IPGP | Paris | University of Reunion.

## PUBLICATIONS

- Publication 62 articles published in international journals between 2010 and 2014
- Belle, P., Aunay, B., Bernadie, S., Grandjean, G., Ladouche, B., Mazué, R., Join, J.-L. (2013), The application of an innovative inverse model for understanding and predicting landslide movements (Salazie cirque landslides, Reunion Island). *Landslides*, doi : 10.1007/s10346-013-0393-5.
- Brothelande, E., Finizola, A., Peltier, A., Delcher, E., Komorowski, J.C., Di Gangi, F., Borgogno, G., Passarella, M., Trovato, C., and Legendre, Y. (2014), Fluid circulation pattern inside La Soufrière volcano (Guadeloupe) inferred from combined electrical resistivity tomography, self-potential, soil temperature and diffuse degassing measurements, *Journal of Volcanology and Geothermal Research*, 288, 105-122, doi : 10.1016/j.jvolgeores.2014.10.007.
- Chaput, M., Famin V., Michon, L. (2014), Deformation of basaltic shield volcanoes under cointrusive stress permutations, *J. Geophys. Res. Solid Earth*, 119, 274-301, doi : 10.1002/2013JB010623.
- Davy, C., Barruol, G., Fontaine, F.R., Sigloch, K., Stutzmann, E., 2014, Tracking major storms from microseismic and hydroacoustic observations on the seafloor, *Geophys. Res. Lett.*, 41, doi : 10.1002/2014GL063199.
- Fontaine, F. R., G. Roul, L. Michon, G. Barruol, A. Di Muro (2014), The 2007 eruptions and caldera collapse of the Piton de la Fournaise volcano (Reunion Island) from tilt analysis at a single very broadband seismic station, *Geophys. Res. Lett.*, 41, 2803-2811, doi : 10.1002/2014GL059691.

## EXPERTISE

Geophysical prospecting :

- Geological mapping
- Chemical water analysis
- Petrographic expertises
- Manufacture of thin and polished sections

Exchanges take place with the BRGM (Geological and Mining Research Office) and companies about these issues that are upstream of energy research :

- Swell quantification,
- Expertise in geothermics (project with EDF) on the Piton des Neige.

## COLLABORATION

### ► Indian Ocean

University of Canberra (Australia), IOGA (Madagascar) MOI (Mauritius)

### ► Europe

Istituto Nazionale di Geofisica e Vulcanologia, (Italy), University of Munich (Germany), Alfred Wegener Institut (Germany), University of Frankfurt (Germany), Université Goetigen (Germany)

### ► International

Jamstec (Japon), IGP (Pérou)

## PATENTS AND LICENCES

Patent regarding an aquatic camera system. Patent filed by the University of Reunion and the IRD (Development Research Institute).





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## ESA

➔ [www.esareunion.com](http://www.esareunion.com)

### School of Art

Statuts : *EPCC (Public Organisation for Cultural Cooperation).*



### RESEARCH ACTIVITIES

#### Research subject

- Arts, Landscapes and Insularities

#### Major research programme

- Phenomenology of the island
- Ecosphere
- Image anthropology and interculturality

### PUBLICATION

- Average number of annual publications 2

### EXPERTISE

#### Technical platforms and advanced equipment

- Technical and creative workshops (printmaking, photography, video, sound, etc.)

### COLLABORATION

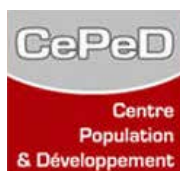
#### ► Public or private partnerships (local, regional, national)

- Partnership with the University of Reunion ;
- The Institute for Higher Studies in Creative Arts ;
- The Mondes du Cinema association.

#### ► International

- Wits School of Arts Of Johannesburg (South Africa)





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## UMR CEPED

→ [www.ceped.org](http://www.ceped.org)

*Joint Research Unit for Population and Development*

*Statuts : UMR (Joint Research Unit).*



### RESEARCH ACTIVITIES

#### Research subjects

- Health and Gender
- Migrations, Circulation and Pathways
- Education and Knowledge in the Sout
- Resources, Populations and Inequalities

#### Major research programmes

- AMP (managers' forum for protected marine areas)
- Sterility and medically assisted reproduction in a context of globalisation (Douala, Paris, Prétoria)
- Demographic masculinisation in the world. International comparisons. COURSE
- Course of life, HIV/AIDS and hepatitis B in migrants from sub-Saharan Africa living in the Ile-de France region
- Dynamics of migratory circulation and cross-border mobility between Guyana, Brazil, Haiti and Suriname
- Observatory of the condensation of South and South East Asia populationst
- DYSTER - Social Dynamics, Territory and Resources in Reunion. Bekonal
- Building and Exchanging Knowledge on Natural Resources in Latin America. Academic mobility : public policies, individual trajectories and production of knowledge

### PUBLICATIONS

- Average number of annual publications : 175
- Publications reviewed between 2013 and 2014 : 50

### EXPERTISE

- Population development expertise

### COLLABORATION

Public and private partnerships in around 40 countries mainly in Africa, Latin America and Asia + partnerships with national and international organisations : UNFPA - UNICEF - ANRS (French Agency for AIDS Research) - ANR (National Research Agency).



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## CREGUR

→ [www.oies.univ-reunion.fr/cregur/equipe/](http://www.oies.univ-reunion.fr/cregur/equipe/)

*La Reunion University Centre for Geographical Research (CREGUR)  
Indian Ocean, Areas and Societies team (OIES)*



### RESEARCH ACTIVITIES

CREGUR focuses its work on india-oceanic areas: the island systems which structure them - particularly the Mascarene Islands- and the bordering countries. Research fields explored are diverse, reflecting the specialization of researchers but all converge on an analysis of territorial dynamics. The transformations of urban spaces, outer-urban and rural issues heritage and landscape , those related to infrastructures and mobilities, analyzes driven on the environment , development, hazards and risks , as on development issues , are covered by the holders or associated researchers

#### Research subjects

- Regional development
- Local development
- Mobility
- Heritage and tourism

- Natural environment and landscape dynamics
- The Indian Ocean area

### COLLABORATION

The research is generally carried out under partnerships with several universities in the southwest Indian Ocean countries (South Africa, Comoros, Madagascar, Mozambique, Mauritius, Mayotte, Seychelles) and also India and Southeast Asia.



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## UMR ESPACE DEV

→ [www.espace-dev.fr](http://www.espace-dev.fr)

### Joint Research Unit for Development

*Statuts : Joint Research Unit in association with IRD and the universities of Reunion, Montpellier II, Antilles and Guyana (UAG). Main premises in Montpellier.*



## RESEARCH ACTIVITIES

### Research subjects

The UMR ESPACE-DEV (Joint Research Unit for Spatial Development) develops and implements innovative spatialisation methodologies for environmental knowledge for the sustainable development of the territories, from data acquisition to decision making. The aim is to contribute to the emergence of environmental observatory networks for sustainable development.

The unit is aimed towards the sustainable development of territories and more specifically of tropical environments. It proposes spatialisation methodologies for environmental dynamics to allow for societies of the South to adapt to global changes.

The UMR is divided into three research teams :

- Spatial environmental observation (OSE) :
  - Processing, analysis and exploitation of data flows
  - Bio-geophysical spatialised indicators
  - Object/process modelling
- Environmental and societal integrated approach (AIMS) :
  - Landscape and observatory for environmental management
  - Health and the environment
  - Integrated management of insular and coastal territories
- Knowledge and information systems (KAIS) :

- Acquisition, management, representation, sharing and integration of data and knowledge
- Modelling of space-time dynamics
- Visualisation, semantic mapping, dissemination and support with decision making

The UMR is heavily involved in the Equipex Géosud project, which aims to develop a national infrastructure for satellite data that is freely accessible to the scientific community and the public. This will aid networking among the scientific community and the management of stakeholders regarding the use of the datasets provided. In Reunion, the UMR Espace-dev is the research unit connected to the SEAS-OI (Satellite Imagery and Remote Sensing for the Indian Ocean), responsible for the scientific leadership of the remote sensing research centre.

### Major research programmes

Main assignments or projects within Reunion : scientific leadership of SEAS-OI, DESCARTES ANR (National Research Agency), GIML (Integrated Sea and Coastal Management) (public market), LEPTO (ERDF), MOZALINK (WIOMSA), REEFsat (ERDF).

## PUBLICATIONS

- Since the creation of the UMR in 2011, there have been 425 scientific productions including 149 journal articles, 9 publications, 43 book chapters, 124 presentations with proceedings and 22 without, and 59 poster presentations.

## EXPERTISE

Alongside its research activity, the unit carries out work and provides services for the international scientific community and countries of the South. It develops and uses a network of satellite receiving stations for Earth observation that helps make space useful to sustainable development in countries of the South.

### Technical platforms and advanced equipment :

The remote sensing satellite SEAS-OI (Satellite Assisted Surveillance of the Environment in the Indian Ocean) situated in Saint-Pierre aims to become a centre of excellence in satellite remote sensing for the purpose of the management of the territories of the South-West Indian Ocean.

## COLLABORATION

The UMR is taking part in the FP7 BRAGMA project within the GMES & AFRICA programme. The aim is to structure links between the African and European networks for Earth observation in order to meet the major challenges surrounding the environment and development. For this it relies on the GEODEV network projects regarding Africa (SEAS-OI, SEAS-Gabon, GEOSUD) and is fostering French cooperation within this strategic domain. Further examples are :

- At the local level, its involvement in the OSU-Reunion (Reunion Observatory of Sciences of the Universe) (coast line SOERE (Observation and Experimental Systems for Long-Term Environmental Research)), Dynalit SNO (Coastal National Observation Services) and its collaborations with the Regional Health Agency, the Reunion Natural Marine Reserve, the Western Town Territories, the Reunion National Park ;
- On the national level : LEGOS (Laboratory for the Study of Geophysics and Spatial Oceanography), GRED : Governance, Risk, Environment and Development, the UMR 6554 for the Coastline, Environment, Remote Sensing and Geomatics, the UMR 7206 for Ecoanthropology and Ethnobiology, the UMR 208 PALOC (Local Heritage), the UR 227 (Research Unit) COREUS 2 (Biocomplexity of Coral ecosystems of the Indo-Pacific) ;
- In the South, numerous collaborations with research institutes in South America, North Africa and in the South-West Indian Ocean (Western Indian Ocean Marine Science Association, ASCLME, etc.).

### ► Desire to collaborate

Partnership research at the regional and European levels in the areas of spatial observation, integrated management of coastal areas, risks and observatories of coast line environments, the links between health and the environment.

## PATENTS AND LICENCES

- Development of «logic brick» s : MDweb (cataloguing and localisation of environmental resources), Wed-SAT (storage and web exploitation of satellite data), SIEL (Local-Scale Information System), IES-web (Spatialised Environmental Indicators via the web)
- Observation and assistance with decisions, notably management of the technological platform network (SEAS) Net (<http://www.seasnet.org>)



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## UMR PRODIG

→ [www.prodig.cnrs.fr](http://www.prodig.cnrs.fr)

### Joint Research Unit for Geographical Research

Statuts : **UMR (Joint Research Unit)**



## RESEARCH ACTIVITIES

### Research subjects

One focus of the UMR PRODIG (Joint Research Unit for Geographical Research) is to unify current links between development and the environment.

This involves understanding the effects of globalisation and globally oriented economic growth through deregulation and competition on new territorial, social and environmental approaches. Matters of order, disorder, adaptability and governance arise and intersect in increasingly complex ways with societal, environmental and political data. The spatial input is central to this theme. The UMR approaches this with questionnaires and multidisciplinary methodologies : geography, anthropology, law, economy.

### Major research areas

- **Territorial mutations, productive processes and globalisation**
  - Agriculture, food and global markets
  - Circulation and mobility
  - Metropolisation, peripheries and relay of globalisation
  - Urban governance and political structuring of local spaces
- **Territorial risks, vulnerabilities and management**
  - Understanding urban vulnerability
  - Management of environments and territories in a context of environmental risk
- **Political geography of resources**

- Representation and construction of resources
- Environmental regulation and heritage designation of resources
- Geopolitics of resources from local to global

#### ■ Observing and modelling changes

- Observations
- Modelling
- Reflective analysis on our methodological practices

#### ■ Utilisation and dissemination of geographic and urban information

- Production of geographic and urban information
- Utilisation and dissemination of iconographic collections
- Inclusion in national and international networks
- IT resources for internal and external distribution

#### ■ Thèmes spécifiques à La Réunion

Environnement et santé ; Facteurs d'émergence des maladies infectieuses ; Crises sanitaires ; Risques sanitaires

## COLLABORATION

### ► International

Partnerships with numerous research centres and universities in Asia, Oceania, Africa, Europe, South Americad.



## CEMOI

→ [www.cemoui.univ-reunion.fr](http://www.cemoui.univ-reunion.fr)

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### Centre for Economics and Management

Statuts : EA 13.



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### RESEARCH ACTIVITIE

#### Research subjects

Regions, Growth and Development

- Analysis of regional dynamic
- Sustainable development and management of natural resources
- Appraisal of public policies

Cross-cutting themes

- (i) sustainable tourism and (ii) Energy and the environment

The preferred field of application is the Indian Ocean.

#### Major research programmes

- Risk management

Business and organisation and all their managerial aspects are the subject of analysis for this focus. The organisations studied are within a particular setting, namely Reunion and the Indian Ocean region.

- Money, Banking, Finance

This focus combines researchers from financial sciences and management sciences working together on exchange rates, the banking economy and finance (market and corporate finance).

- Decisions and Strategies

The common denominator of the research carried out as part of this focus is the reference to the microeconomic approach and in particular game theory. The issues addressed include the industrial economy, social choice and voting theory as well as work and family economies.

### PUBLICATIONS

- Average number of annual publications : 26

M. Le Breton et D. Lepelley, «Une analyse de la loi électorale du 29 juin 1820», Revue Economique 65 (3), pp. 469-518 (2014).

- S. Blancard et J.F. Hoarau, «An optimal sustainable human development indicator for small island developing states: a reappraisal from data envelopment analysis», Economic Modelling, 30(C), pp. 623-635 (2013)
- K. Angué et U. Mayrhofer, «Coopération internationale en RetD : les effets de la distance sur le choix du pays des partenaires», M@n@gement 13(1), pp. 1-37 (2010).

### COLLABORATION

Member of the Arch-net network





#### Desire to collaborate

Discussions about integrating cluster Green



**CRESOI**

→ [www.cresoi.fr](http://www.cresoi.fr)

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*Centre for Research into the Societies of the Indian Ocean*



Picture © CRESOI

## RESEARCH SUBJECTS

### Thématiques de recherche

- Colonisation/decolonisation
- History of slavery
- Political history, cultural history, sports history and bodily practices
- Historical studies of heritage and tourism
- History of archaeology

### Major research programme

- History and Politics in the Indian Ocean
- History, Heritage, Tourism
- Indian Ocean Area
- History and TIC (IT and communication technologies)
- French Overseas Territorie

## PUBLICATIONS

See details of published books on the website [cresoi.fr](http://cresoi.fr)

Two CRESOI (Centre for Research on the Societies of the Indian Ocean) journal :

- La Revue internationale historique de l'océan Indien - Revue de recherches en Histoire (The International Historical Journal for the Indian Ocean - History Research Journal) ;
- La Revue Tsingy - revue sur les Thématiques des enseignements de l'histoire dans l'océan Indien (The Tsingy Journal - education in the history of the Indian Ocean).

## EXPERTISE

- Expertise in Indian Ocean societies (studies and analyses)
- Expertise on achievements (human sciences, cultures) of municipal, departmental or regional projects

## COLLABORATION

Scientific studies are carried out under a partnership (research associates and students) with universities from Southern countries of the Indian Ocean (Madagascar, Comoros, Mauritius) and active cooperation through seminars and conferences





- CRESOI heads the Commission Internationale des historiens de l'océan Indien (International Commission of Historians of the Indian Ocean (member of the Commission Internationale des sciences historiques (International Commission of Historical Sciences)
- CRESOI contributes to the work of the Comité Français des sciences historiques (French Committee of Historical Sciences)
- Partnership with the UNESCO Chair
- Partnership with Association Historique Internationale de l'océan Indien (International Historical Association of the Indian Ocean) (created in 1961)
- Partnership with universities of French Overseas Territories
- Partnership with universities in France, Europe, Quebec, etc.

Network of researchers of history and current politics of the Indian Ocean (publications on the state of political power and institutional evolution in the Western Indian Ocean) Indien (publications sur l'état des pouvoirs politiques et des évolutions institutionnelles dans l'océan Indien occidental)



**CRJ**

→ [www.crj.univ-reunion.fr](http://www.crj.univ-reunion.fr)

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## Centre for Legal Research

Statut : *Host team (EA)*



## RESEARCH ACTIVITIES

### Research subjects

The CRJ (Centre for Legal Research) belongs to the OSOI (Observatory of the Societies of the Indian Ocean) research group of the university.

- Research group for law of the Overseas Territories and the Indian Ocean
- Research group for corporate and business contract law
- Research group for property and human rights law
- Research group for transnational law

### PUBLICATIONS

- Over 150 publications per year
- Ouvrage collectif fondamental : SEUBE Jean-Baptiste, Technique contractuelle, Francis Lefebvre, 4ème éd., 2010, avec J.-M. Mousseron, P. Mousseron, J. Raynard
- Recherche collective sous la dir. de la co-directrice du CRJ, responsable de l'axe 2 : Dr. ZATTARA-GROS Anne-Françoise, ouvr. Coll. « Bioéthique et genre » (dir.), LGDJ 2013
- Publication originale portant sur l'axe 3 : Pr. Laurent SERMET, Une anthropologie juridique des droits de l'homme. Les chemins de l'Océan indien, Paris, Agence universitaire de la francophonie éd., Edition des archives contemporaines, nov. 2009, Préface d'Abdou Diouf et postface de David Anoussamy, 266 pages.
- Recherche collective originale sous la dir. du co-directeur du CRJ, responsable de l'axe 4 : Droit et olympisme, colloque organisé à la Faculté de droit et d'économie de La Réunion, 5 septembre 2012, avec notamment la participation de M. Bruno GENEVOIS (président de section honoraire au Conseil d'État et président de l'Agence française de lutte contre le dopage), PUAM, 2013
- Ouvrage incontournable : PUIG Pascal, Contrats spéciaux, Dalloz, coll. Hypercours, 4e éd. 2011 (775 p.), 1re éd. 2005, 2e éd. 2007, 3e éd. 2009

### EXPERTISE

Thanks to its ambitious team, the CRJ has the honour of being the reference centre for law within the Overseas Territories. From institutional specificity to the adaptation of substantive laws, the strength of this field lies in its multidisciplinary.

In order to structure our research, taking into account our environment,

four areas have been engaged that include our ultra-marine size and quality training given within the Faculty of Law and Economics :

- Research group for law of the Overseas Territories and the Indian Ocean ;
- Research group for corporate and business contract laws ;
- Research group for property and human rights law ;
- Research group for law and transnational phenomena.

Plus :

- Many professional training programmes throughout the area with lawyers, notaries, magistrates, etc.
- Government consultations with countries from the area (Madagascar, Mozambique, etc.) ;
- Training breakfasts and meetings between the university and island professionals ;
- Higher Notary's Diploma in association with the Chamber of Notaries.

### Technical platforms and advanced equipment

- Document resource room (3rd floor of the Faculty for Law and Economics) with work stations
- Over 30,000 works and around 30 subscriptions to legal private and public law journals
- Access to the largest legal databases (Dalloz, Lamy, Lexisnexis, Doctrinal, Cairn, Le Moniteur, RCADI, etc.)

### COLLABORATION

The CRJ is the only European legal research centre in the Southern Hemisphere and the Indian Ocean and our links with South Africa, Mozambique, Australia, Madagascar, Mauritius or India involve a French presence within the area.

Indian Ocean Area : University of Reding (Mauritius), University of Antananarivo (Madagascar) and the Pretoria Centre for Human Rights (South Africa).

### Desire to collaborate

Areas of Cooperation :





- Overseas Territories and Indian Ocean law ;
- Corporate and contract law ;
- Heritage and human rights ;
- Law and transnational phenomena.





## DIRE

→ [www.crlhoi.univ-reunion.fr](http://www.crlhoi.univ-reunion.fr)

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### Research Centre for Literature, Culture, Sociology and Anthropology

Statut : EA



### RESEARCH ACTIVITIES

#### Research subjects

A single federating theme for 2015-2019 : DIRE (Déplacements, Identités, Regards, Ecritures), a Research Centre for Literature, Culture, Sociology and Anthropology, which has four main areas of focus:

- 1 : Imagination, travel and utopi ;
- 2 : Images, looks and bodies in movemen ;
- 3 : Plural contexts in contact and diasporic identities ;
- 4 : Thought, knowledge, (re)writing and (counter)discourse.

### PUBLICATIONS

141 - over 6 years from 2008 to 2013 :

- 13 books ;
- 34 books chapters ;
- 49 articles ;
- 1 translation ;
- 2 book reviews ;
- 1 critical edition of a text ;
- 41 unpublished communications.

### EXPERTISE

70 scientific demonstrations (23 symposia, 30 study days, 10 panel discussions, 4 seminars, 3 round tables) from 2008 to 2013.

16 theses defended and 2 HDRs (Accreditations to Supervise Research) between 2008 and 2013.

### COLLABORATION

#### ► Indian Ocean area

University of Mauritius and MIE (Mauritius), University of Toliara, Antananarivo and Toamasina (Madagascar), University of Delhi and Hyderabad (India), University of Kelanyia (Sri Lanka), University of Adelaide (Australia), University of Cape Town (South Africa), Inha University of Incheon (South Korea)

#### ► National

University of Montpellier 3 and Bordeaux (France)

#### ► International

Humboldt University in Berlin (Germany), University of Graz and Vienna (Austria)

#### Desire to collaborate

University of Stellenbosch (South Africa)



## ICARE

→ [www.icare.univ-reunion.fr](http://www.icare.univ-reunion.fr)

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*Cooperative Southern Institute of Education Research*

*Statuts : Host team (EA) - EA 7389.*



### RESEARCH ACTIVITIES

#### Research subjects

- Subject 1: Languages, cultures and identities
  - Sub-topic 1-1: Identity construction and interculturality
  - Sub-topic 1-2: Language contact and/in the plurilingual setting
  - Sub-topic 1-3: Linguistic and educational policies
- Subject 2: Knowledge, learning and mediation in context
  - Sub-topic 2-1: Teaching and learning processes in context
  - Sub-topic 2-2: Engineering and professionalisation of adults (educational fields of health and society)
  - Sub-topic 2-3: Relationships of knowledge (writing, health, illness, mathematics, etc.), co-education and mediation

#### Major research programmes

Current projects :

- ERMIES-ETHNOSOCIO : Randomised multicentre trial of Structured Educational Intervention (ERMIES) outpatient for type 2 diabetes inadequately controlled in Reunion: related ETHNOSOCIOlogical research ;
- DIABETIC «Health and autonomy in the living space through digital technology» ;
- Translation into French and validation of HLQs (Health Literacy Questionnaires) and HEIQ (Health Education Impact Questionnaires) ;
- Linguistic socialisation and bilingual classes ;
- Diversity in schools ;
- Afordens - Appui à la Formation à Distance dans l'Enseignement Supérieur par le numérique (digital technology assisted distant

learning within higher education) ;

- Curriculum, plurilingual contextualisation and teacher training
- Micro-ethnography of school drop-out/re-entry ;
- BQR 2015 «Opening to other Worlds : a comparative study of the reception of otherness in classroom practice» ;
- School, Families, Parents : the school dropout ;
- International project «Educational and social objectives for the 21st century school» (piloted by the University of Sherbrooke, CA).

### PUBLICATIONS

- Average number of annual publications : 89
- ALAQUI D. (2010). Eduquer et former à l'interculturel : un impératif sociétal. *Recherches en éducation*, 9, 5-9.
- BALCOU-DEBUSSCHE, M. (2013). Inscription sociale de l'ETP. Hétérogénéité et vulnérabilité des personnes. Analyse de résultats obtenus en contexte pluriel, à Mayotte. *Education Thérapeutique du Patient / Therapeutic Patient Education*, 5, 1, 113-121.
- CLAUZARD, P. (2014). Les glissements conceptuels : un observable de secondarisation en classe élémentaire de grammaire. *Revue Éducation & Didactique*, 8, 3, décembre 2014, 23-41.
- OLLIVIER, C. & PUREN, L. (2013). Du fantasme à la réalité: des pratiques et une recherche à construire au-delà de l'espace clos de la classe. In : OLLIVIER, Christian et PUREN, Laurent (éd.), *Mutations technologiques, nouvelles pratiques sociales et didactique des langues*. *Recherches et Applications*, 54, p. 16-27.
- DOLZ, J. & TUPIN, F. (2011). La notion de situation dans l'étude du phénomène d'enseignement et d'apprentissage des langues: vers une perspective socio-didactique. *Revue Recherches en Education*,

12, novembre 2011, 82-9. <http://www.recherches-en-education.net/IMG/pdf/REE-no12.pdf>

- WALLIAN, N., POGGI, MP., & CHAUVIN, A. (2014). Action, interaction, intervention. A la croisée du langage, de la pratique et des savoirs. Berne : Peter Lang.

## EXPERTISE

- Expertise in and implementation of cultural strategies : the state of culture in the Indian Ocean area or elsewhere
- Development of therapeutic education according to health facilities (French and foreign), public profiles (chronic diseases, diabetes, obesity, etc.)
- Scientific assessment (expertise theses, HDR (Accreditation to Supervise Research), journal articles, careers, etc.); audit of education systems and international expertise
- Editorial management of journals and books
- Design and coordination of training modules in didactic and professional engineering
- Education-oriented design tools (manuals, contextualised curricula, multimedia materials, assessment tools, etc.)
- Ongoing training actions in practice analysis and advice
- Educational research of the disciplines (languages and plurilingualism, French/Creole, history and geography, EPS, physics, etc.)
- Development of curricula for target audiences (children, adolescents, adults, educators, and institutional and administrative audiences)

## COLLABORATION

### ► International partnerships (including the Indian Ocean) :

- Canadian Research Chair for Educational Intervention
- Centro de Investigação em Educação da Universidade da Madeira
- University of Pondichéry and University of Chennai on the teaching of French (India)
- AUF (University Agency for French-speaking Countries)/the Office for the Indian Ocean - Mauritius Institute of Education
- Institute of Languages, Civilisations and Social Sciences (Mahajanga, Madagascar) - Universities of Antananarivo and Antsiranana (Madagascar)
- Institute of Languages, Civilisations and Social Sciences (Mahajanga, Madagascar) - Universities of Antananarivo and Antsiranana (Madagascar)
- Johannesburg (Afrique du Sud)
- Pedagogical University of Maputo (Mozambique), University of Johannesburg, University of KwaZulu-Natal and Cape Town (South Africa)
- Universities of Rome (Italy), Salzburg (Austria), Barcelona (Spain), Frankfurt (Germany), Rio (Argentina)
- National Taiwan Normal University (Taipei, ROC)
- University of Tsukuba (JP)

### ► National Partnerships

- Nantes Educational Research Centre (CREN)
- OPEAN & REFORM Network, which succeeds the OPEN network (observatory of teaching practices) bringing together numerous French researchers
- UNIRÉS Network (Network of Universities for Health Education)/Prof. Didier Jourdan,
- Clermont-Ferrand University & University Lyon 1 - ELLIADD-DIDactiques laboratory, University of Franche Comté
- IFE/ENS, network of associated educational establishments (LÉA)
- CRREF Laboratory (Centre for Research and Educational Resources and Training), University of the West Indies, Pointe à Pitre

### ► Local Partnerships

- CHU (University Hospital Centre) Reunion/Regional Directorate of Clinical Research & CIC
- Reunion Local Education Authorities
- Regional Council of Reunion
- ARS-OI (Indian Ocean Health Agency for Reunion-Mayotte)
- CIEP (International Centre for Educational Studies)
- County Council of Reunion and Mayotte
- Directorate General of Cultural Affairs
- Health Networks RéUCARE (Reunion) and REDIAB YLANG (Mayotte)





### Desire to collaborate

Some areas of collaboration :

- Identity construction and interculturality ;
- Language contact and/in the plurilingual setting ;
- Linguistic and educational policies ;
- Teaching and learning processes in context ;
- Engineering and professionalisation of adults ;
- Co-education and mediation ;
- Linguistic socialisation ;
- Plurilingualism and didactics of plurilingualism.





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## LCF

→ [www.lcf-cnrs.univ-reunion.fr](http://www.lcf-cnrs.univ-reunion.fr)

*University division of language, texts and communication for Creole and French speakers*

*Statuts : (UA (West Indies University), UMR (Joint Research Unit))*



### RESEARCH ACTIVITIES

#### Research subjects

- LCF-LIL (LCF = University division of language, texts and communication for Creole and French speakers/LIL = Literature, Information-Communication and Linguistics); linguistics and sociolinguistics
- French and Francophone literature
- information and communication

#### Major research programmes

**Languages in contact:** «Creole and Francophone linguistics: description of usages, linguistic policy and didactics of languages»

- Further description of Creole languages and their analysis in the context of language contact
- Proposal of policy measures and linguistic development to Creole-speaking and plurilingual societies
- Elaboration of questions of linguistic didactics in Creole and Francophone environments

**Literature in contact:** «Relevance and Irrelevance: examining the systems of legitimisation of genres, categories, voices and identities»

- Observation of literature of the islands of the South-West Indian Ocean and description of their development
- Examination of the system of genres and literary legitimisation throughout the history of the islands
- Understanding of literature in its relationships with other forms of aesthetic and artistic expression

#### Mediated communication, networks and territories

- Understanding the processes of transformation of social, linguistic and discursive practices caused by increasing urbanisation and the development of networks, information technology and communication
- Development of communicational research in a work/organisational environment

### PUBLICATIONS

- Average number of annual publications : 54





### COLLABORATION

- Research Federation «Typology and Linguistic Universals» (FR 2559)
- National GIS (Scientific Interest Group) «Institute of the Americas»
- «TIC (information and communication technologies) : networks, usages, strategy, territories, innovation and cognition» Brittany MSH (House of Human Sciences) Hub
- «American and Atlantic Worlds» Brittany MSH Hub
- Breton GIS «The Brain, Behaviour and Society»
- GIS «Linguistic and Cultural Pluralities» Universities of Rennes 2, Reunion, F. Rabelais in Tours, Strasbourg 3 and J.Verne de Picardie
- PRES (Centre for Higher Education and Research) «European University of Brittany»
- Research Federation : «Observatory of the Societies of the Indian Ocean»
- AUF (University Agency for French-speaking Countries) network «Language contact and Francophone expression in Maghreb : comparison of the social function of ordinary, didactic and literary linguistic practices»
- AUF Network : «Study of French in Francophone Countries» (Reunion, Madagascar)



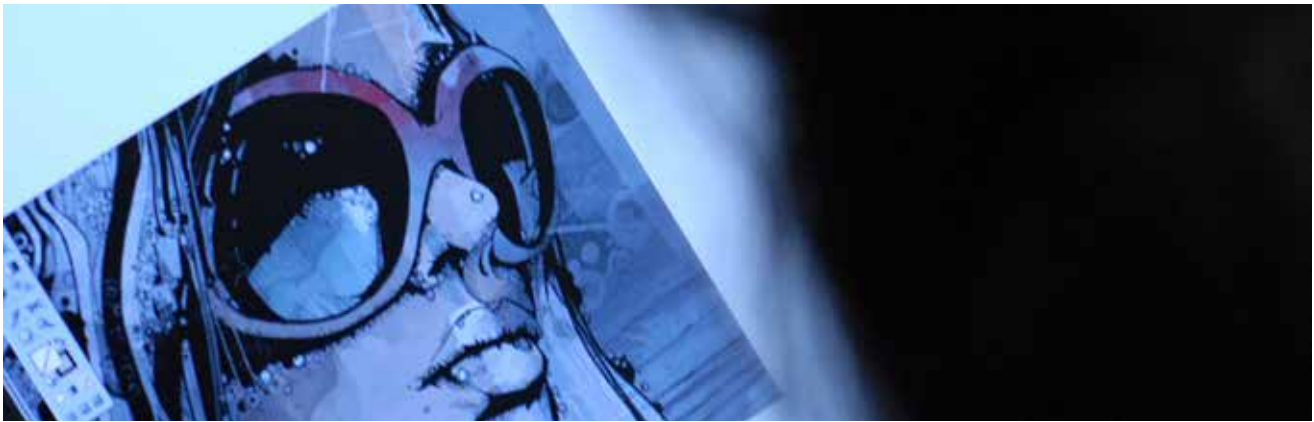
**ILOI**

→ [www.iloif.fr](http://www.iloif.fr)

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### *Imaging and Media Institute*

*Secteurs : multimedia, digital, audiovisual.*



#### POSITION WITHIN THE INNOVATION CHAIN

- The Indian Ocean Imaging and Media Institute is a higher educational establishment offering vocational and adult training and specialising in imaging and new media.

#### SERVICES

- Adult training in audiovisual, 2D and 3D computer graphics, web development and multimedia.
- Courses offered : drawing, graphic design, 2D/3D computer graphics, graphics publishing, visual communication, traditional animation, motion animation, framing and editing, lighting, 3D animation, motion capture, sound design, 2D/3D post-production, multimedia design, web development, audiovisual production for TV, cinema and new media.
- The RECOVER 3D research project : in association with XD Production at the University of Reims and Euromédia, the ILOI (Indian Ocean Imaging and Media Institute) will take part in 3D cloning over the 3 years selected as part of the national call for funding loans for the project.
- Select expertise in the field of 3D, special effects and computer-generated images (ILOI is an approved Autodesk training centre for Maya software).
- Hosts companies and artists.
- Event organisation (Carrefour de l'image, etc.)

#### SERVICES TO PROJECT DEVELOPERS

- The ILOI has the largest French Motion Capture CyberDome available to students, designers, researchers and even producers. This tool assists applied research in the field of collaborative long-distance education conducted in partnership with XD Productions, the F.A.C (Faculty of Self-Teaching), Pipangaï Productions, the CNAM (National Conservatory of Arts and Crafts), ESA (School of Art) of Reunion and the AUF (University Agency for French-speaking Countries).
- Spin-off : the emergence of animation, multimedia, and video game industries in Reunion favouring the creation of animation studios like Pipangaï and multiple micro-companies.

#### NETWORKS AND COLLABORATION

- Companies : XD Production, Euromédias
- Training and Research: Université de Paris 8 : Creating and Digital Publishing department, LEDEN (Digital Publishing) Laboratory, University of Reunion, Reunion School of Art, the School of Journalism and Communication of Marseille (EJCM), Gobelins School of Imaging
- Networks : ETNA European Training Network for Animation, the largest European network of animation schools through the Europee
- Media and International University programme



## IRISSE

→ [www.dimps.univ-reunion.fr](http://www.dimps.univ-reunion.fr)

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*University Centre for Engineering, Research, Sport, Health and Anthropology*

*Statuts : EA (Host Team) 4075*



### RESEARCH ACTIVITIES

#### Research subjects

- Sport and health engineering
- Management of environmental risks, sports and sustainable development, sports and interculturality
- Intervention and training engineering in sports

#### Major research programmes

- ANR EFFIGIE : «Environmental Justice and Equity»
- DDiabeTIC (DIMPS-CHU Reunion) : «therapeutic education of diabetic patients» ; project focusing on Friedreich's Ataxia
- Teacher training (DIMPS-CRAFT University of Genoa - Fond National Suisse (Swiss National Science Foundation - UNESCO Chair «Training teachers in the 20th century»)

### PUBLICATIONS

- Indexed scientific journals: 65 articles (impact factor between 1.9 and 6.3) in four years
- Specialist journals and books available to buy (human sciences and psychology journals, books from publisher Armand Colin in particular)
- General newspapers (Le Nouvel Observateur, Le Point, L'Express)
- Daily nationals (Le Monde, Libération, Le Parisien) and locals (Le Quotidien, le JIR) : 24 articles in 4 years

### EXPERTISE

Development of electronic equipment for transmitting geographical locations of the physiological and mechanical parameters of hikers (tested during Le Grand Raid race)

#### Technical platforms and advanced equipment

- Motion capture system - force platform

### COLLABORATION

- Collaborations with the universities of Cambridge (England)
- Porto (Portugal))
- Stellenbosch (South Africa)
- Paris V (France)
- The Faculty of Educational Sciences of Genoa (Switzerland)
- Business partnership on an e-Health project with the CHU (University Hospital Centre) of Reunion and the University of Montreal



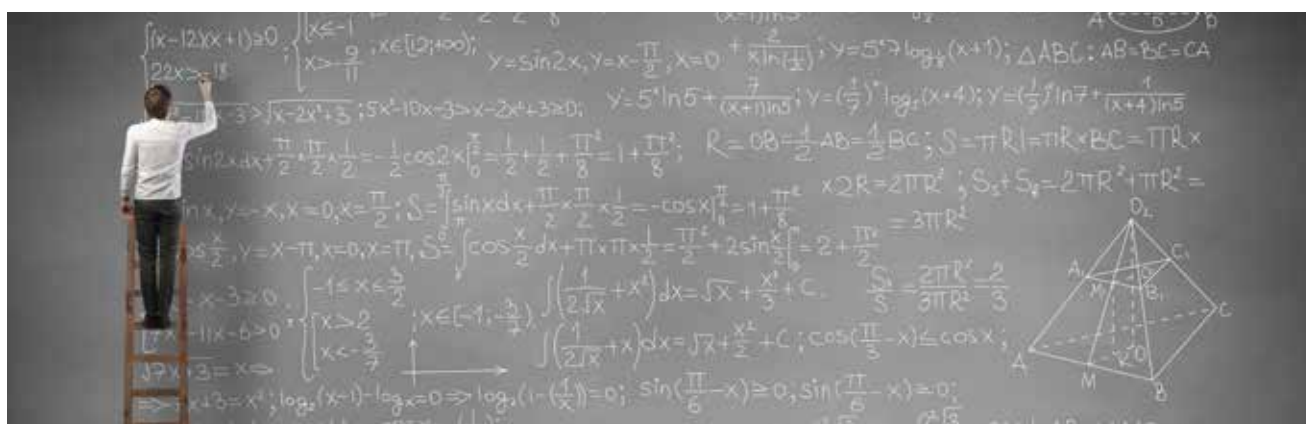
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**LIM**

→ [www.lim.univ-reunion.fr](http://www.lim.univ-reunion.fr)

**IT and Mathematics Laboratory**

Statuts : (EA 2525).



**RESEARCH ACTIVITIES**

**Research subjects**

- Data, Knowledge, Decision
- IT and Mathematics Epistemology and Didactics
- Mobile and Communicative IT
- Analysis and Mathematics Foundation
- Discreet Mathematics

**PUBLICATIONS**

- Average number of annual publications : 30

**EXPERTISE**

- Backing of four projects in incubation
- Around ten virtualised linux servers

**COLLABORATION**

- Griffith University, Australia
- University of Sfax, Tunisia
- University of Verona, Italy
- University Paris Dauphine, France
- Imperial College London, UK



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## CHU RÉUNION

→ [www.chu-reunion.fr](http://www.chu-reunion.fr)

*University Hospital Centre  
Public Health Establishment*



### RESEARCH ACTIVITIES

#### Research subjects

- Institutional research :
  - Focus 1 : Nutrition, diabetes, chronic diseases ;
  - Focus 2 : infectious, tropical and emerging disease ;
  - Focus 3 : genetics and perinatal care.
- Industrial research :
  - Focus 1 : type 2 diabetes ;
  - Focus 2 : pneumology (asthma, COPD, bronchial Kulchitsky) ;
  - Focus 3 : haemato-oncology ;
  - Focus 4 : cardiology.

### PUBLICATIONS

- Average number of annual publications : 86
- 947 publications for the period 2005/2015

### COLLABORATION

- University and laboratories of Reunion, Institut Pasteur (health research institute), CYROI (bio-innovation health research organisation), CRVOI (Research and Monitoring Centre for Emerging Diseases of the Indian Ocean), Qualitropic (Tropical Bio-economy Hub)
- Pharmaceutical industry
- IO zone countries

### CONTACTS

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### DRCl SERVICES

#### Head of University Hospital Centre Promotion committee

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#### Monitoring platform

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#### Investigator support uni

Mrs Isabelle MADELINE

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#### Methodological support unit

Dr Laetitia HUIART

#### Centre for Clinical Investigation - Clinical Epidemiology (CIC-EC)

Regional clinical research and epidemiology facility (methodology, biostatistics, monitoring of large cohorts)

#### Biological Resource Centre

- Biobanque DNAtèque (Biobank DNAbank) : official facility since 201
- Biobanque tumorotheque (biobank tumourbank) : official facility since 201
- Chikungunya serum bank.





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## UMR DETROI

→ [www.blog.univ-reunion.fr/geico](http://www.blog.univ-reunion.fr/geico)

*Joint Research Unit for Diabetes and Treatment for the Indian Ocean*

*Statuts : UMR (Joint Research Unit)*



### RESEARCH ACTIVITIES

#### Research subjects

Specific objectives :

- Establishing a link between diabetes, atherothrombosis and stroke in Reunion and discovering susceptibility biomarkers for vascular complications in diabetic patients ;
- Studying the endothelial dysfunction mechanisms in situations of acute or chronic ± ischemic ± inflammatory hyperglycemia (adipocyte as a source of inflammatory molecules) ;
- Developing imaging tools to assess the vulnerability of the atheromatous plaque and cerebral ischemia ;
- Proposing innovative therapies based on protective molecules from Reunion biodiversity - ROI and vectorisation by HDL.

The scientific rationale behind the UMR DETROI (Joint Research Unit for Diabetes and Treatment for the Indian Ocean) is that diabetes leads to endothelial dysfunction, which results in the development of atherothrombosis, the weakening of the small vessels leading to atherothrombotic complications (stroke and myocardial infarction). The weakened endothelium also causes bleeding complications of ischemic stroke. Several co-morbidity factors, such as obesity or periodontitis, generate chronic inflammation and oxidative stress, involving vascular complications of diabetes.

Our research aims to be translational, using human biological samples for the study of biomarkers with the potential to represent therapeutic targets. To do so, we constitute biological collections in diabetic and obese subjects, in the acute phase of stroke, or in the general population (participation in the constitution of a clinico-biological cohort in the general

population of 35-70 years). The cellular models used are adipocytes and endothelial cells. Preclinical murine models of diabetes and stroke are used to validate our assumptions and to propose innovative therapies and to test ligands used in medical imaging. Finally, we propose therapeutic approaches based on the plant biodiversity of the Indian Ocean area (nutritional or drug molecule research).

#### Major research programmes

- CPER FEDER GR11 2009 - 2014
- POCT REDOX 2014-2015



## PUBLICATIONS

- Around 20 international publications per year
- Hatia S., Septembre-Malaterre A., Le Sage F., Badiou-Bénéteau A., Baret P., Payet B., Lefebvre d'hellencourt C., Gonthier MP. Evaluation of antioxidant properties of major dietary polyphenols and their protective effect on 3T3-L1 preadipocytes and red blood cells exposed to oxidative stress. *Free Radic Res.* 2014 48 387-401 IF=3
- Baraka-Vidot J, Guerin-Dubourg A, Dubois F, Payet B, Bourdon E, Rondeau P. New insights into deleterious impacts of in vivo glycation on albumin antioxidant activities. *Biochim Biophys Acta.* 2013;1830(6):3532-41 IF = 3,85
- Baret P, Septembre-Malaterre A, Rigoulet M, Lefebvre d'Hellencourt C, Priault M, Gonthier MP, Devin A. Dietary polyphenols preconditioning protects 3T3-L1 preadipocytes from mitochondrial alterations induced by oxidative stress. *Int J Biochem Cell Biol.* 2013 ; 45(1) : 167-74 IF = 4,15
- Moreno JA, Ortega-Gómez A, Delbosc S, Beaufort N, Sorbets E, Louedec L, Esposito-Farèse M, Tubach F, Nicoletti A, Steg PG, Michel JB, Feldman L, Meilhac O. In vitro and in vivo evidence for the role of elastase shedding of CD163 in human atherothrombosis. *Eur Heart J.* 2012 ; 33(2) : 252-63. IF = 14
- Debussche X, Rollot O, Le Pommelet C, Fianu A, Le Moullec N, Régnier C, Boyer MC, Cogne M, Bakiri F, Schwager JC, Favier F. Quarterly individual outpatients lifestyle counseling after initial inpatients education on type 2 diabetes : the REDIA Prev-2 randomized controlled trial in Reunion Island. *Diabetes Metab.* 2012 ; 38(1) : 46-53. IF = 2,4
- Lapergue B, Moreno JA, Dang BQ, Coutard M, Delbosc S, Raphaëli G, Auge N, Klein I, Mazighi M, Michel JB, Amarenco P, Meilhac O. Protective effect of high-density lipoprotein-based therapy in a model of embolic stroke. *Stroke.* 2010 ; 41(7) : 1536-42 IF = 6,2
- R. Awada, P. Rondeau, S. Grès, J. S. Saulnier-Blache, C. Lefebvre d'Hellencourt, E. Bourdon. Autotaxin protects microglial cells against oxydative stress. *Free Radic Biol Med* 2012. 52, 516-26 IF=3

## EXPERTISE

- Histology, murine models of diabetes and stroke, zebrafish

### Technical platforms and advanced equipment

- CYROI (bio-innovation health research organisation) (histology, radio imagery of small animals, zebrafish, NMR, cell culture)

## COLLABORATION

- RIPA Group (Radio Imagery of Small Animals, CYROI)



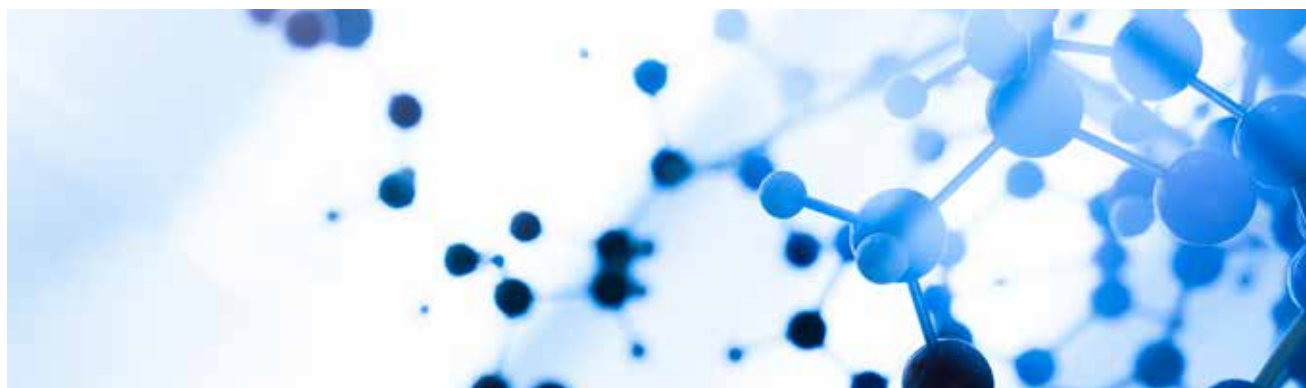
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## UMR DSIMB

→ [www.sciences.univ-reunion.fr/laboratoires/dsimb](http://www.sciences.univ-reunion.fr/laboratoires/dsimb)

### Joint Research Unit for Bioinformatics

Statut : UMR INSERM (Joint Research Unit of the National Institute for Health and Medical Research) in association with the University of Reunion, the University of Paris-Diderot (Paris 7) and INSERM. Main premises in Reunion.



## RESEARCH ACTIVITIES

### Research subjects

The UMR'S (Joint Research Unit) research on bioinformatic approaches to the study of protein structures and their interactions and applications. Areas of research are as follows :

- Analysis of protein structures and comparison using structural alphabets ;
- Understanding molecular recognition mechanisms between proteins and ligands by using both dynamic molecular simulations and quantum chemical calculations ;
- Genome analysis and applications ;
- In silico approaches and directed evolution of proteins ;
- Molecular modelling of small proteins and peptides ;
- Analysis and 3D structural modelling of disulfide bond rich proteins ;
- Data analysis and exploitation applied to biological data and systems.

## PUBLICATIONS

- Average number of annual publication : 5

PNAS, J. Theor. Biol, Biophys Rev, BMC Structural Biology, J Comput Chem Theory...

## EXPERTISE

- Expertise in areas of biotechnology, bioinformatics, biological data analysis, modelling, optimisation

### Technical platforms and advanced equipment

- Scientific Calculator: 16 core cluster

## COLLABORATION

### ► National

- INSA (National Institute of Applied Sciences), Toulouse, France
- LE<sup>2</sup>P , Université de La Réunion, France
- Laboratoire Enzymologique de complexes supramoléculaires, BIP (Bioenergetique et Ingenierie des Proteines), CNRS , Marseille, France

### ► International

- Indian Institute of Science, Bangalore, Inde-National Centre for Biological Sciences, Bangalore, India
- Institute of Applied Biotechnology and Bioinformatics, Bangalore, India
- Max Planck Institute for Coal Research, Mulheim an der Ruhr, Germany
- TUFTS University, Boston, MA, USA
- Stanford University, Palo Alto, CA, USA
- California Institute of Technology, Pasadena, CA, USA

## PATENTS AND LICENCES

Various software, patents pending





## UMR MIVEGEC

→ [www.mivegrec.ird.fr](http://www.mivegrec.ird.fr)

- 👤 Director : **Frédéric SIMARD (IRD)**  
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### *Joint Research Unit for Infectious Diseases and Carriers*

*The Joint Research Unit (UMR) in association with the IRD, the CNRS (National Centre for Scientific Research) and the University of Montpellier. Main premises at the IRD of Montpellier.*



## RESEARCH ACTIVITIES

### Research subjects

The MIVEGEC (Infectious Diseases and Carriers: Ecology, Genetics, Evolution and Control) mission is to understand the process of replication and transmission of infectious agents in order to control them better. Research and analysis focus on the dynamics of transmission, potential vectors, and adaptation and evolutionary strategies and mechanisms (in particular genetic) of host-pathogen complexes. Our research should lead to new methods for combating disease. Research by MIVEGEC is carried out on various models, across different continents and on different scales : ecosystems, host populations (vertebrates, invertebrates), vector populations and pathogenic agent populations (viruses, bacteria, parasites) by integrating the links between the different components. The primary infectious models being tackled are as follows : Leishmania/sandflies, Plasmodium/Anopheles, Trypanosoma/Triatoma, Arboviruses/Aedes - Culex, Borrelia - Babesia/Ixodidae, insect pathogens, Buruli ulcer, toxoplasmosis, Mycobacterium and tuberculosis, cholera, meningitis, Ebola, influenza virus.

The various models studied bring an important wealth of diversity to the Unit. The Unit is made up of 5 research teams located in Benin, Burkina-Faso, Cameroon, the Ivory Coast, Gabon, Senegal, Thailand, Vietnam and France, including Guyana and Reunion, and in collaboration with numerous other countries of the South.

### Major research programme

- BioGeppe : Biology, Genetics and Pathology of Eukaryotic Pathogens
- EEPI : Ecology & Evolution of Parasite Interactions
- ESV : Evolution of Scalable Vector System
- GeneSys : Biodiversity of Infectious Systems: from the Gene to the Ecosystem
- SEE : Health, Ecology, Evolution

### ► Main action in Reunion :

Development of the TIS or «Sterile Insect Technique» (financial partners : Ministry of Health, the EU and the Reunion Region).

## PUBLICATIONS MAJEURES

- Average number of annual publication : 170

Link : <http://www.mivegrec.ird.fr/> rubrique «Publications»

## EXPERTISE

The Unit's scientists carry out national and international assessments in their areas of competence: entomological and parasitological reference collections, surveillance and vector control; product evaluation, structure, strategy, risk, insecticide resistance: studies and recommendations.

### Technical platforms and advanced equipment

Vectopôle : Insectarium I2 and I3 and common genotyping platforms (Labex CeMEB) in Montpellier.

## PATENTS AND LICENCES

3 patents obtained in 2011-2014



Director : **Patrick MAVINGUI**  
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## UMR PIMIT

→ [www.univ-reunion.fr/umr-pimit](http://www.univ-reunion.fr/umr-pimit)

*Joint Research Unit for Infectious Processes in Tropical Island Environments*

*UMR (Joint Research Unit) for Infectious Processes in Tropical Island Environments (UMR PIMIT)*



The UMR PIMIT was created on 1 January 2015 by the University of Reunion and the research organizations INSERM (National Institute for Health and Medical Research), CNRS (National Centre for Scientific Research) and IRD (Development Research Institute). It resulted from the merger between GIS CRVOI (Research and Monitoring Centre for Emerging Diseases of the Indian Ocean/Scientific Interest Group) of the EA (Host Team) 4517 GRI.

### RESEARCH ACTIVITIES

The PIMIT Unit is specialized in the investigation of infectious diseases, particularly those with epidemic potential in the South-West region of the Indian Ocean. Researchers aim to understand the epidemic and/or endemic emergent mechanisms of pathogens in humans and animal and environmental breeding grounds through a «one health» ecosystemic approach. Research into infectious processes at the molecular level, notably the immune, cellular and clinical levels, and in animal models, aim to identify the protective or awareness mechanisms vis à vis pathogens, or to learn about the variability in pathogen-host interactions in order to develop innovative diagnostic and preventive tools and strategies.

### Research subjects

- Emerging and endemic infectious diseases
- Ecosystemic dynamics of infectious diseases
- Immunopathology et autoimmunity
- Anti-infection strategy and vector control

### Major research programmes :

- Ecosystemic and genetic investigations of determinants involved in the adaptation, evolution and crossing of the species barrier by infectious agents (viruses, bacteria, protozoa) and their transmission to humans through vectors (mosquitoes, ticks, fleas) and wild/synanthropic animals (rodents, bats, migratory birds) in tropical environments of the South-West region of the Indian Ocean ;
- Pre-clinical investigations using cellular models (insect and mammalian cells) and animals (humanized mice, rats hamsters) to study the biology (virulence, pathogenicity) of pathogenic agents (notably arboviruses and *Leptospira* bacteria) and the variability of responses in the host ;
- Clinical investigation into hospital cohorts to learn about the immunopathophysiological process triggered in humans by emergent zoonotic pathogens (e.g. the Chikungunya virus and *Leptospira* bacteria) and to propose innovative diagnostic tools and appropriate therapeutic strategies.



## PUBLICATIONS

Some highlights of the major work carried out in Reunion and the Indian Ocean region by the PIMIT Unit members :

- Identification of the role of wildlife breeding grounds (bats, mammals, migratory birds) and arthropod vectors (mosquitoes, ticks, fleas), either endemic or introduced, for tropical endemic or potentially epidemic pathogens (bacteria, viruses, protozoa) in the South-West region of the Indian Ocean ;
- First manifestation in the South-West region of the Indian Ocean of human infection with the genotype 3 hepatitis E virus indicating zoonotic transmission ;
- Description of the role of innate immunity in the pathophysiological processes mobilized by the Chikungunya virus in target tissues, and the role of acquired immunity in T and B cellular induction. Plus, the study of patient cohorts highlights chronic suffering with neurological complications or rheumatoid arthritis ;
- Implementation of the TIS (Sterile Insect Technique) programme for the control of tiger mosquito (*Aedes albopictus*) populations.

## EXPERTISE

- The UMR PIMIT has an outstanding biobank (tissue, blood, plasma, urine, nucleic acid) collected from endemic or introduced wildlife enabling investigation into the presence of infectious agents in the animals' blood with pathogenic potential for humans, and the assessment of the risk of epidemic outbreak.
- Expertise in microbiological risk and the construction of cohorts
- Expertise in the manipulation of level-3 pathogens

## Technical platforms and advanced equipment

- Equipment for : virology, bacteriology, biochemistry, molecular and cell biology, histology, recombinant proteins, monoclonal and polyclonal antibodies, microscopy, cell culture, virology.
- PIMIT has an outstanding animal biobank (tissue, blood, plasma, urine, nucleic acids) enabling investigation into the breeding grounds of zoonotic pathogens.

## COLLABORATION

### ► Local

UMRS (CMAEE (Exotic Animal and Emergent Disease Control), DETROI (Diabetes and Treatment for the Indian Ocean), ENTROPIE (Biocomplexity of Coral Reef Ecosystems in the Indo-Pacific), MIVEGEC (Infectious Diseases and Carriers : Ecology, Genetics, Evolution and Control)), CIC-EC (Centre for Clinical Investigation - Clinical Epidemiology), CIRE (Antilles-Guyana Regional Epidemiology Unit), LAV (vector control), INVS (French Institute for Public Health Surveillance), ARS (Indian Ocean Health Agency), CHU (University Hospital Centre).

### ► Régional

Vahatra Association (Madagascar), IP Madagascar, academic institutions of the CIO (Indian Ocean Commission) (Comoros, Madagascar, Mauritius, Seychelles), Mayotte.

### ► National

ANSES (French Agency for Food, Environmental and Occupational Health and Safety), CEA (Reunion Insurance Company), Malardé Institute (Tahiti), UMRS : BF2i (Laboratory for the Biological Function and Interactions of Insect Pests), CEFE (French Ecology Research Centre), ECOMIC (Microbial Ecology Laboratory of Lyon), EPV (Emergence of Viral Pathologies), IP Paris, ISEM (Montpellier Institute of Evolutionary Sciences), LBBE (Laboratory of Evolutionary Biology and Biometry), MIVEGEC (Infectious Diseases and Carriers : Ecology, Genetics, Evolution and Control), UMRS 707, UMRS 945, URMITE (Joint Research Unit for Emerging, Tropical and Infectious Diseases).





### ► International

CR ENEA (Italy), Field Museum of Chicago (USA), Instituto FIOCRUZ (Brazil), Kentucky University (USA), Liverpool University (UK), NIH Maputo (Mozambique), Pirbright Institute (UK), Pretoria University (SA), Western University (Australia).

### Desire to collaborate

Partnerships with the socio-economic sector.

# CEPOI

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## Indian Ocean Perinatal Research Centre

Statuts : EA.



### RESEARCH ACTIVITIES

#### Research subjects

- Perinatal epidemiology
- Clinical research
- Neonatal pharmaco-surveillance
- Learning about health simulators

#### Major research programmes

B-PEN (automated benchmarking of neonatal intensive care units in France : NUTRITION in neonatology ; SIMUL-RUN (learning methods regarding intensive care units among midwifery students) ; LOGIPREN (consultation and utilisation of a national neonatology pharmaco-surveillance base ; ProHémie (cardiocirculatory adaptation of very preterm babies) ;

### PUBLICATIONS

- Average number of annual publications : 15
- Ferdynus C, Quantin C, Abrahamowicz M, Burguet A, Sagot P, Gouyon JB.
- Comparison of the ability of alternative birthweight and fetal weight standards to identify preterm newborns at increased risk of perinatal death. *BJOG*. 2013 May 31. doi : 10.1111/1471-0528.12282 . / . Total plasma protein in very preterm babies: prognostic value and comparison with illness severity scores.
- Iacobelli S, Bonsante F, Quantin C, Robillard PY, Binquet C, Gouyon JB.
- *PLoS One*. 2013 Apr 16;8(4):e62210. / . Antenatal factors associated with perinatal arterial ischemic stroke.q.
- Darmency-Stamboul V, Chantegret C, Ferdynus C, Mejean N, Durand C, Sagot P, Giroud M, Bejot Y, Gouyon JB./.

- *Stroke*. 2012 Sep;43(9):2307-12 . / . Neonatal problems of late and moderate preterm infants.
- Gouyon JB, Iacobelli S, Ferdynus C, Bonsante F.
- *Semin Fetal Neonatal Med*. 2012 Jun ; 17(3) : 146-52. / .
- Inositol phosphoglycan P-type in infants of preeclamptic mothers.
- Scioscia M, Robillard PY, Hall DR, Rademacher LH, Williams PJ, Rademacher TW.
- *J Matern Fetal Neonatal Med*. 2012 Feb ; 25(2) : 193-5.

### EXPERTISE

- Expertise in neonatal pharmacology/therapies and nutrition with private laboratories and the DGOS (General Directorate for Healthcare Provision).

### COLLABORATION

#### ► National

Economies of the health (Prof. S Béjean, Laboratory for Economy and Management (UMR (Joint Research Unit), CNRS (National Centre for Scientific Research), University of Bourgogne) ; biostatistics and epidemiology (Prof. C Quantin, INSERM (National Institute for Health and Medical Research) (U866).

#### ► International

Department of biostatistics and epidemiology at the Mc Gill University Canada ; Prof. M Abrahamowicz) ; cognitive psychology by Prof. JM Boucheix (Mrs E Bonnetain, LEAD-CNRS UMR 5022, University of Bourgogne).





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**LE<sup>2</sup>P**

➔ [www.laboratoires.univ-reunion.fr/le2p/site](http://www.laboratoires.univ-reunion.fr/le2p/site)

*Laboratory For Energy, Electricity And Processes*

*Statut : Equipe d'accueil de l'Université de La Réunion (EA 4079).*



## RESEARCH ACTIVITIES

### Scientific Operation

LE2P is developing three scientific operations to contribute to the smart management of intermittent energy :

1. Solar Resources : variability in Reunion and the tropics, metrology and modelling ;
2. Energy storage and conversion: A-cell fuel and hybridisation systems ;
3. Energy optimisation of WSN sensor network.

The scientific matters related to each scientific operation are as follow :

#### Solar Resources : variability in Reunion and the tropics, metrology and modelling

- Predicting the quality and quantity of solar resources for D + 1 and H + 1
- Determining the sensitivity of the radiation on climate change
- Estimating the solar resources and predicting its growth on a regional scale (10km)
- Determining the components of the solar radiation at a scale of 10km then 100m of resolution

#### Energy storage and conversion : A-cell fuel and hybridisation system

- Determining the ageing conditions of the proton exchange membrane and the performance of the CAP
- Optimising CAP-based hybrid energy storage systems

#### Energy optimisation of sensor networks

- Minimising energy consumption of a sensor network
- Recovering energy in wireless sensor networks for use with instrumentation and measurement

#### Major research programme

- CI\_GS (2010 - 2013) : Réseau de Capteurs Intelligents pour une meilleure connaissance du Gisement Solaire (smart sensor network for a better understanding of Solar Resources)
- AXISol : Analyse des Corrélations de l'Irradiance Solaire dans la zone sud-ouest de l'Océan Indien (correlation analysis of solar irradiance in the South-West area of the Indian Ocean (2014 - 2015))
- GEO\_SUN : Gisement solaire: mesures, évaluation, coopération (2014 - 2015) (solar resources : action, assessment, cooperation (2014 - 2015))
- ORC.HY.RE (2013 - 2015)
- ASIA STIC (2010 - 2012)
- CARERC (2013 - 2015) CARTographie Electromagnétique par Réseaux de Communications (electromagnetic mapping via communications networks)
- RCSF optimised routing for maximising the lifespan of wireless sensor networks (2013 - 2014)
- Real-time testing of a production and hybrid electrical energy storage system (2013 - 2014)
- SECTEUR H2 Storage and production of energy through the hydrogen vector for optimal use of the renewable resources of Reunion
- VERT (2013) Véhicule Electrique pour une Réunion Technologique (electrical vehicles for a technological Reunion)



## PUBLICATIONS

- Average number of annual publications : 6 ACL - 8 C-ACT
- Fast NMPC scheme of a 10 kW commercial PEMFC  
International Journal of Hydrogen Energy, Volume 38, Issue 18, June 2013, pp.7407-7413 Damour C\*, Benne M\*, Kadjo J-J A\*, Rosini S\*\* and Grondin-Perez B\*  
\* LE2P, University of La Reunion  
\*\* LITEN, CEA France
- A clustering algorithm based on energy variance and coverage density in centralized hierarchical Wireless Sensor Networks (accepted for publication at the IEEE AFRICON 2013 conference sept. 2013)  
IEEE AFRICON 11th edition, Volume, Issue, sept 2013 2013, pp. Randriatsiferana R-S-A\*, Alicalapa F\*, Lorion R\* and Aquil-Mirza Mohammed\*\*  
LE2P 34/74  
\* LE2P, University of La Reunion  
\*\* Birla Institute of Technology and Science (BITS), Dep. of Electrical and Electronics Engineering, Pilani, Rajasthan, India
- A Method for Mapping Monthly Solar Irradiation Over Complex Areas of Topography : Reunion Island's Case Study  
Climate Smart Technologies - Integrating Renewable Energy and Energy Efficiency in Mitigation and Adaptation Responses, Volume 978-3-642-37752-5 (ISBN), Issue, 2013, pp.295-306  
Miloud Bessafi, Béatrice Morel, Jean-Daniel Lan-Sun-Luk, Jean-Pierre Chabriat and Patrick Jeanty
- Ultra-Low Power, Low Voltage, Self-Powered Resonant DC-DC Converter for Energy Harvesting  
Journal Low Power Electronic, Volume 9, Issue, April 2013, pp.103-107  
Salah-Eddine Adami\*\*, Nicolas Degrenne\*\*, Walid Haboubi\*, Hakim Takhedmit\*, Denis Labrousse\*\*\*, François Costa\*\*\*, Bruno Allard\*\*, Jean Daniel Lan Sun Luk, Laurent Cirio\*, Odile Picon\*, and Christian Vollaire\*\*  
(\* ) ESYCOM, Univ. Paris-Est Marne La Vallée, (\*\* ) AMPERE, Ecole Centrale de Lyon, (\*\*\*) SATIE, Ecole Normale Supérieure Cachan
- Clustering daily solar radiation from Reunion Island using data analysis methods.  
International Conference on Renewable Energy and Power Quality, ICREPQ 13, Volume, Issue, March 2013, pp. P. Jeanty, M. Delsaut\*, L. Trovalet, H. Ralambondrainy\*, J.D. Lan-Sun-Luk, M. Bessafi, P. Charton\*, J.P Chabriat (\*) LIM, Université de La Réunion
- Innovative model-based control approach of a proton exchange membrane fuel cell system  
Journal of Power Sources, Volume 206, Issue 0, 2012, pp.144 - 152  
Damour C.\*, Grondin D.\*, Benne M.\*, Grondin-Perez B.\*, Deseure J.\*\* and Chabriat J.-P.\*  
\* LE2P, University of La Reunion  
\*\* LEPMI, UMR CNRS 5279, France

## EXPERTISE

Solar metrology - thermal metrology - RF and HF metrology - DAQ National Instruments - DAQ Campbell Sci - Multiphysical Modelling - Optimisation - Control Command - Development Data Warehouse

### Technical platforms and advanced equipment

Solar Resource Sensor Networks (12) - Weather Reference Station - Artificial Sun - pyranometer calibration bench - CAP H2Driver (PV electrolyser, H2 storage, CAP) - DAQ NI (4) - Metrology Environment HF (analysers vector, 4-channel oscilloscope, signal generator, spectrum analyser, PNX) - Data Warehouse (2)

## COLLABORATION

### ► Local and national

- TEMERGIE
- EDF
- ENERTIME
- ADEME
- RENAULT
- TENESOL
- Group DIJOUX
- TEE0
- Ville du Port
- GDR Waves
- GDR HYSPEC
- LEAT, Laboratory of Electronics, Antennae and Telecommunications, Nice
- LEPMI, Laboratory of Electrochemistry and Physical Chemistry of Materials and Interfaces, Grenoble
- LITEN, Laboratory for Innovation in New Energy Technologies and Nanomaterials, Nantes
- PPRIME, Research and Engineering in Mechanical and Energy Materials for Transport, Energy and the Environment, Poitiers
- LEMTA, Laboratory of Energy and Theoretical and Applied Mechanics, Nancy
- Climatology Research Centre, Dijon

### ► International

- International Centre for Theoretical Physics
- Nankai University, China
- University of Mauritius
- University of Kwazulu Natal
- IT Delhi
- University of Sfax
- Ville de Durban

### Desire to collaborate: (ongoing)

HySA (Hydrogen South Africa - <http://hysasystems.com/>)- AREVA

## PATENTS AND LICENCES

Patent «A synchronised emission device for ultra-high frequency waves in phase and frequency and processed from the device»





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## PIMENT

➔ [www.piment.univ-reunion.fr](http://www.piment.univ-reunion.fr)

**Laboratory for Physics and Mathematical Engineering for Energy and the Environment**

*Statuts : Host team: EA4518*



### RESEARCH ACTIVITIES

#### Research subjects

##### Energy efficiency for buildings, neighbourhoods and towns

- Positive Energy buildings and neighbourhoods : design, applications, thermal behaviour, user behaviour
- Building physics
- Building envelopes: energy storage, ventilated walls, green roofs
- Air quality and comfort : thermal and fluid mechanics, thermal, visual, acoustic and olfactory comfort
- Control/command and real-time optimisation : smart building
- Sustainable and organically sourced materials : repurposing or otherwise of waste and organic materials

##### Sustainable energies

- Potential resources: wind, temperature, solar radiation
- System behaviours/optimisation of components : SWAC (air conditioning by cold sea water), PAT ETM (Thermal Sea Energy), solar cooling, photovoltaics (Thermal), air conditioning and cooling systems
- Bioenergies : production of biogas from waste
- Predictions, real-time control, control-command: of resources, with injection into a smart grid
- Energy storage
- Intensification of transfers
- Treatment of intermittence

*Scientific obstacles removed in the following areas : heat science, thermodynamics, optimisation, model analysis, mechanics, fluid mechanics, urban engineering, thermal engineering, power engineering*

##### Major research programme

- Study of accelerated ageing of photovoltaic and thermal solar components and systems and climate correlations via multi-site platforms, DURASOL, equipment of excellence, ANR EQUIPEX

- Emulation reduction techniques ; sensitivity analysis and reversal of hydrology transfer models, RESAIN, ANR
- Forecast reliability of energy performance of buildings, Reliability, ANR
- Comfort in Warm Climates without Air Conditioning, 4C, ANR
- Method for Ensuring Performance of Solar Air Conditioning and Heating Installations, MEGAPICS, ANR
- A hybrid storage of renewable electricity in Overseas Territories, ENERSTOCK OSEO FUI
- Net Zero Energy Solar Buildings, International Energy Agency, AIE SHC Task 40, ADEME
- Wave Energy : Seawatt, SEAWATT, ADEME
- Using deep-sea resources of the Indian Ocean Prospective study for the exploitation of thermal sea energy, DEEP BLUE, ADEME
- Short-term predictions of photovoltaic production, Solfin, ADEME
- Thermodynamic Solar Concentration, Solartherm, Région
- Prototype Earth, Thermal Energy of the Seas, PAT-ETM, DCNS
- Phase Changing Materials, MCP, Région
- Green Roofs, TV, Région
- RESINNOVRUN, Région
- DVPT BIOENERGIE, Région
- EVAL NUM THERM, MAUVILAC
- Energy efficiency of insulating concrete in hot climates, LAFARGE-LCR
- Repurposing waste, BIO DECHET, CINOR
- Repurposing waste for energy, RVE
- Thermal Efficiency of Green Roofs, SAPEF
- Repurposing of sludge from wastewater treatment plants : study of biogas potential, CILAM
- SOLEKA Technopole Incubator
- DHOME Technopole Incubator

### PUBLICATIONS

- 25 international publications per year
- Fahs, M.; Younes, A.; Mara, Thierry, «A new benchmark semi-analytical solution for density-driven flow in porous media», *Advances in Water Resources*, (2014) 24-35

- Guichard, Stéphane; Miranville, Frédéric ; Bigot, Dimitri; Boyer, Harry, «A thermal model for Phase Change Materials in a building roof for a tropical and humid climate : Model description and elements of validation», Energy and Buildings, (2014) <http://www.sciencedirect.com/science/article/pii/S0378778813007952>
- Anstett-Collin, Floriane ; Mara, Thierry ; Basset, Michel, «Application of global sensitivity analysis to a tire model with correlated inputs», Simulation Modelling Practice and Theory, (2014) 54-62
- Morillon, Jean-Paul, «SOLVING WENTZELL-DIRICHLET BOUNDARY VALUE PROBLEM WITH SUPERABUNDANT DATA USING REFLECTING RANDOW WALK SIMULATION», Methodology and Computing in Applied Probability, (2013) 1-23
- Adly, Samir ; Chau, Oanh, «On some dynamic thermal non clamped contact problems», Mathematical Programming B, (2013) 5-26
- Bigot, Dimitri ; Miranville, Frédéric; Boyer, Harry ; Bojić, Milorad ; Guichard, Stéphane ; Jean, Aurélien, «Model optimization and validation with experimental data using the case study of a building equipped with photovoltaic panel on roof : Coupling of the building thermal simulation code ISOLAB with the generic optimization program GenOpt», Energy and Buildings, (2013) 333--347
- Brogliato, Bernard ; Goeleven, Daniel, «Existence, uniqueness of solutions and stability of nonsmooth multivalued Lur'e dynamical systems», Journal of Convex Analysis, (2013) 881-900
- David, Mathieu ; Lauret, Philippe ; Boland, John, «Evaluating tilted plane models for solar radiation using comprehensive testing procedures, at a southern hemisphere location», Renewable Energy, (2013) 124--131
- Desrayaud, G.; Chénier, E.; Joulin, A.; Bastide, Alain; Brangeon, Boris; Caltagirone, J.P.; Cherif, Y.; Eymard, R.; Garnier, C.; Giroux-Julien, S.; Harmane, Y.; Joubert, P.; Laaroussi, N.; Lassue, S.; Le Quere, P.; Li, R.; Saury, D.; Sergent, A.; Xin, S.; Zoubir, A., «Benchmark solutions for natural convection flows in vertical channels submitted to different open boundary conditions», International Journal of Thermal Sciences, (2013) 18-33
- Jaohindy, Placide ; McTavish, Sean ; Garde, Francois ; Bastide, Alain, «An analysis of the transient forces acting on Savonius rotors with different aspect ratios», Renewable Energy, (2013) 286-295
- Jaohindy, Placide ; Ennamiri, H.; Garde, Francois; Bastide, Alain, «Numerical investigation of airflow through a Savonius rotor», Wind Energy, (2013) n/a-n/a
- Lauret, Philippe ; Boland, John ; Ridley, Barbara, «Bayesian statistical analysis applied to solar radiation modelling», Renewable Energy, (2013) 124--127
- Mamode, Malik, «Two Phase Stefan Problem with Boundary Temperature Conditions: An Analytical Approach», SIAM Journal on Applied Mathematics, (2013) 460--474
- Martins, Matthieu ; Sinama, Frantz ; Lucas, Franck, «Equivalent Gibbs systems for modelling an onshore OTEC experimental plant on Reunion Island», International Journal of Energy Research, (2013) 1112-1121
- Paris, D.; Liefoghe, C.; Estienne, I.; Grout, C.; Bosredon, P.; Grégoris, M.; Leduca, Divya; Lusso, B., «Penser et produire la ville au 21ème siècle : du territoire apprenant à la ville expérimentale», Revue Urbia, (2013) à paraître

## EXPERTISE

We provide expertise to national organisations : ANR (BLANC, HABISOL, Générique, Digital Methods, Sustainable Cities), OSEO (business funding body), CEA, Ministries

- We can provide expertise in : Thermal Transfer, Optimisation, Thermodynamic Systems, Analysis, Mechanics, Fluid Mechanics, Digital Methods, Sensitivity Analysis, forecasting and prediction techniques of systems and their optimisation.

## Technical platforms and advanced equipment

- ENERPOS (positive energy buildings)
- Scale 1 experimental platforms for physics experiments on buildings : full weather station, solar tracker, PV field test bench.

## COLLABORATION

- Collaborations with national organisations : CEA, CEA/INES, CNRS (National Centre for Scientific Research), ADEME
- Collaborations with major groups/national or international SMBS : Lafarge LCR, SOMFY, EDF R&D, etc.
- Collaborations with the universities of Madagascar, Mauritius, Australia, New Zealand, US, Serbia, etc.

## Desire to collaborate

Expertise, collaborative projects, prototypes, experiments, modelling...

## PATENTS AND LICENCES

- ECODOM approval, thermal comfort and energy efficiency for housing
- Outil de Performance Energétique (PERENE) (Energy Performance Tool)
- Thermal stimulation software for buildings (CODYRUN)
- Energy waste repurposing software, energy waste repurposing
- Fluid Mechanics Software
- Predictive software for intermittent resources







# PART 3

## TRANSFERT FACILITATORS



Resources centres / Technical Platforms



Professional associations / Clusters



Support and development organisations





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## CIRBAT

➔ [www.cirbat.re](http://www.cirbat.re)

*CIRBAT (Centre for Innovation and Research of Tropical Construction) is accredited by the Ministry of Economy as an «innovation hub for trade and small businesses» since 2009. CIRBAT is a service provided by the Chamber of Trades and Crafts for the Isle of Reunion.*



### POSITION WITHIN THE INNOVATION CHAIN

- Generation
- Detection
- Qualification
- Emergence
- Development
- Monitoring

### ASSIGNMENT

CIRBAT'S work involves adapting construction materials and the way they are used as well as the standards governing the construction industry to the constraints of a tropical environment in order to allow companies to access local material and human resources needed to innovate their techniques and products as part of an integrated approach of sustainable development.

CIRBAT also aims to provide construction industry workers with coherent and relevant technical training and studies, knowledge sharing and innovation support.

### INFRASTRUCTURES

- LEM : Joinery testing lab - contact : [Willy.nalatiapouille@cm-reunion.fr](mailto:Willy.nalatiapouille@cm-reunion.fr)
- LVM : Laboratory for the Ageing of Materials - contact : [Frederic.chanfin@cm-reunion.fr](mailto:Frederic.chanfin@cm-reunion.fr)
- ORLAT : Regional Observatory for Termite Prevention - contact : [jerome.vuillemin@cm-reunion.fr](mailto:jerome.vuillemin@cm-reunion.fr)
- Laboratories complying with the recommendations of the NF EN ISO 17025 standard Air Wind Water test bench linked to the COFRAC (French Accreditation Committee) calibration chain

- MATRIX : Technical Support, Research, Innovation, Certification and Environment Assignment

### SERVICES TO PROJECT DEVELOPER

- Innovation diagnostics
- CAP'Innovation : Innovation Project Support Agreement : technical support for companies with developing products and techniques for tropical environments
- Standardised testing (ORLAT, LEM, LVM)
- Technical assistance: innovation, certification, the environment...
- Technical training
- Certification, standardisation

### NETWORKS AND COLLABORATION

- Chambers of trades and crafts
- Innovation hub network
- Professional organisation
- Technical centres, laboratories, universities : FCBA (technical centre for forestry, construction, etc.), CSTB (Scientific and Technical Centre for Construction), PIMENT Laboratory (Laboratory for Physics and Mathematical Engineering for Energy and the Environment), ESIROI - CODE (Reunion School of Engineering), CIRAD (Agricultural Research for Development), CESI (Higher Education Institute), CAUE-EnviroBAT (Consultancy for Architecture, Urbanisation and the Environment)
- Administrations
- Standardising bodies (AFNOR (industrial standards authority), CEN, ISO, SBS)



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## CRITT

→ [www.reunion.cci.fr/innovation](http://www.reunion.cci.fr/innovation)

*Regional Centre for Innovation and Technology Transfer. CRITT is associated with the Reunion Chamber of Commerce and Industry (CCIR). It is accredited as a «Centre of Technological Resources» (CRT) by the French Ministry for Research*



### RESEARCH TOPICS OR SERVICES

- Consultation in technological development : technological development consultants provide various types of responses to companies queries. They help to identify technological needs and formalise the company's strategic objectives. This involves a free service generally limited to half a day
- Strategic and technological information : associated centre AFNOR (industrial standards authority), the Regional Agency of Scientific and Technological Information (ARIST) is a resource centre concerning regulation and French or overseas standards. Official partner of the INPI (National Institute for Intellectual property), it advises on industrial and intellectual protection
- Food safety : CRITT supports companies with best practice in food hygiene, such as HACPP and all its different stages and ISO 22000 certification (or IFS - BRS)
- Sensory analysis : additional microbiological and physico-chemical analyses, sensory analysis is a decision-making support tool for agri-food manufacturers, particularly for the launch of a new product. The laboratory is COFRAC (French Accreditation Committee) no. 1-1792 accredited
- The development of agri-food products : to develop food products, CRITT has a newly equipped R&D laboratory. Its technicians and engineers develop products and manufacturing processes. They carry out control tests in laboratories, monitor company production and train staff
- Organisational engineering and strategic management : CRITT QSE (Quality Safety Environment) diagnoses, trains and supports

companies with improving their performance : quality, safety, environment, CSR and models of excellence

- Metrology : the CRITT metrology laboratory standardises masses and temperature and distance measuring instruments (COFRAC certified)
- Industrial automation and rapid prototyping : CRITT assists with the CAD of objects with very quick turnaround times for 3D and colour models thanks to the rapid prototyping equipment. This means the design can be approved from an aesthetic, geometric, functional and technological point of view.
- Regional cooperation : CRITT Reunion provides all of its tools in the IO zone as part of private assignments and public partnerships.

### INFRASTRUCTURES

- Centre for information on standardisation and Industrial Property
- Sensory analysis laboratory COFRAC n° 1-1792 accredited
- Metrology laboratory COFRAC accredited - n° 2-1455 for masses and n° 2-5584 for temperatures
- Agri-food R&B laboratory
- Rapid prototyping laboratory





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**CYROI**

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*Bio-innovation health research (CYROI)*



**POSITION WITHIN THE INNOVATION CHAIN**

- Nature : Biotechnological platform
- Sectors : Health, bio-economics

**ASSIGNMENT**

- **RADIOPHARMACY**

The radiopharmaceutical production unit manufactures an injectable radiotracer called 18-FDG. The daily preparation of this medicine means patients of the Reunion CHU (University Hospital Centre) can be given an early cancer detection examination using PET (Positron Emission Tomography) imaging.

- Research focused on three strategic theme
  - Emerging infectious diseases
  - Metabolic diseases (diabetes, obesity, hypertension) GEICO (study group for chronic inflammation and obesity)

Relationship between adipose tissues and susceptibility of the central nervous system to trauma, oxidative stress and cell interactions with diabetes/obesity, adipose tissue, the endocannabinoid system, toll-like receptors and inflammation, screening of active ingredients for the development of new therapeutic approaches for emerging and infectious pathologies and diseases.

- Development of terrestrial and marine biodiversit

The platform includes APLAMEDOM (Association for the Aromatic and Medicinal Plants of Reunion) and ARVAM (Agency for Marine Research and Development)

**SERVICES TO PROJECT DEVELOPERS**

**CB-TECH BIOTECHNOLOGY COMPANY INCUBATOR**

CYROI provides innovative companies operating in the life sciences and biotechnology sector with premises and tailored support within the CB-TECH biotechnology company incubator.

**Service provision and training :**

La RMN et l'unité analytique répondent à des demandes spécifiques : élucidation de structures moléculaires, détection des pesticides dans l'eau, détection d'antibiotiques dans la viande, des stupéfiants dans le sang...

**NETWORKS AND COLLABORATION**

International scientific cooperation from industry players involved with the platform are extensive as part of the call for European projects (FP7 - Regpot), of programme within the C.O.I. (Indian Ocean Commission), of bilateral relations (India, Madagascar, Mauritius).

**STRUCTURE OF THE BOARD**

- **President** : Mohamed ROCHDI, President of the University of Reunion
- **Vice-President** : Lionel CALENGE, Director of the Reunion University Hospital Centre
- **Deliberative members** (10)
- **Consulting members** (3)





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## HYDRÔ RÉUNION

→ [www.arda.fr](http://www.arda.fr) → [www.hydrounion.re](http://www.hydrounion.re)

*Reunion Association for the Development of Aquaculture*

*This association is accredited as a «Centre of Technological Resources» (CRT) by the French Ministry for Research*



### PRESTATION AUX PORTEURS DE PROJETS

A law 1901 association, Hydrô Réunion was created in November 1991 under the initiative of the Regional Council of Reunion in order to support the development of the island's aquaculture industry.

Since 2007, Hydrô Réunion has enjoyed the status of Centre of Technological Resources issued by the Ministry of Higher Education and so functions as a CRITT (Regional Centre for Innovation and Technology Transfer).

Today, given the diversity of its activity, the association is a technical centre that is internationally recognised for its know-how and work in Research and Development in 3 different areas :

- Tropical aquaculture and related biotechnologies ;
- Ecologies of aquatic environments and water engineering ;
- Coastal and deep-sea fishing.

Hydrô Réunion also provides scientific and technological knowledge export in the fields of :

- Scientific mediation ;
- Technical cooperation.

### INFRASTRUCTURES

#### Antenne Sud - Headquarters - ETANG SALE

- A mainland aquaculture station : a fish rearing station (ECLOSIA), production pool
- A freshwater ecology laboratory

#### Antenne Ouest - LE PORT

- A marine aquaculture station : a marine hatchery, live prey breeding room, a marine fish hatchery, algae culture room, a marine fish hatchery, larval breeding room, an offshore cage, farming pilot plant, an onshore breeding pilot unit.

#### Antenne Nord - CYROI (bio-innovation health research organisation) - TECHNORD/Sainte-Clotilde

- A research laboratory (CBEM = biotechnology and marine environment cell) with themes focusing on the study of marine biotoxins and biotechnology through the development of microalgae and an analytical laboratory for the marine environment.

### PARTNERSHIPS

#### ► National

IRD (Development Research Institute), CIRAD (Agricultural Research for Development), IFREMER (French Research Institute for Exploitation of the Sea), INRA (Science and Impact Research Centres), UNIVERSITY, CNRS (National Centre for Scientific Research), MUSEUM OF PARIS

#### ► Indian Ocean





Darwin Aquaculture Centre (Australia), IHSM (Fisheries and Marine Sciences Institute) (Madagascar), INAQUA (Mozambique), Albion Research Centre (Mauritius)

#### ► International

University of Virginia Tech (US)



# OPAR

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→ <http://lacy.univ-reunion.fr/activites/station-du-maido-opar/>

*Reunion Observatory for Physics and the Atmosphere*  
*Statuts : Joint Research Unit (UMS) 3365*



## RESEARCH ACTIVITIES

### Research subjects

OPAR stands for the Reunion Observatory of Atmospheric Physics and includes the atmospheric observatory at Maïdo, at an altitude of 2,610 m and with observation rooms located on the campus of the University of Moufia and the Gillot meteorological station seen on the Météo-France website. OPAR is part of the OSU-Reunion (Reunion Observatory of Sciences of the Universe) and is managed by an agreement between the University of Reunion and the INSU-CNRS (National Institute of Sciences of the Universe-National Centre for Scientific Research). Several research laboratories work with OPAR. Reunion has the Mixed Services Unit (UMS 3365) of the OSU-R and LACY (Laboratory for the Atmosphere and Cyclones). On mainland France are numerous other laboratories : LATMOS (Laboratory for the Atmosphere, the Environment and Spatial Observation), LOA Laboratory of Atmospheric Optics, Lille), LaMP (Laboratory for Physical Meteorology, Clermont-Ferrand), LA (Laboratory of Aerology, Toulouse), and LSCE (Laboratory for the Climate and Environmental Sciences)

OPAR's research subjects are related to the study of atmospheric processes, the climate, and climate change. All the details of OPAR's geographical positioning (southern hemisphere, subtropical belt, Western Indian Ocean basin, at an altitude of 2,160 m, on the windy side of the island) are all advantages, meaning OPAR is becoming a strategic observatory at the international level.

**The first OPAR mission** is to assist with the operation of numerous international observation networks for the atmosphere and the climate : NDACC (Network for the Detection of Atmospheric Composition Changes), SHADOZ (Southern Hemisphere ADitional OZone sondes), AERONET (Aerosols Robotic Network), ICOS (Integrated Carbon Observing System), TCCON (Total Column Carbon Observing Network), ICOS (Integrated Carbon Observation System), et GAW/WMO (Global Atmospheric Watching/World Meteorological Organization). The mission is therefore to carry out long-term observation of atmospheric and climatic parameters set by these networks. These observational activities are approved and comply with specific protocols in terms of their standardisation, quality, accuracy and duration. They add to the databases of these international networks, freely accessible for all atmospheric and climatic research communities.

**OPAR's second mission** is research into atmospheric and climatic processes specific to the South-West region of the Indian Ocean. For this, OPAR organises experimental campaigns through national and international collaborations with periods of intensive observation dedicated to research into one or several atmospheric processes. The aims of these campaigns can vary greatly and include changes to interfaces (atmosphere-ocean, atmosphere-biosphere, stratosphere-troposphere), the dynamics and composition of the UTLS (Upper Troposphere Lower Stratosphere) zone, the study of deep storm convection, the large-scale transport of air pollutants, the dynamics of the recovery of the stratospheric ozone layer, etc.

**The third OPAR mission** is to participate in European action for transnational access to research infrastructures. As part of this, OPAR is taking part in the European H2020 projects ACTRIS2 (Aerosols, Clouds, and Trace gases Research InfraStructure) and ENVIplus (Environmental Research Infrastructures Providing Shared Solutions for Science and Society). The TNA (TransNational Access) agendas of these 2 projects allow international research teams (not based in France) to respond to calls for ongoing projects in order to access the atmospheric observatory in Maïdo, where research projects and observation campaigns can be conducted in collaboration with OPAR laboratories. Financial support has been granted to co-fund scientific missions (airfares, expenses) and the transport of equipment, if needed.

## Major research programmes

The partners of OPAR are working on several major research programmes with the aim of improving our understanding of tropical atmospheric processes and climate change :

- Stratospheric ozone layer : monitoring of trends and recovery in the tropics, study of meridian transfer processes ;
- Stratospheric aerosols : origins, radiative and chemical impacts, monitoring trend ;
- Composition and dynamics of the UTLS (Upper Troposphere Lower Stratosphere) zone : the ozone's functions, water vapour and short-life species ;
- Large-scale transport of atmospheric pollutants in the troposphere : origins, radiative and chemical impacts, monitoring trends ;
- Processes of atmospheric convection and tropical cyclogenesis ;
- Ocean-atmosphere exchanges and atmosphere-biosphere roles of marine and biogenic aerosols.

As part of the European programme H2020, OPAR is taking part in several research programmes on the atmosphere and the climate.

- OPAR's role in the ARISE-2 programme (Atmospheric dynamics Research InfraStructure in Europe, INFRADEV 2015-2018), whose aim is to improve our knowledge of global atmospheric dynamics and their effects on climate change, is to qualify the performance and the accuracy of the observations conducted by lidars for vertical wind profiles (between 5 and 60 km altitude) and temperature profiles (between 5 and 100 km altitude).
- As part of the ACTRIS-2 programme (Aerosols, Clouds and Trace Gases Research InfraStructure Network, INFRADEV 2015-2018), the aim of which is to improve our knowledge of climate change, air quality and the long-distance transport of atmospheric pollutants, OPAR is taking part in an initiative to promote transnational access for European research teams to research infrastructures. So far, OPAR has already hosted teams from the IASB (Belgian Institute of Space Aeronomy), the DWD Deutsche WetterDienst, Lindenberg, Germany) and the IAP (Institute of Applied Physics, Berne, Switzerland).

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- Pastel M., Pammereau J.-P., Goutail F., Richter A., Pazmino A., Ionov D., Portafaix T. ,Construction of merged satellite total O3 and NO2 time series in the tropics for trend studies and evaluation by comparison to NDACC SAOZ measurements, *Atmospheric Measurement and Techniques*, 2014, 7, pp.3337-3354. <10.5194/amt-7-3337-2014> - hal-00829176 -
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## EXPERTISE

OPAR is made up of several technical platforms.

The Moufia atmospheric station on the university campus houses several atmospheric surveillance instruments : two spectrometers with IR and UV ranges of solar radiation, a radiometer for total ozone column, a photometer and a lidar for atmospheric aerosol profiles, and an in-situ measurement tool for greenhouses gases (CO<sub>2</sub>, CH<sub>4</sub> and H<sub>2</sub>O).

A collaboration with Météo-France means the Gillot station can be used to carry out weekly radiosondes of ozone and meteorological parameters.

Finally, the atmospheric observatory at Maïdo, at an altitude of 2,160 m, has housed an extensive range of instruments since 2012. A collection of 6 lidars means vertical profiles of meteorological parameters (temperature, wind) and atmospheric varieties (stratospheric and tropospheric ozone, water vapour, aerosols) can be measured. These lidars include powerful lasers (class IV), large-diameter telescopes (up to 120 cm) and spectrometers, advanced equipment for atmospheric and climatic research. The doppler lidar for wind is part of the network of ground instruments for checking the measurements of an analogue lidar on board the satellite ADM-AEOLUS.

Radiometers operating in different wave bands (infra red, microwave) mean the composition of the troposphere and the stratosphere can be analysed in terms of trace gas products from biomass burning or human activity. A GPS station allows for the observation of the total column water vapour in the atmosphere and helps calibrate the water vapour lidar.

The Maïdo observatory houses a whole range of instruments for



the in-situ measurement of ambient air. These instruments mean the composition of the air can be characterised in terms of trace gases (reactive and greenhouse gases) and aerosols of different origins (marine, land-based, biogenic, anthropic).

Other instruments help characterise electrical cloud activity on the Indian Ocean basin : a VHF antenna that contributes to a global network of lightning detection and localisation, an ultra-fast sensitive camera for detecting transitional events between the tops of convective clouds and the upper atmosphere.

## COLLABORATION

### ► National

- Institut Pierre Simon Laplace (Paris)
- LATMOS (Laboratory of Atmosphere, Environment, and Spatial Observation <http://www.latmos.ipsl.fr/>)
- LSCE (Laboratory of Climate and Environmental Sciences) <http://www.lsce.ipsl.fr/>
- LMD (Laboratory of Dynamic Meteorology) <http://www.lmd.jussieu.fr/>
- SIRTA (Atmospheric Remote Sensing Research Site) <http://sirta.ipsl.polytechnique.fr/>
- Mid-Pyrenees Observatory, Toulouse (<http://www.omp.obs-mip.fr>)
- Aerology Laboratory <http://www.aero.obs-mip.fr>
- National Centre for Meteorological Research (CNRM, Toulouse) <http://www.cnrm.meteo.fr/>
- Laboratory of Atmospheric Optics (LOA, Lille) <http://www-loa.univ-lille1.fr/>

### ► International

- Belgian Institute of Space Aeronomy (IASB, Brussels) <http://www.aeronomie.be>
- National Administration for Space and Aeronautics, Goddard Space Flight Center, NASA GSFC, <https://www.nasa.gov/centers/goddard/home/>
- National Administration for Space and Aeronautics, Goddard Space Flight Center, NASA GSFC, <https://www.nasa.gov/centers/goddard/home>
- National Oceanographic and Atmospheric Administration, [www.noaa.gov/](http://www.noaa.gov/)
- Council for Scientific and Industrial Research (CSIR, Pretoria, Afrique du Sud) <http://www.csir.co.za/>

### ► Desire to collaborate

- WMO GCOS GRUAN (World Meteorological Organization, Global Climate Observing System, GCOS Reference Upper-Air Network)
- WMO GAW (Global Atmospheric Watching)

## PATENTS AND LICENCES

- Brevet OMER7-A : Digital tools for the study of Environmental Earth Sciences ATMOSPHERIC POLLUTION : CAUSES AND CONSEQUENCES

Author :

- Robert DELMAS is a professor at the University of Toulouse III, currently seconded to the CNRS (National Centre for Scientific Research) where he runs the Reunion Laboratory for the Atmosphere and Cyclones (UMR CNRS 8105) and the Reunion Observatory for Sciences of the Universe (OSU-R). He is president of the user committee of the ETHER Centre
  - Mireille PAULIN is an engineer at the National Centre for Space Studies (CNES) of Toulouse. She is the project manager for the ETHER Centre.
  - Pascale PUPPO is professor of physics and chemistry at the Léon Blum college of Colomiers (31)
  - Dominique SERCA is a lecturer at the University of Toulouse III. He is joint director of the Aerology Laboratory (UMR CNRS 5560).
- Patent no. 1051258 filed on 22/02/2010

# 3P

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## Platform for the Protection of Plants



### POSITION WITHIN THE INNOVATION CHAIN

- Experimentation platform
- Plant health, plant biotechnology and biodiversity

### ASSIGNMENT

The Pôle de protection des plantes (Hub for Plant Protection or 3P) is a plant experimentation platform managed by CIRAD (Agricultural Research for Development) along with its founding partners (University of Reunion, ANSES (French Agency for Food, Environmental and Occupational Health and Safety), FDGDON (Reunion Departmental Federation for Defence Groups Against Harmful Organisms)). Open since 2002, today it host :

- Scientists from CIRAD, the University of Reunion (UMR PVBMT (Joint Research Unit for Plant Communities and Biological Invaders in Tropical Environments) and various national and international research centre ;
- The laboratory for plant health (ANSES), the unit for destructive and pathogenic agents ;
- The plant clinic (Reunion FDGDON) for diagnosis of plant diseases from individuals and farmers ;
- Professional associations or businesses (eg FARRE (forum for environmentally friendly farming), eRcane (organisation for sugar cane resource development)), including 2Reunion start-ups (VitroRun and eKoal)

This organisation brings together resources and facilitates technological transfer.

3P gained national approval from the GIS-IBISA (Biology, Health and Agronomy Infrastructures) in 2009. Its activity is part of an ISO 9001 and ISO 17025 quality approach.

3P works in 4 main areas :

- Plant health: prevention and diagnosis of crop pests and diseases (CIRAD ANSES, FDGDON) ;
- Pathology and molecular genetics : development and genomic innovation for selecting varieties adapted to tropical products (CIRAD, INRA (Science and Impact Research Centres), IRD (Development Research Institute), University of Reunion) ;
- Ecology : improvement of knowledge on interaction within cultivated and natural ecosystems in order to control invasive species and preserve biodiversity (CIRAD, University of Reunion, MNHN (Reunion Museum of Natural History) ;
- Biological resources : conservation, dissemination, development of genetic resources of vanilla, under-used tropical garlic and vegetables and improved accessibility to them (CRB Vatel (Centre for Biological Resources)).

### NETWORKS AND COLLABORATION

- Host to many collaborative projects with companies accredited by Qualitropic (tropical bio-economy hub) (Delicas, Orchifah, Germendemik, Biophyto, etc.)
- Regional cooperation within the COI (Indian Ocean Commission) (ePRPV and Germination projects)
- International cooperation with universities (eg University of Captown RSA), research centres (eg INERA (Institute for the Environment and Agricultural Research), FOFIFA (National Centre for Rural Development Research), AVRDC), networks (eg Rex Endure, Mouches des fruits, AIEA) G50



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## SEAS OI

→ [www.seas-oi.org](http://www.seas-oi.org)

### Satellite Imagery and Remote Sensing



#### POSITION WITHIN THE INNOVATION CHAIN

- Nature : Observation of the Earth, remote sensing, signal processing
- Areas : spatial planning, marine and coastal environment, biodiversity, risk prevention and management, health and climate change

#### ASSIGNMENT

The SEAS-OI hub (Satellite Imagery and Remote Sensing for the Indian Ocean) is made up of an operational infrastructure for receiving data and a centre of expertise in remote sensing that conducts research and provides assistance.

#### SERVICES TO PROJECT DEVELOPERS

Provision of optic satellite imagery and radar to public partners of the Indian Ocean.

#### NETWORKS AND COLLABORATION

Over 70 public partners of the Indian Ocean region enhancing satellite data from the SEAS-OI programme.

#### STRUCTURE OF THE BOARD

SEAS-OI is a partnership between the State, the Regional Council of Reunion, the Institute for Research and Development and the University of Reunion.

This partnership is managed by a governance agreement and piloted by a Strategic Orientation Committee that meets annually.



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**ADIR**

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*Association for the Industrial Development of Reunion (ADIR)  
The association was created in August 1975*



## SECTORS OR AREAS OF EXPERTISE

All sectors of industrial activity including :





- Agri-food ;
- Materials and components of the construction industry ;
- Capital goods and consumer goods.

## SERVICES - MISSIONS

- Promotion of local industry, its related products and the workers it employs
- Maintaining a constant dialogue with the authorities to create an environment conducive to industrial development and protection of the collective interest within negotiations with the various financial institutions
- Provision of study and research resources for industrial development
- Technical assistance :
  - Company diagnosis or audit (overall performance, life cycle, all functions within the company)
  - Improvement of working conditions
  - Implementation of a tool or label: GEOCERT, ACERBAT (Association for the Certification of Reunion Construction Companies)
  - Structuring of industries (fruits and vegetables, tropical construction, waste recycling and repurposing)
  - The association has 200 members.





 President : **Dominique VIENNE**  
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## CGPME RÉUNION

→ [www.cgpme-reunion.com](http://www.cgpme-reunion.com)

*General Confederation of Small and Medium-Sized Businesses*



### PROFESSIONAL SKILLS WITHIN THE INDUSTRY

As an interprofessional union, the CGPME Reunion (General Confederation of Small and Medium-Sized Businesses) is developing a cross-cutting support operation with local participating VSBS and SMBs. The following expertise feature as part of the CGPME Reunion commission :

- Legal, social ;
- Training, employment ;
- Sustainable development ;
- Digital economy and innovation ;
- Economy and forward planning ;
- Commerce ;
- Services ;
- Industry.

### SERVICES

The principal aim of the CGPME is to defend and represent the interests of VSBS and SMBS in Reunion. As such, various actions and projects are being deployed :

- The support of members in all business endeavours (information, advice, communication, technical support, etc.) ;
- The development and implementation of proposals for the protection of VSBS and SMBS of Reunion with local and national bodies ;
- Protection of the specific interests of VSBS and SMBS by the agents of the protecting bodies ;
- The organisation of events to reinforce leaders' skills ;
- Setting up projects beneficial to local VSBS and SMBS (Small Business Act, guide to support schemes, etc.).

The CGPME Reunion also provides access to the following range of services :

- CILGERE (housing and employment organisation) SMB, to facilitate employee housing processes ;
- AGEFOS (Reunion employment/training organisation), to facilitate staff training ;
- AGEFICE (management of manager training financing) to facilitate manager training ;
- GSC, employment insurance for managers and company directors.

### NETWORKS

As a representative employee organisation, the CGPME is at the heart of numerous national facilities and geared towards partnership with all local organisations playing a role in the life of the company (state, authorities, consular chambers, business support organisations, etc.). The CGPME of Reunion has approximately 220 mandates.

### STRUCTURE OF THE BOARD

The board is made up of business managers distributed into 4 divisions :

- Industry ;
- Commerce ;
- Services ;
- Trade.





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## CLUSTER GREEN

➔ [www.sicr.re](http://www.sicr.re)

*Regional Association for Businesses Working for the Environment*



### PROFESSIONAL SKILLS WITHIN THE INDUSTRY

Innovation in waste recovery and recycling of raw materials.

### SERVICES

- Networking/Interclustering
- Observation
- Emergence and collaborative project support
- Sharing good practice, promotion
- Training

### TARGET MARKETS

Island of Reunion and international cooperation

### NETWORKS

- Clusters and eco-companies (PEXE (eco-company export programme))
- Training and research institutes
- Companies from all sectors
- Public and private institutions

### STRUCTURE OF THE BOARD

- 3 institutions
- 60 importers represented by the associations
- 15 businesses
- 1 research department





👤 President : **Philippe ARNAUD**  
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## DIGITAL RÉUNION

➔ [www.digitalreunion.com](http://www.digitalreunion.com)

*Association professional of digital in Reunion*



### PROFESSIONAL SKILLS WITHIN THE INDUSTRY

Digital Reunion represents the players of the local Digital sector and supports those aiming to develop and promote the industry in Reunion.

### SERVICES

- Helping to make Reunion a land of excellence when it comes to new technologies
- Promoting the development of the digital industry in Reunion : supporting innovation, developing regional, national and international cooperation
- Sharing the expertise of Reunion's digital companies
- Helping to develop financial support within the industry.
- Promoting ITC and helping the public with getting to grips with them
- Pooling the skills and resources of the digital industry : economic monitoring and monitoring of technology, partnerships, communal projects, clusters, etc.
- Helping to develop skills within organisations and assisting them in identifying and sharing good practice
- Aiding the digital shift of the local economy

### COLLABORATION

- Partner of the Syntec Numérique National (National Digital Syntec)
- Technopole de La Réunion
- ADIR (Association for the Industrial Development of Reunion), MEDEF (Businesses of France)

### STRUCTURE OF THE BOARD

President	Philippe ARNAUD
Secretary	Elodie ROYER
Administrator	Philippe FABING
Vice-President for Skills and Professions	Audrey Maur COURT
Treasurer	Yannick BEREZAIE
Vice-President for Innovation and Research	Didier HOAREAU
Vice-President for Internationalisation and Export	Stéphane JAILLET
Administrator	Christopher LAO THIANE
Administrator	Bruno MILLOT
Administrator	Antoine NOIRBUSSON
Administrator	Daniel RAMSAMY
Administrator	Manuel WARLOP





Mouvement des Entreprises de France  
MEDEF Réunion

## MEDEF RÉUNION

→ [www.medef-reunion.com](http://www.medef-reunion.com)

 President : **Didier FAUCHARD**  
 General Delegate : **Sandrine DUNAND-ROUX**  
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### Businesses of France






### PROFESSIONAL SKILLS WITHIN THE INDUSTRY

MEDEF Reunion (the Reunion branch of the Employer Federation for Businesses of France) is an employer organisation whose primary role is to protect and represent companies. MEDEF Reunion offers real solutions to the issues faced by company directors :




- Seeking support ;
- Expanding networks ;
- Being genuinely understood and protected ;
- Being represented ;
- Informed ;
- Better understanding and management of the complexity that surrounds you ;
- Contributing to the growth of the local economy.
- Helping you become international and promoting your role as head of the company.

### SERVICES




- Business Relations Manager

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- Corporate Project Manager

 Isabelle Percebois  
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- Employment/Insertion Project Manager

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- Financial Analysis Project Manager

 Soraya Moussa  
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- Regional Vocational Training Coordinator

 Sabrina Rivière  
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- Communication Project Manager

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 06 92 62 26 51

- Assistant - Secretary

 Peggy Crescence  
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## TEMERGIE

➔ [www.temergie.com](http://www.temergie.com)

*(Technology for Controlled Energy, Renewable Energy and Isolated Energy Management of Reunion  
In 2010, TEMERGIE was approved as a cluster by DATAR (Directorate for Spatial Planning and Regional Affairs)  
Statuts : Cluster*



### PROFESSIONAL SKILLS WITHIN THE INDUSTRY

- Renewable energy
- Energy management
- Energy storage
- Sustainable electrical mobility

### SERVICES

- Leadership of network of energy stakeholders: the number of members is growing steadily.
- Assistance, setting up, promotion and approval for Research and Development projects, collaborative projects and innovative projects for Reunion companies.
- International development support for Reunion companies
- With a network of around 130 organisations, TEMERGIE hopes to grow to become a real support tool for its network of stakeholders. The objective is to boost the development of the energy sector and help achieve the Reunion 2030 electrical energy self-sufficiency objective by stimulating R&D and the creation of jobs and local added value.

### TARGET MARKETS

- Reunion, the Indian Ocean Area, Europe and International

### COLLABORATION

- TEMERGIE is connected to the Capenergies (solar energy equipment supplier) competitive hub and assists Reunion project developers with approving their projects in order to gain national recognition.
- TEMERGIE hopes to become a part of the regional and national dynamic with numerous partnerships within Reunion and with other clusters and competitive hubs

### NETWORKS

- The Reunion Technopole
- Capenergies in Reunion

In 2010, TEMERGIE was approved as a cluster by DATAR (Directorate for Spatial Planning and Regional Affairs)

### STRUCTURE OF THE BOARD

President	Mr Michel Dijoux, Dijoux Group
1 <sup>st</sup> Vice-President	Mr Frédéric Cadet, Regional Council
2 <sup>nd</sup> Vice-President	Mr François Garde, University of Reunion
Vice président du conseil d'administration	FRBTP, Fédération Régionale du BTP, M. Jean Marie Le Bourvellec
Vice-Chairperson of the Board	Mr. Jean Marie Le Bourvellec, BTP Regional Federation
Vice-President for External Development	Mr. Richard Martorelle, Hemisphère Sud Ingénierie
Treasurer	Mr Patrice Galbois, Corex Solar
Deputy Treasurer	Mr Laurent Blériot, Bioalgastral
General Secretary	Mr Richard Huitelec, SPL Energies, Reunion
Deputy Secretary	Mr Maurice Cerisola, Reunion Industrial Development Agency



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## CB TECH BY CYROI

➔ [www.cyroi.fr](http://www.cyroi.fr)

*Biotechnology Company Incubator*



### POSITION WITHIN THE INNOVATION CHAIN

- Nature : Business Incubators/Standard NF X50-770
- Sectors : Biotechnology - Life Sciences

### ASSIGNMENT

- Additional projects
- Incubator management
- Provision of human resources, equipment, offices

### SERVICES TO PROJECT DEVELOPERS

#### Administrative

- Project launch support
- IT maintenance
- Mail franking
- Dispatching and receipt
- Access to meeting rooms, fax, telephones, conferencing
- Printing
- Internet
- Server and IT stations.

#### Financial

- Project feasibility studies
- Research funding
- BUSINESS PLAN DEVELOPMENT
- Assistance with compiling finance dossiers (banks, public subsidies, investment funds),
- FINANCIAL STRUCTURE STUDIES
- Economic analysis

#### Tax

- R&D services eligible for research tax credits (CIR)
- Tax arrangements for new businesses

#### Communication

- Visual identity
- Website
- Communication tools
- Community networks

#### Marketing

- Market research
- Innovation marketing

#### Strategy

- Business growth strategies (locally or international)
- Strategic diagnostic



## CELLULE EUROPE

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➔ [www.innovonslareunion.com](http://www.innovonslareunion.com)

### *The Europe Committee*



### POSITION WITHIN THE INNOVATION CHAIN

Aware of the challenge of the Integration of Reunion into the European Research Area (ERA) and the Innovation Union and eager to increase recognition and readability of the Reunion territory on a national and European scale, the University of Reunion and Nexa, the Regional Agency for Development, Investment and Innovation, provide the territory with a Europe Cell headed by two project engineers.

Sectors :

- Support ;
- European project structuring for Research ;
- Innovation.

### ASSIGNMENT

The cell facilitates the mobilisation of funding sources, international cooperation and the participation of research centres, clusters and business of Reunion in national (ANR (National Research Agency)) and European (Horizon 2020) competitive research and innovation programmes.

### SERVICES TO PROJECT DEVELOPERS

- **OBSERVATION** : a census platform calling for national and community proposals (ANR, Horizon 2020)
- **AWARENESS** : themed briefings and ascertaining of local needs
- **PROJECT STRUCTURING** : (support of research centres and businesses in building candidacy dossiers (mobilisation of networks, partner research, financial packages, assistance with writing and submitting proposals, consortium contact and management)
- **IMPLEMENTATION** : support for teams with implementation,

monitoring (financial reporting, audits, time sheets) and project communication

- **DEVELOPMENT ASSISTANCE** : mobilisation of research results to maximise effects of feedback for teams and the territory

### NETWORKS AND COLLABORATION





- Network of national and European points of contact
- European Regions Research and Innovation Network (ERRIN)
- Enterprise Europe Network (EEN)
- Club of associated research organisations (CLORA)

### STRUCTURE OF THE BOARD

Association between Nexa, Regional Agency for Development, Investment and Innovation and the research hub of the University of Reunion.





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## COUVEUSE REUSIT

→ [www.reusit.re](http://www.reusit.re)

### Project development organisation



#### POSITION WITHIN THE INNOVATION CHAIN

- Nature : multi-faceted company project incubator
- Sectors : project developer assistance

#### ASSIGNMENT

- To enable testing in real situations through legal provision (post-creation)
- Assistance from project developers with learning the profession
- Study/Action on implementation of economic micro-industry

#### SERVICES TO PROJECT DEVELOPERS

- Information on the «incubator tool»
- Assistance with integration process (prior to start of test)
- Legal provision for project through facility SIRET number
- Assistance from project developers with learning the profession (individual and collective)
- Assistance from developer in the «registraton» phase
- Post-creation monitoring

#### NETWORKS AND COLLABORATION

- Member of the Réseau Point Chance (Network)
- Member of the Union des Couveuses d'Entreprises (Union of Business Incubators)

- Member of the Comité Régional d'Innovation (Regional Innovation Committee)

#### STRUCTURE OF THE BOARD

12 board members, including :

- 6 individuals
- 6 legal entities





Director : **Stéphane DELAUNAY**  
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## MESS CAPAB

*Social and solidarity economy organisation (MESS) and Centre for the Implementation of Alternative Projects and Biodiversity*



### POSITION WITHIN THE INNOVATION CHAIN

- Nature : Support service for project developers under the Social Solidarity Economy (ESS)

CAPAB (Centre for the Implementation of Alternative Projects and Biodiversity) is a local development organisation.

- Sectors : Social innovation  
Solidarity projects  
Sustainable development  
Solidarity finances  
Short circuits  
Circular economy  
Fair trade, ethical purchasing

### ASSIGNMENTS

- HOSTING, INFORMING AND GUIDING project leaders
- SUPPORTING, ASSISTING projects under ESS
- PROMOTING trial of new projects

### NETWORKS AND COLLABORATION

- Alternative Energy CAE (Business and Employment Cooperative) - Dynamic Services
- REUSIT (project development organisation) incubator
- POC (Reunion funding/crowdfunding platform)
- Association pour le Droit à l'Initiative Economique (association for the right to economic initiative)
- Collège Coopératif (Reunion cooperative business initiative)





### STRUCTURE OF THE BOARD

La Maison de l'Economie Sociale et Solidaire (Centre for Social and Solidarity Economy) is supported by the Association Locale d'Insertion par l'activité Economique (Association of Local Insertion through economic activity) (ALIE)







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**NEXA**

→ [www.nexa.re](http://www.nexa.re)

*Mixed Economy Company whose mission is to strengthen and promote the economy of Reunion.*



## POSITION WITHIN THE INNOVATION CHAIN

- **Nature** : Nexa, the Regional Agency for Development, Investment and Innovation, focuses on the general theme of the economy as well as territorial, regional, national and international issues. It operates in all areas, with a particular focus on anchor projects in the areas that are cornerstones of regional strategy
- **Sectors** : Tropical bio-economy ; tourism ; regional agility ; health ; digital ; energy transition ; human and social sciences

## ASSIGNMENTS

Nexa's work focuses on :

- Building strong industries for greater competitiveness ;
- Developing innovation potential for businesses ;
- Piloting and implementing the attraction strategy «INVEST IN REUNION» ;
- Increasing information on the economy and strengthening knowledge of the island ;
- Helping to develop and implement regional strategies.

## SERVICES TO PROJECT DEVELOPERS

- Observation and dissemination of economic intelligence
- Guidance and support of anchor project developers (advice, networking, coaching)
- Expertise and support with innovative networking projects
- Supporting business and promoting the island through local and international trade shows
- Support from project developers from the worlds of research and business with new sources of funding: financial tools and calls for projects launched by national and European organisations and major international backers.
- Organisation of themed events in connection with innovation in order to develop and promote the spirit of entrepreneurship and innovation among the general public, students and businesses

## NETWORKS AND COLLABORATION

- ERRIN, EURADA, EEN,
- Business France, ADARI, CNER (Federation of French Economic Development and Investment Agencies)
- Agreement : CROEC (Regional Council of the Order of Chartered Accountants), QUALITROPIC (tropical bio-economy hub), the university, CCI Réunion (Reunion Chamber of Commerce and Industry), AEFC, (Franco-Chinese Association) and CYROI (bio-innovation health research organisation)

## STRUCTURE OF THE BOARD

- Representatives from the Reunion Region
- Representatives from private facilities





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## QUALITROPIC

➔ [www.qualitropic.fr](http://www.qualitropic.fr)

### Tropical Bio-economy Cluster



#### POSITION WITHIN THE INNOVATION CHAIN

From the emergence of an idea to the release of the product or service on to the market (excerpt from the hub performance agreement 2014-2018)

##### ■ Sectors

- SUGAR CAN
- FRUIT AND VEGETABLES
- AROMATIC AND MEDICINAL PLANT
- HORTICULTURE AND OTHER PLANT PRODUCE
- FISHING AND AQUACULTURE
- BREEDING
- MICROALGAE
- AGRI-FOOD INDUSTRY
- HEALTH AND WELL-BEING
- ENVIRONMENT

##### ■ Main Markets

- FOOD AND FUNCTIONAL FOODS
- BIOENERGY
- BIOFERTILISERS
- ECOPRODUCTS
- E-HEALTH
- NATURAL TROPICAL EXTRACTS
- ORGANICALLY SOURCED PRODUCTS AND MATERIAL
- SEEDS AND PLANT

#### MISSIONS

The hub has three major objective categories likely to receive assistance from public authorities.

##### 1 Missions conducted strictly on behalf of public authorities, which include :

- The development, implementation and monitoring of the hub strategy ;
- The accreditation of collaborative R&D projects ;
- Reporting required by public authorities ;
- Tasks performed by the hub at the express request of the State or regional authority participation in work related to public authorities

##### 2 Objectives to stimulate collaborative innovation, research and development between companies and laboratories, or actions relating to :

- The emergence of new R&D projects and assistance with these to develop new products, services and innovative processes for the market ;
- The formalisation of support with other R&D projects ;
- The management of the community of hub members ;
- Participation in and management of joint hub action.

##### 3 Support objectives of hub member companies in order to foster an environment conducive to their growth and to facilitate the industrialisation of the results from R&D endeavours :

- Support with innovation ;
- Actions to strengthen the link with those involved with training ;
- Actions on the international level and the internationalisation of hub members.

These actions are organised in tandem with the services offered by



other parties invested in the ecosystem to businesses across the hub's region. This can involve all hub members or can be personalised for just a few members.

## GENERAL DEVELOPMENT OBJECTIVES

(Excerpt from the hub performance agreement 2014-2018)

QUALITROPIC (tropical bio-economy hub) focuses on the «tropical bio-economy», meaning the production and use of any resources of plant or animal origin, whether foodstuffs or not, or considered a co-product or waste product, and in response to major global issues relating to climate change, depletion of fossil fuels, food safety, preservation of biodiversity, public health, etc. This key issues are exacerbated in tropical island settings.

The hub's principal objective is to become a global benchmark for the tropical bio-economy of self-sufficient insular economic systems under a philosophy of circular economy :

- In the production of tropical products or tropicalised products,
- In the identification of tropical food products or non-food products bringing added value either to the tropical market or the global market ;
- In tropical environment production systems ;
- In solutions (nutritional, pharmaceutical) for combating tropical risk factors ;
- In the development of innovative economic models in order to maximise the exploitation of renewable tropical resources and to reduce import dependency.

## STRATEGIC ACTION AREAS

(Excerpt from the hub performance agreement 2014-2018)

The hub's objectives are categorised into 4 strategic action areas that correspond to areas of technology-related skills or non-technology-related skills, which must be mastered over time by the hub members. The strategic action areas fall under the hub's theme(s) and are consistent with them.

These areas are as follows :

- Development of tropical resources ;
- Improvement of sustainability of industrial, agricultural and fishing processes in tropical environments ;
- Treatment of co-products and organic waste ;
- Fulfilment of social expectations.

## SERVICES TO PROJECT DEVELOPERS

- Support in for «development, Research an innovation» Marketing services : Marketing audit, Strategic development, Market study, Marketing strategy, Marketing plan
- Connexion with financiers

## NETWORKS AND COLLABORATION

### ► Local

Nexa (Regional Agency for Development, Investment and Innovation), Témergie

(Technology for Controlled Energy, Renewable Energy and Isolated Energy Management of Reunion),

Technopole, Club Export, CRITT (Regional Centre for Innovation and Technology Transfer), consular chambers

### ► National

- Other hub/centres (Terralia, Végépolys, IAR, Pôle Mer Bretagne, Pôle Mer Méditerranée, Vitagora, PASS)
- Ultramarine clusters: PARM (Martinique), Tahiti Fa'ahotu (Polynésie)
- Carnot Institutes Network
- National Association of Agri-food Industries

### ► International

- Agronomic Research Centre Wallonia (CRAW)/Gembloux - Belgium
- Cape Peninsula University of Technology (CPUT)/Cape Town - South Africa
- University of Stellenbosch/South Africa

## STRUCTURE OF THE BOARD

### Business College

BIOALGOSTRAL	Laurent BLERIOT
CREDIT AGRICOLE	Karl TECHER
Distillerie J.CHATEL	Alain CHATEL
HCE	Alex HOW CHOONG
ISODOM	Manuel WARLOP
OCEANE PRODUCTION	Elsa PANECHOU
SAPMER	Justine MEHAUT
STEMCIS	Régis ROCHE
TEREOS OI	Jean-Claude PONY
VIVEA	Jean-Pierre AVRIL

### Scientific Colleges

APLAMEDOM	Claude MARODON
Hydrô Réunion	Emmanuel TESSIER
CIRAD	Eric JEUFFRAULT
CYROI	Maya CESARI
eRcane	Bernard SIEGMUND
IRD	Pascale CHABANET
UNIVERSITY	Mohamed ROCHDI

### Institutional Colleges

ADIR	Daniel MOREAU
MEDEF	Sylvie LEMAIRE
CCIR	Jaëla DEVAKARNE

### Ex officio members

The Representative for the Regional Council

The Representative for the Departemental Council





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## THE TECHNOPOLE OF RÉUNION

→ [www.technopole-reunion.com](http://www.technopole-reunion.com)

### Régional Incubator



#### POSITION WITHIN THE INNOVATION CHAIN

- Nature : Innovation assistance, leadership and promotion
- Sectors : Cross-cutting innovation

#### ASSIGNMENT

- Development of cross-fertilisation between companies and higher education institutes
- Innovation awareness and generation
- Innovative business creation :
  - Technological detection and transfer ;
  - Innovation classification (benchmarks eg Incubateur and RETIS (European Transnational Network for Social Inclusion) and selection of innovative projects ;
  - Formulating and structuring projects ;
  - Assistance during incubation ;
  - Development ;
  - INNOVATIVE BUSINESS ASSISTANCE THROUGH BPI FRANCE'S APPI (INNOVATION PROJECT KICK-START) TOOL ;
  - Promotion of innovative business creation.
- Management of technology parks
  - Innovation leadership through networking
  - Development of ecosystems dedicated to innovation
  - Collective and individual assistance for up-and-running companies
  - Promotion of business parks and their occupants

#### SERVICES TO PROJECT DEVELOPERS

- For innovative business creation projects

##### Internal services :

- Pre-incubation assistance : project structuring, formalising and feasibility ;
- Preparation for the Incubator Selection Committee ;
- Innovation classification and selection by a Committee of Experts ;
- Project strategy assistance ;
- Project developer coaching ;
- Training: mornings, Innovation Workshop, etc. ;
- Networking: incubation club, etc. ;
- Administrative assistance ;
- Occasional hosting of those in incubation ;
- Project promotion.

##### Externally funded incubation services :

- Scientific and technical services (collaborations with public or private research laboratories) ;
- Legal, fiscal and financial assistance ;
- Strategy assistance (marketing, sales) ;
- Safeguarding of innovation (trademarking, patents, etc.) ;
- Trainings ;
- Mainland travel expenses.

- For innovative SMEs

- Assistance with setting up in the Technor and Techsud parks
- Project engineering
- Technopole experts



- Networking with research or funding bodies
- Guidance with APPI financial aide
- Seeking our commercial partners
- Promotion of innovative businesses

## NETWORKS AND COLLABORATION

### ► Local

Those involved in RDI (Development Research Institute) = Nexa (Regional Agency for Development, Investment and Innovation),

Qualitropic (tropical bio-economy hub), Reunion Digital, TEMERGIE (Technology for Controlled Energy, Renewable Energy and Isolated Energy Management of Reunion) ADIR, PEPITE Réunion (Reunion Student Centre for Innovation, Transfer and Entrepreneurship), the University of Reunion

CIRAD (Agricultural Research for Development), IRD (Development Research Institute), CRITT (Regional Centre for Innovation and Technology Transfer), CIRBAT (Centre for Innovation and Research of Tropical Construction), Reunion Entrepreneurship Initiative, BPI France, etc.

### ► European

EBN

### ► National

RETIS (European Transnational Network for Social Inclusion) ; the Technopole of Reunion is a member of the RETIS network office

## STRUCTURE OF THE BOARD

7 Permanent members

7 Business College members

5 Members of Higher Education and Research College

7 Members of the college Representative Professional Organisations and Public Institutions









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