

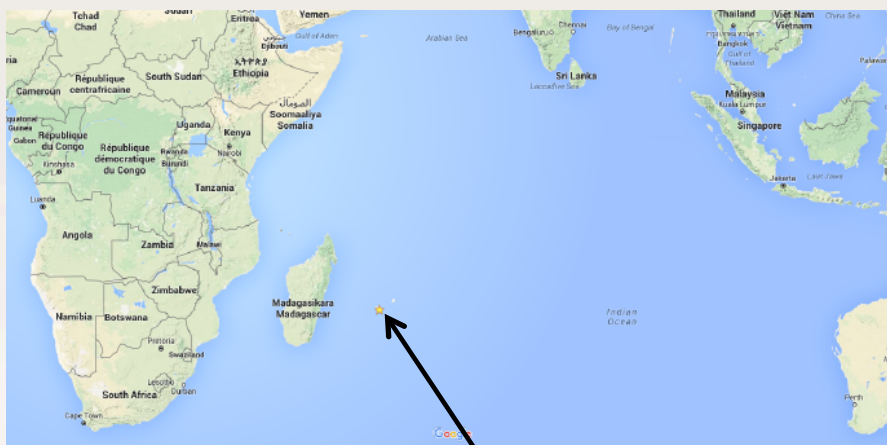
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Observatoire des Sciences de l'Univers
La Réunion

CNRS & Université de La Réunion



Position of La Réunion:
Indian Ocean
800 km east of Madagascar
Latitude: 21°S / Longitude: 55°E
Surface area: 2512 km²

Located in the Mascarene Archipelago, Reunion Island – a French overseas department – offers travellers the exoticism of a tropical island in the Indian Ocean. At the crossroads of European, African and Asian cultures, Reunion is a true melting pot.



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Reunion Island



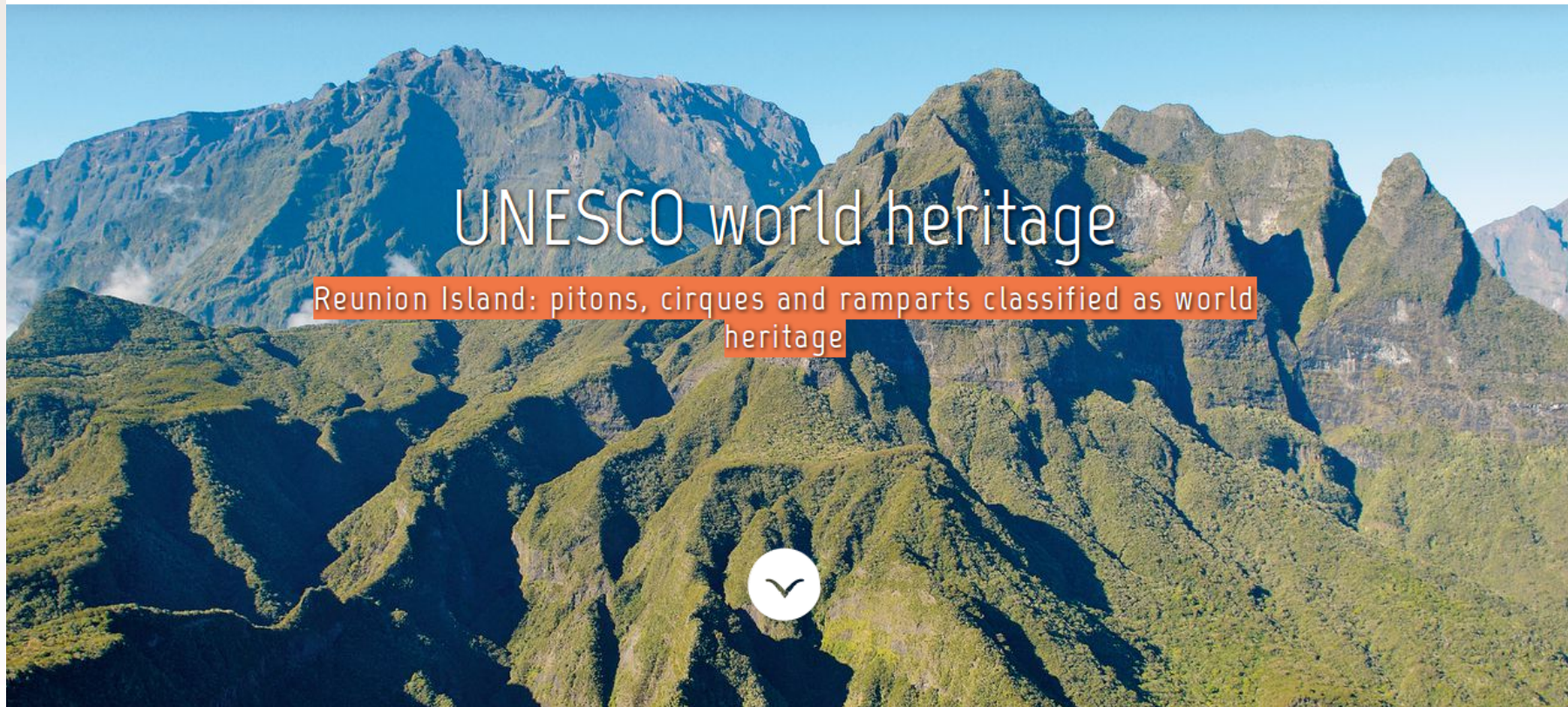
DISCOVER

ORGANIZE

BOOK

SHARE

PRACTICAL



ENVRI WEEK – 16-20 November 2015 – Prague, Czech Republic



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Two adjoining volcanic massifs:

- Piton des Neiges 3070 m
- Piton de la Fournaise 2632 m

Three cliff-rimmed cirques with massive walls:

- Cirque de Salazie
- Cirque de Mafate
- Cirque de Cilaos

Hot spot of biodiversity:

Plant ecology: Natural habitat for a wide diversity of plants, presenting a high level of endemism. There are subtropical rainforests, cloud forests and heaths creating a remarkable and visually appealing mosaic of ecosystems and landscape features.

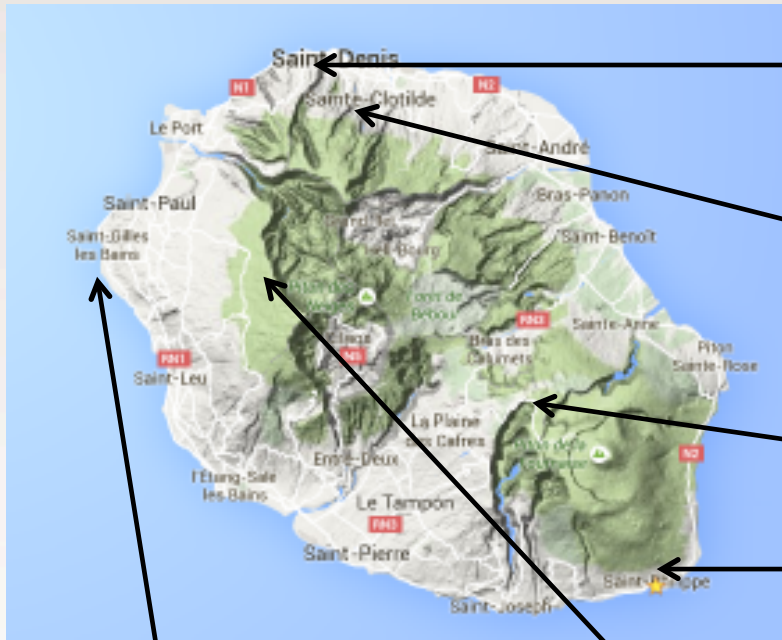
Marine ecology: Lagoon created by a coral reef : a 30 km strip running on the western coast



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Where OSU-R is operating its monitoring stations ?



University in Saint-Denis

Hydrological station nearby Saint Denis in Rivière des Pluies catchment

Volcanic observatory in Bourg Murat

Forest station in Saint Philippe

Coastline station at Saint Gilles : Coastal aquifer, Coast line, Lagoon and barrier reef

Atmospheric observatory at Piton Maïdo (2160 m)



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OPAR: Observatoire de Physique de l'Atmosphère à La Réunion

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

Geographical

localisation:

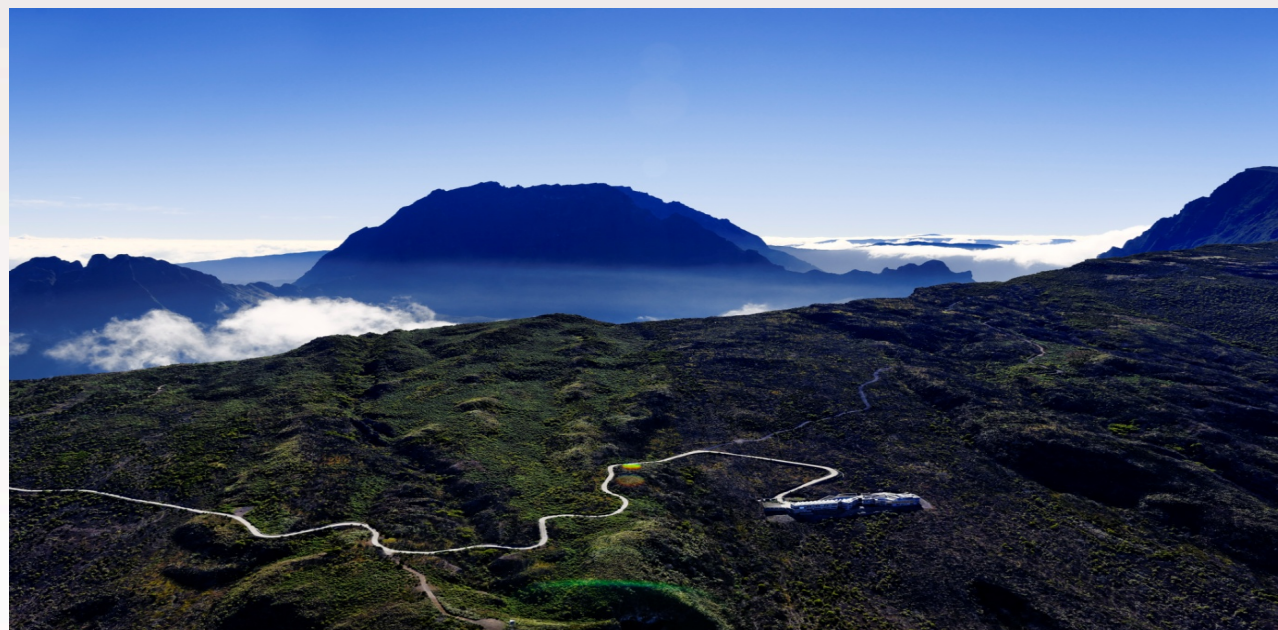
Lat: 21.08°S

Long: 55.38°E

Alt: 2160m asl

RI associated:

ACTRIS & ICOS



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OSU-R / OPAR

Relevant research area and expertise:

- *Atmospheric composition (gas, aerosols)*
- *Atmospheric processes*
- *Atmospheric tendencies (climate)*



Why is the station unique in each RI domain represented ?

- *Unique location for Europe: tropical band of the southern hemisphere in the south western Indian Ocean*
- *Quality and representativeness of nighttime measurements: large footprint*
- *Regional interests for daytime measurements: sea/land and orographic breezes*
- *Occasional long-range transport of pollutants*



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OSU-R / OPAR

Brief (main) instruments accessible:

- *Lidars: temperature, ozone, water vapor, aerosols, wind (NDACC & ACTRIS)*
- *Spectrometer FTIR (x2): partial columns of many molecules (NDACC & TCCON)*
- *Spectrometer SAOZ (O3 & N2O columns, NDACC)*
- *Radiosounding: ozone (NDACC/SHADOZ), water vapor (CFH/GRUAN), aerosols (COBALD)*
- *Photometer CIMEL (Aerosol Optical Depth, AERONET)*
- *Lightning observations: VHF antenna (WWLLN), TLE camera*
- *Greenhouse gas measurements (ICOS)*
- *Aerosols and reactive gases insitu measurements (Regional GAW/WMO)*
- *Meteorological & GPS stations*



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OSU-R / OPAR

Past experience in TNA?

- *ACTRIS: FTIR calibrations (IASB, Belgium), CFH radiosounding (DWD, Germany)*
- *OTHER: lidar intercomparison campaign (NASA/GSFC, USA), biogenic aerosol campaign (NOAA/ESRL, USA)*

Expectations from ENVRI+TNA: potential cross-domain studies

- *Atmosphere-Biosphere: forest, biogenic aerosols and clouds interactions*
- *Atmosphere-Ocean: ocean, marine aerosols, halogens, and cloud interactions*
- *Atmosphere-hydrosphere: flash foods during tropical cyclones*
- *Volcano plumes: aerosols and SO₂ emissions, long-range transport and H₂SO₄ washout*



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FOREST STATION

<http://stationmarelongue.univ-reunion.fr/scientific-programs/programs>

Geographical localisation:

Lat: 21°20'S

Long: 55°44'E

RI associated:



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OSU-R / FOREST STATION

Relevant research area and expertise:

- forest ecology
- taxonomy
- ecophysiology
- climatic long term sensors

Why is the station unique in each RI domain represented ?

The field station is located in the last place in EU with intact tropical habitats from sea level to high elevation subalpine vegetation, on a “true” oceanic analog to Hawaii; located in a World Heritage Site & Biodiversity Hotspot.



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OSU-R / FOREST STATION

Brief (main) instruments accessible:

- tropical field forest station with accomodation (12-14 people)
- permanent plots in rainforest and lab facilities
- potential site for common garden experiment and plant nursery
- close to lowland and mountain tropical rainforest
- access to historical lava flows of the Piton de La Fournaise and intertidal habitats at shoreline



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OSU-R / FOREST STATION

Past experience in TNA?

- since 2010, more than 100 external searchers accomodated from : Spain, Portugal, Germany, Austria, UK, Italy, and African / SW Indian Ocean countries, South Africa, Kenya, Mauritius.

Expectations from ENVRI+TNA: potential cross-domain studies

- *Atmosphere-Biosphere: forest, biogenic aerosols and clouds interactions*
- *Atmosphere-Biosphere-hydrosphere: role of hidden rains under tropical conditions on volcanic origin catchments*
- *Island biogeography, biogeochemistry, restoration ecology*
- *Human sciences (sociology, ethnology, ecotourism)*



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COASTLINE STATION (1/2)

<http://www.la-reunion.ird.fr/recherche-et-missions/les-unites-de-recherche/250-ecologie-marine-tropicale-des-oceans-pacifique-et-indien>

Geographical localisation:

Lat: 21°06' S

Long: 55°14' E

Altitude: 1.5 m deep (reef flat)

17 m deep (reef slope)

RI associated:



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OSU-R / COASTLINE STATION (1/2)

Relevant research area and expertise:

- Biogeochemistry of coral reefs
- Sampling and measurement of seawater physico-chemical parameters (including high frequency in situ measurement of salinity and pH, and discrete measurement of alkalinity and nutrients) and currents (ADCP)
- Used for the calculation of C and CaCO₃ budgets.
- Long-term monitoring of ocean acidification

Why is the station unique in each RI domain represented ?

Tropical coastal location very well described in terms of benthic communities structure (30-years record), water quality, metabolism etc.



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OSU-R / COASTLINE STATION (1/2)

Brief (main) instruments accessible:

- small field research facility (wet lab)
- field equipment (including benthic chambers, O2 probes etc)
- chemistry lab at Saint-Denis (50 km from the field).



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OSU-R / COASTLINE STATION (1/2)

Past experience in TNA?

No

Expectations from ENVRI+TNA: potential cross-domain studies

- Impact of tropical cyclones (swell, floods, submersion)
- Impact of climate changes (global warming, rising ocean level)
- Impact of anthropogenic activity



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COASTLINE STATION (2/2)

<http://dynamit.indigeo.fr/geocms/maps/dynamit-jtnvimml>

Geographical localisation:

Lat: 21° 03' 58"

Long 55° 13' 17"

Altitude: +3 m -2 m

RI associated:

SOERE

Trait de Côte (Alliance Allenvi)

SNO DYELITC (INSU-CNRS)



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OSU-R / COASTLINE STATION (2/2)

Relevant research area and expertise:

- Biodetric beach
- Fringing coral reef
- South equatorial current
- Water temperature : 23 °C and 31 °C
- Natural cyclones and anthropogenic disturbances

Why is the station unique in each RI domain represented ?

Biodetric beach and tropical site integrated in a strategy of long-term observations



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OSU-R / COASTLINE STATION (2/2)

Brief (main) instruments accessible:

- Topography equipment, DGPS



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OSU-R / COASTLINE STATION (2/2)

Past experience in TNA?

No

Expectations from ENVRI+TNA: potential cross-domain studies

- Coastal management
- Impact of climate change on coastal



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Hydrological station

<http://osur.univ-reunion.fr/observations/soere/bassins-versants/>

Geographical localisation:

Lat: 20° 57' 58.2"

Long 55° 29' 24.9"

Altitude: 362m

RI associated:

SOERE:

Réseau de Bassins Versants (Allian



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OSU-R / Hydrological station

Relevant research area and expertise:

- Rivière des Pluies is a small volcanic catchment within the Piton des Neiges volcano under tropical conditions and cyclonic events.
- Catchment area: 45Km², Stream length:18,5Km
- Altitude max: 2270m
- Mean Rainfall: 3400mm, Q 100years: 1000m³/s

Why is the station unique in each RI domain represented ?

The river network consists of streams of short length and steep slopes , torrential regime under frequent cyclonic event in volcanic terrains



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OSU-R / Hydrological station

Brief (main) instruments accessible:

- 3 hydrological gauging stations
- 3 weather station



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OSU-R / Hydrological station

Past experience in TNA?

No

Expectations from ENVRI+TNA: potential cross-domain studies

- Hydrologic risk management.
- Erosion
- Landslide



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OVPF: Observatoire Volcanologique du Piton de la Fournaise

IPGP: Institut de Physique du Globe de Paris

<http://www.ipgp.fr/fr/ovpf/observatoire-volcanologique-piton-de-fournaise>

Geographical

localisation:

Lat: 21°12'30.87"S

Long: 55°34'18.64"E

Alt: 1550 m

RI associated:



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OVPF / IPGP

Relevant research area and expertise:

- The Piton de la Fournaise volcano has probably the largest number of eruptions per year globally, with 40 eruptions between 1998 and 2015 and an average of an eruptive phase every 5 months.

Why is the station unique in each RI domain represented ?

Means of OVPF are not unique in Europe. In Italy, the INGV is also a central figure in the European volcanoes monitoring. However here interdisciplinarity, team size and insularity are huge advantages when it comes to work faster. Moreover, unlike other European volcano, Piton de la Fournaise is the only highly active volcano in the tropics



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OVPF / IPGP

Brief (main) instruments accessible:

The Piton de la Fournaise activity is monitored 24h / 24 by the volcano observatory with 3 monitoring and research networks (Sismology, Geodesy and Geochimy) that correspond to around 100 instruments.



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OVPF / IPGP

Past experience in TNA?

No

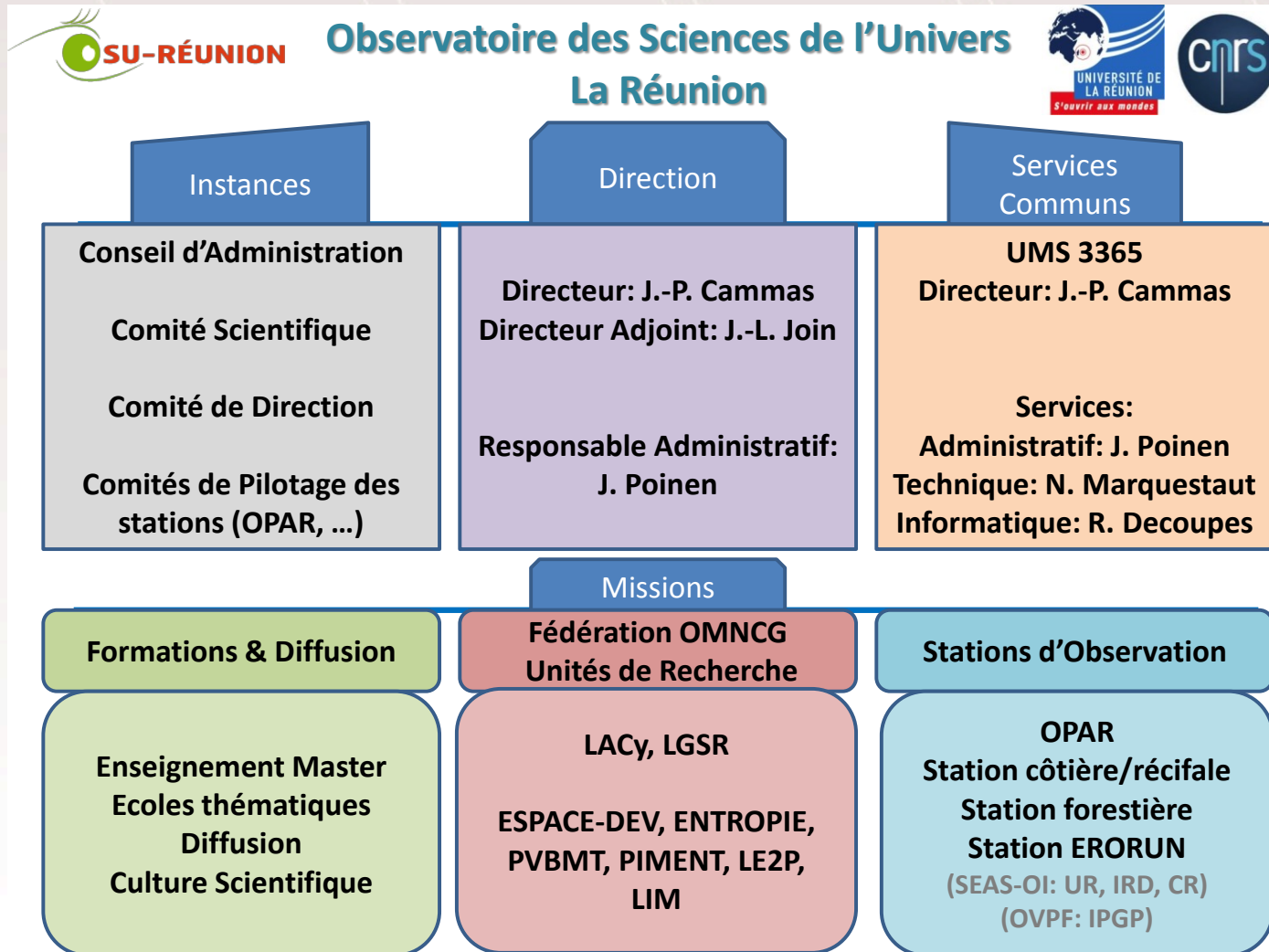
Expectations from ENVRI+TNA: potential cross-domain studies

- Geophysics
- Geology
- Geodesy
- Remote sensing
- Atmospheric Physic
- Earth Physic
- Environment
- Geography



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Fédération OMNCG (Natural Environments & Global Changes):



- 2016 provisional budget: 90 k€ for 6 to 8 projects selected
- Call for proposals opened in December with deadline in January
- Rules for proposals:
 - Research objectives must be multidisciplinary
 - Proposals must involve a minimum of two laboratories
 - Support of the Federation must serve as a stepping stone for more ambitious projects addressed to other financing bodies
- Main results:
 - Laboratories are learning how to work together
 - Peer-review publications in multidisciplinary research
 - Ongoing project on the volcanic eruption plumes (STRAP, ANR: 400 k€)
 - Ongoing project on the role of biogenic aerosols in orographic cloud life cycles (OMNCG, NOAA)
 - Project submitted on natural risks associated with tropical cyclones: wind damages, flash floods, degradation of coastline, submersion, etc (RenovRisk, FEDER 920 k€)

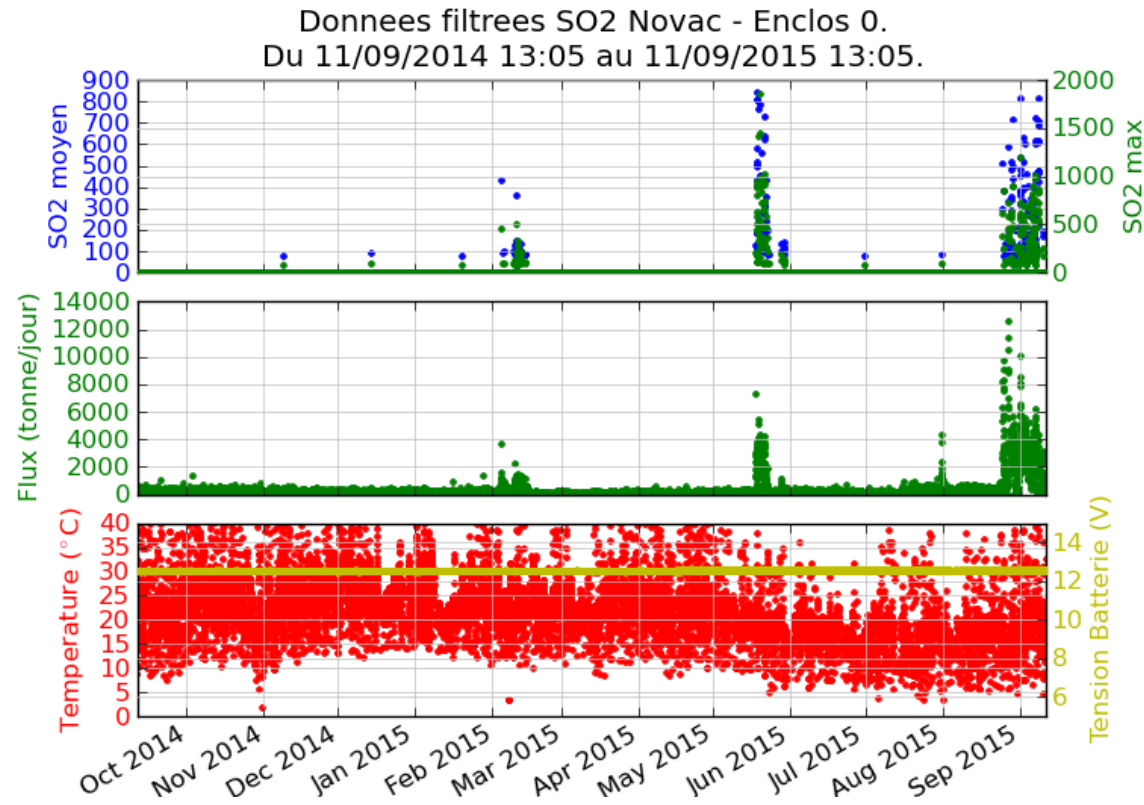


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**Volcanic eruption of Piton de la Fournaise
August – October 2015
Ground field measurements of SO₂ gas emissions**

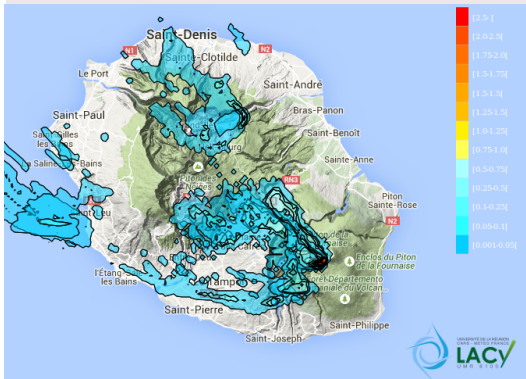


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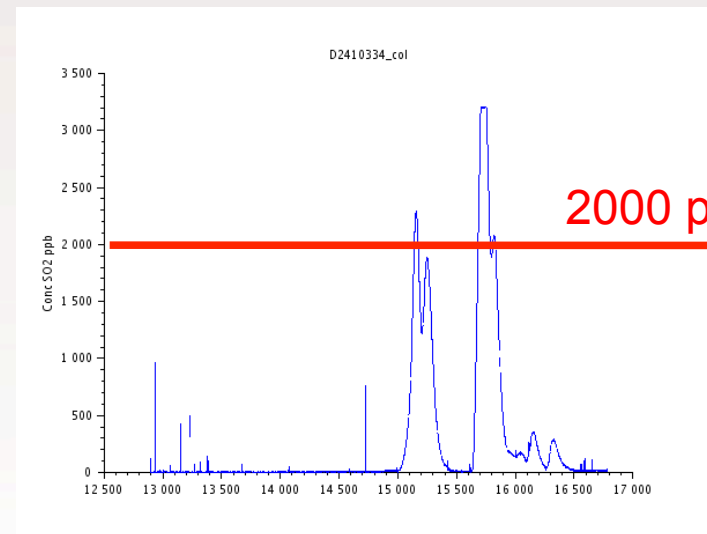
**Volcanic eruption of Piton de la Fournaise
August – October 2015**
Airborne measurements of SO₂ gas emissions



Volcanic plume forecast



Aircraft flight plan



Airborne SO₂ measurements



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Come and access the OSU-R stations at Réunion Island !!



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