Research evaluation

FINAL RESUME ON THE RESEARCH UNIT

ISPA - Interactions Sol Plante Atmosphère

UNDER THE SUPERVISION OF THE FOLLOWING INSTITUTIONS AND RESEARCH BODIES:

Bordeaux Sciences Agro - École nationale supérieure des sciences agronomiques

Institut national de recherche pour l'agriculture, l'alimentation et l'environnement - INRAE

EVALUATION CAMPAIGN 2020-2021

GROUP B

Report published on May, 25 2021

High Council for evaluation of research and higher education

In the name of Hcéres[1]:	In the name of the experts committee[2]:
Mr Thierry Coulhon, President	Ms Cécile Gubry-Rangin, Chairwoman of the committee

Under the decree No.2014-1365 dated 14 November 2014,

[1] The president of Hcéres "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5);

[2] The evaluation reports "are signed by the chairman of the experts committee". (Article 11, paragraph 2).

Tables in this document were filled with certified data submitted by the supervising body on behalf of the unit.

UNIT PRESENTATION

Unit name:
Interactions Sol Plante Atmosphère
Unit acronym:
ISPA
Current label and N°:
UMR_A 1391
ID RNSR:
201421781U
Application type:
Renewal
Head of the unit (2020-2021):
Ms Laurence Denaix
Project leader (2021-2025):
Mr Alain Mollier
Number of teams and/or themes:
6

EXPERTS COMMITTEE MEMBERS

Chair:	Ms Cécile Gubry-Rangin, University of Aberdeen, UK
Experts:	Ms Dominique Courault, INRAE, Avignon (representative of CSS INRAE) Ms Marie-France Dignac, INRAE, Paris Ms Maria Isabel Freire Ribeiro Ferreira, University of Lisbon, Portugal Mr Bernard Nicolardot, AgroSup Dijon Mr Jean-Daniel Paris, French Alternative Energies and Atomic Energy Commission (CEA), Gif-sur-Yvette (representative of supporting personal) Mr Rainer Schulin, ETH Zurich, Suisse

HCÉRES REPRESENTATIVE

Mr Christopher Carcaillet

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Ms Catherine Bastien, INRAE
Ms Sabine Brun-Rageul, Bordeaux Sciences Agro
Mr Frédéric Gosselin, INRAE
Mr Philippe Hinsinger, INRAE
Ms Isabelle Masneul, Bordeaux Sciences Agro
Mr Frédéric Saudubray, INRAE

INTRODUCTION

HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

ISPA is located on three sites in the region of Bordeaux, France. It includes two sites INRAE of the Centre de Nouvelle Aquitaine Bordeaux in Villenave d'Ornon (La Grande Ferrade) and in Cestas (Pierroton), and one site on the engineering university campus of Bordeaux Sciences Agro in Gradignan. Majority of staff are located on the site of the Grande Ferrade, in three different buildings.

The unit was created on January 1, 2014, following the merger of UMR *Transferts et Cycles des Éléments Minéraux dans les écosystèmes cultivés* (TCEM), and UR *Écologie Fonctionnelle et Physique de l'Environnement* (EPHYSE). These two founding units studied for one the transfers of nutrients (P, K) and trace elements of contaminants (Cd, Cu, Pb, Zn) from soil-plants and for the other the exchanges between vegetation and atmosphere. They both depended on the same INRA departments *Environment and Agronomy* (now called INRAE AGROECOSYSTEMES) and *Ecology of Forests, Grasslands and Aquatic Environments* (now INRAE ECODIV). Following its assessment in 2014, the UMR ISPA was renewed on January 1, 2016.

ISPA is organised in five teams, encompasses multidisciplinary approaches and based on multiple technological skills from biogeochemistry, microbiology, remote sensing, ecophysiology, biomechanics and applied mathematics to address the functioning of forest and agricultural systems: (1) « Biogeochemistry of trace elements » (BIOGET, 9 people); (2) « Biochemistry of nutrients » (BIONUT, 19 people): (3) « Hydric relations and ecosystem functioning » (ECOFUN, 6 people); (4) « Environmental mechanics » (ME, 8 people); (5) « Modelling and spatiotemporal observations » (MOST, 6 people). For the new contractual period, the unit will be organised in a matrix scheme, functioning as a network organized along five research themes, conceptually-centred, and transversal to the five former teams, plus one additional theme cross-cutting the five others and dedicated to interactions with the society, such as: (T1) « Drivers of available elements dynamics in soil » (16 people, 5.15 FTE), (T2) « Origin and distribution of major and trace elements in plants » (11 people, 3.15 FTE), (T3) « Biogeochemical and biophysical functioning of forest ecosystems in a heterogenous environment » (18 people, 6.55 FTE), (T4) « Multiscale approaches of vulnerability and adaptation of ecosystems facing global changes and resources rarefaction » (15 people, 4.85 FET), and (T5) « Mitigation of climate change effects » (14 people, 3.85 FTE). The cross-cutting theme gathering most of people of ISPA is entitled: (T6) « Environmental impacts of non-conventional agricultural and forestry practices » (22 people, 5.10 FTE).

RESEARCH ECOSYSTEM

Within INRAE, UMR depends on two departments, AGROECOSYSTEMES and ECODIV. UMR ISPA is strongly involved in the LabEx COTE (financed by the French *Programme Investissement d'Avenir*, PIA), which aims to develop ecosystem interactions in environmental sciences in the Aquitaine region, especially between research units but also with industry, associations and general public. ISPA also belonged to the Bordeaux IdEx (PIA), which allowed some international opening (such as with Canada or Spain among others). ISPA also benefited from the EquipEx XYLOSYLVE (PIA), a platform providing a test system on innovative forestry. The new proposed structuration of IdEx and LabEx COTE (currently under evaluation) would lead to the involvement of ISPA to three *Grands Projets de Recherche* (GPR): "Tackling Global Change", "Plant Science" and "Design, Analysis and Control Systems". ISPA is also regionally involved into three « *Réseaux Régionaux de Recherche* » (3R), *"Forêt-Bois", « AclimaT »* and *« BIOSENA »* and into an international network (2RI) *"FORWARD"*.

HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE1_3 Biotechnologies, sciences environnementales, biologie synthétique, agronomie

SVE1_2 Évolution, écologie, biologie des populations

ST3_1 ST3_1 Océan, atmosphère

MANAGEMENT TEAM

The unit director is Ms Laurence Denaix and the deputies are Mr Alain Mollier and Mr Sylvain Dupont.

UNIT WORKFORCE

Active staff	Number 06/01/2020	Number 01/01/2022
Full professors and similar positions	2	2
Assistant professors and similar positions	3	3
Full time research directors (Directeurs de recherche) and similar positions	8	8
Full time research associates (Chargés de recherche) and similar positions	10	10
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	0	0
High school teachers	0	0
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	34	34
Permanent staff	**57**	**57**
Non-permanent professors and associate professors, including emeritus	0	
Non-permanent full-time scientists, including emeritus, post-docs (except PhD students)	0	
PhD Students	14	
Non-permanent supporting personnel	5	
Non-permanent staff	**19**	
Total	**76**	**57**

GLOBAL ASSESSMENT OF THE UNIT

The Interactions Sol Plant Atmosphere laboratory, ISPA, has established itself as a strong ecological research unit addressing relevant societal issues in agro- and forestry ecosystems in the Bordeaux region. In line with the current context of global change, ISPA's research focuses on the understanding and modelling of the fluxes and cycles of materials and energy in agricultural and forestry ecosystems under climatic and anthropogenic stresses in order to guarantee plant production in quantity and quality, and to preserve the environment. This integrated understanding of ecology is achieved through multidisciplinary approaches combining experimental studies and modelling, with incorporation of different spatial and temporal scales to describe fundamental mechanisms and to understand their impact on resources (water, soil) and productions from local to global scale, at both short and long term.

The overall scientific output of the unit is between very good and excellent, based on the track-record of the scientific publications and on their diversified portfolio of grant incomes, including competitive international or national research grants. Most international visible ISPA teams are ECOFUN and MOST for their studies understanding and predicting the physiological responses of terrestrial ecosystems to environmental changes and extreme climatic events and their consequences on crops, water, CO_2 and energy balances (ECOFUN) and remote sensing and monitoring of atmospheric fluxes in forest ecosystems (MOST), both for the outreach of their scientific productions and their capacity to raise funds at national and European level.

ISPA has developed very good interactions with the academic world. Their research is impactful both at the economy and at the territory management levels, and contribute to solve societal challenges of the Aquitaine region. The reputation of ISPA is very good as demonstrated by the extent of its local, national and international collaborative network and its appeal is good. ISPA evidenced a very good involvement in training through research and is attractive for national and international PhD candidates. The organisation of ISPA unit for the five-year project, based on six thematic themes cross-cutting original teams specialised on ecosystem compartments or scales, is very good and has potential to socially flourish further, especially given the planned

short-term delivery of a new building which will facilitate interactions on a unique geographical localisation. The multidisciplinary expertise and strong scientific capacities and motivation within ISPA will benefit to the proposed scientific project, which includes multiple very good to excellent cross-cutting themes aiming to address future research challenges, and to increase the societal impact of the unit's research.

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2 rue Albert Einstein
75013 Paris, France
T. 33 (0)1 55 55 60 10