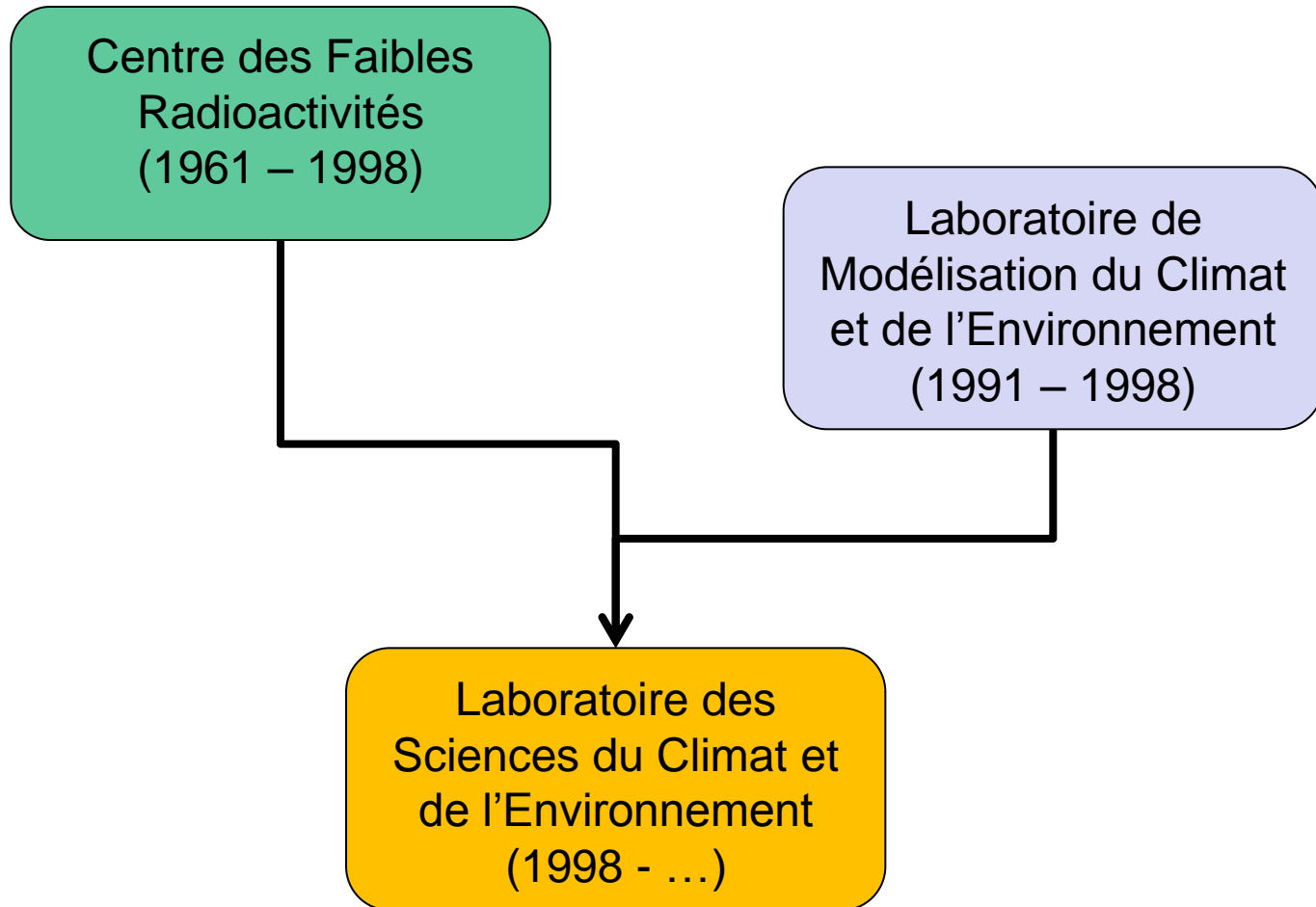




Environmental and Climate Researches at LSCE

Dr Cyril MOULIN – Associate Director

History of LSCE



LSCE : a joint unit between



Direction des Sciences de la Matière
Fundamental research for Energy



Institut National des Sciences de l'Univers (INSU)
Institut National de l'Écologie et de l'Environnement (INEE)
Ocean and Atmosphere Division



University of Versailles – Saint Quentin en Yvelines
Training on climate, environment
Interdisciplinarity on Environmental research

300 staff

160 permanent positions
about 50 PhD students

2 sites :

Orme des Merisiers
Gif / Yvette

5 Research Programs

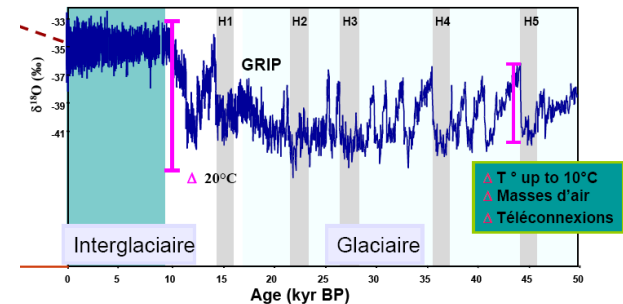
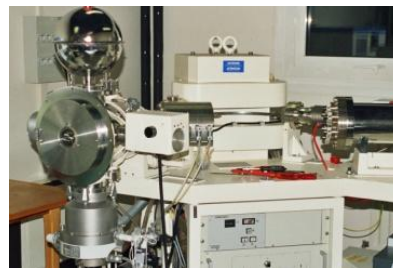
3 Research Platforms

LSCE programs: 1. Dynamics and Archives of Climate



- Reconstruct climate dynamics **from the synergy of a large variety of natural archives**
- Main focus :
 - Orbital & other natural forcings and climate / carbon response
 - Rapid instabilities
 - Last millenium variations

From sites to time series



To be used with models

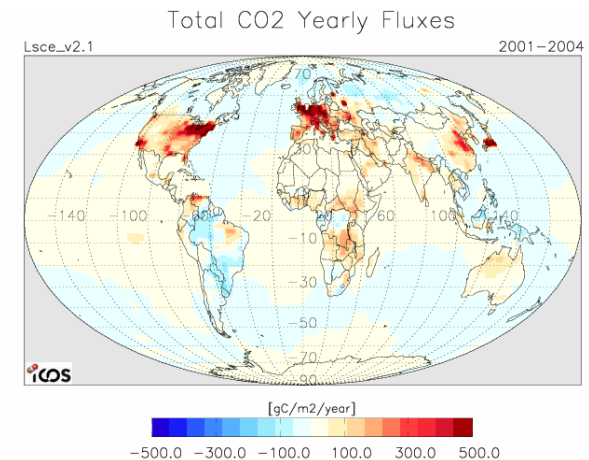
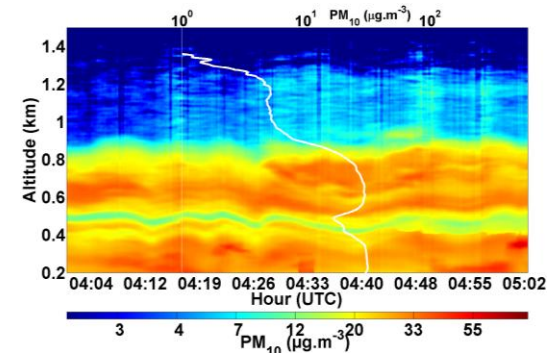
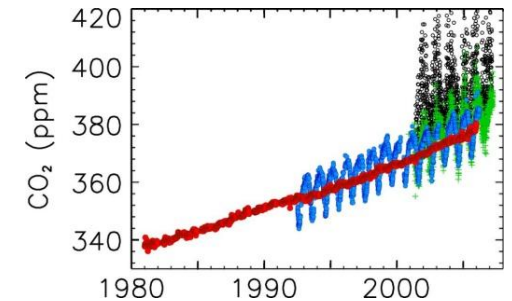
LSCE programs: 2. Atmospheric Composition and Fluxes



- **Observation and monitoring of atmospheric composition (Greenhouse & reactive gases & aerosols, air pollution)**
 - in situ monitoring
 - Remote sensing from space and surface

- **Innovating instruments**
 - Lidar techniques

- **Innovating inversion methods to quantify surface fluxes**
 - Towards an integrated monitoring of emissions



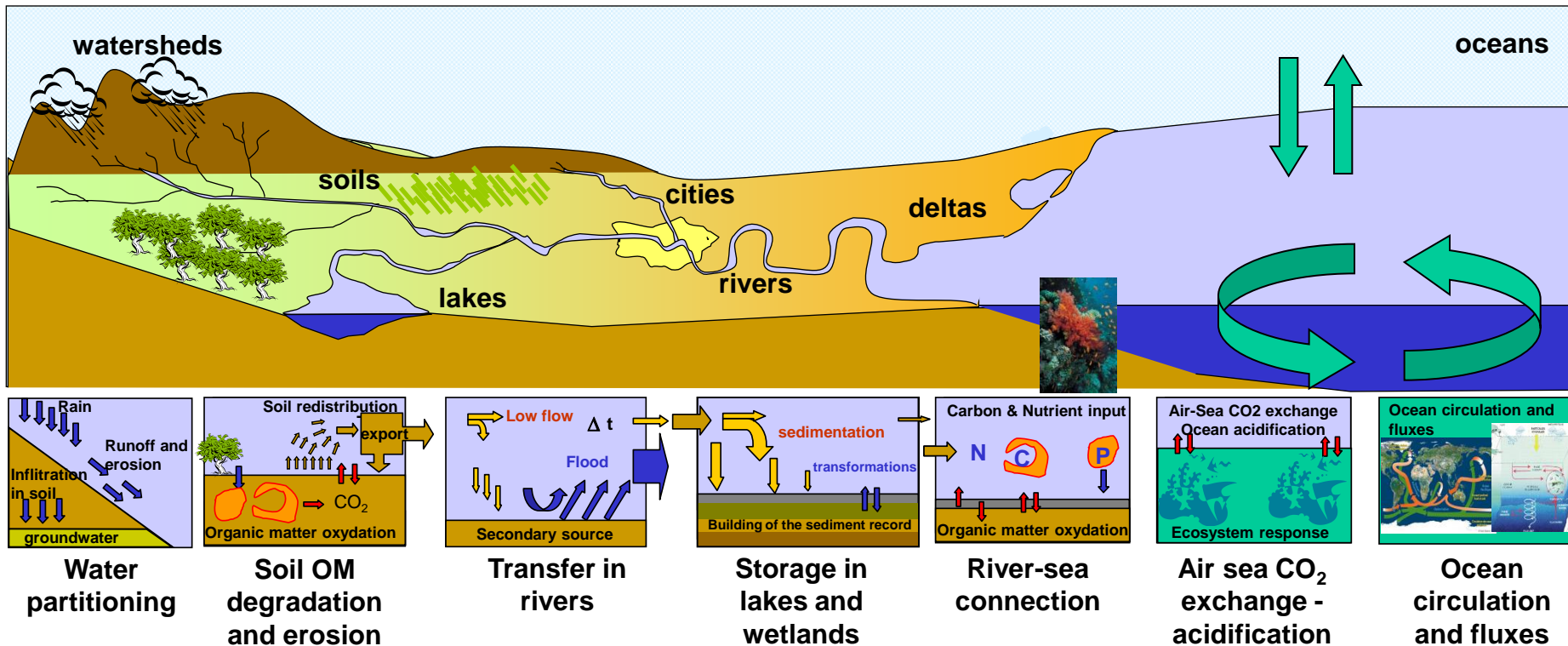
LSCE programs: 3. Transfers and Tracers in the Environment



Process studies of transfer and transformation of water, carbon, pollutants, in the continent-ocean continuum

Impact studies of anthropogenic activity and climate change on the environment

Integrated studies of vulnerable regions such as the Mediterranean Basin



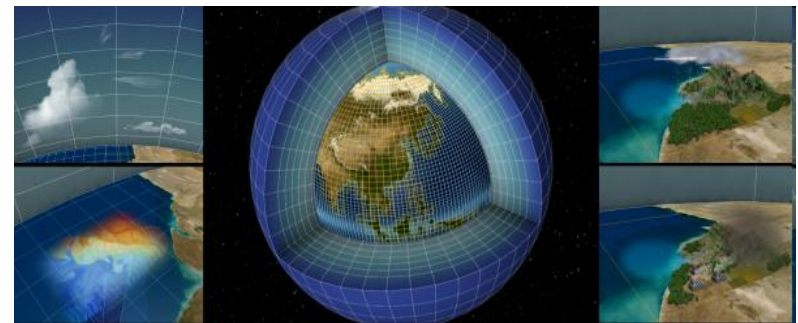
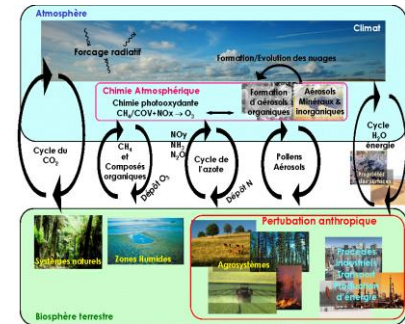
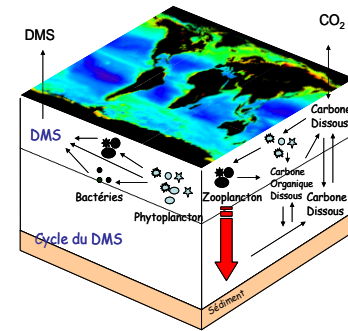
- **Climate-cycles interactions** at all time scales (past, present, future)
- **Abrupt events** : causes, past examples and uncertainties for the future
- **Model-data** comparaisons
- **Integrated Impact of human activity**

Simplified and intermediate complexity models (for long-term simulations)

Biogeochemical cycles models (land surface and ocean)

Frontier simulations for scientific and technological challenges strongly connected to high performance computing

Advanced statistical techniques (trend, detection and attribution analysis, regional downscaling)





LSCE

1. Foster and intensify new inter-disciplinary collaborations

Examples:

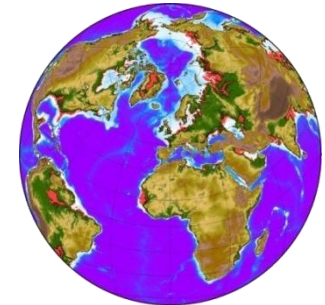
→ Climate – History
(archives, impacts)



→ Climate – Agriculture
(impacts, carbon cycle)



→ Climate – Energy
(impacts, mitigation)



2. Study of vulnerable regions

Mediterranean, Arctic areas



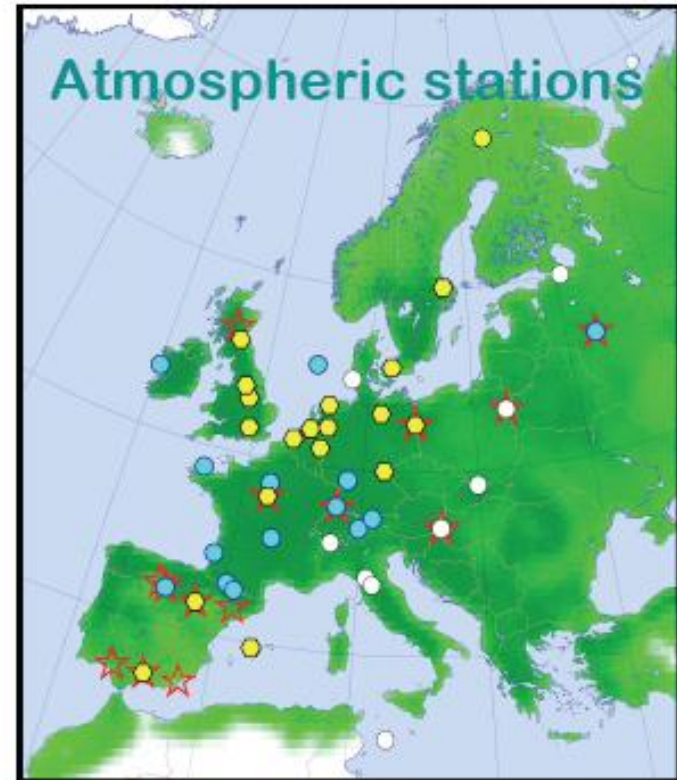
3. New training programs with journalists

LSCE Platforms: 1. ICOS



LSCE

Goals: long-term, operational monitoring of greenhouse gases, their fluxes and the carbon cycle, integration with space – borne monitoring

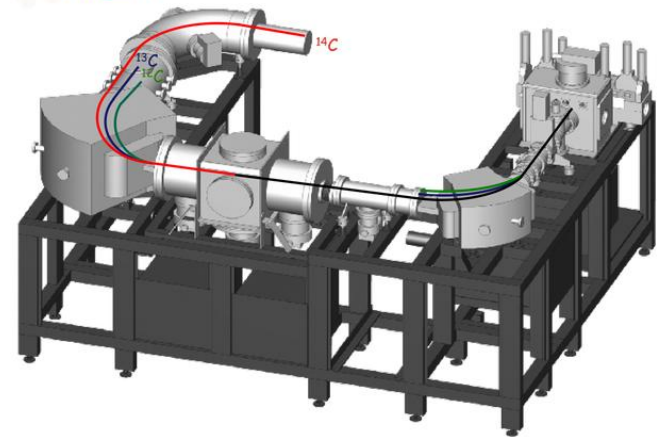


LSCE Platforms: 2. Analytical Platform for Geochemistry



LSCE

Goal: A collaborative regional analytical platform for climate & environment reconstruction, analysis and hydrology

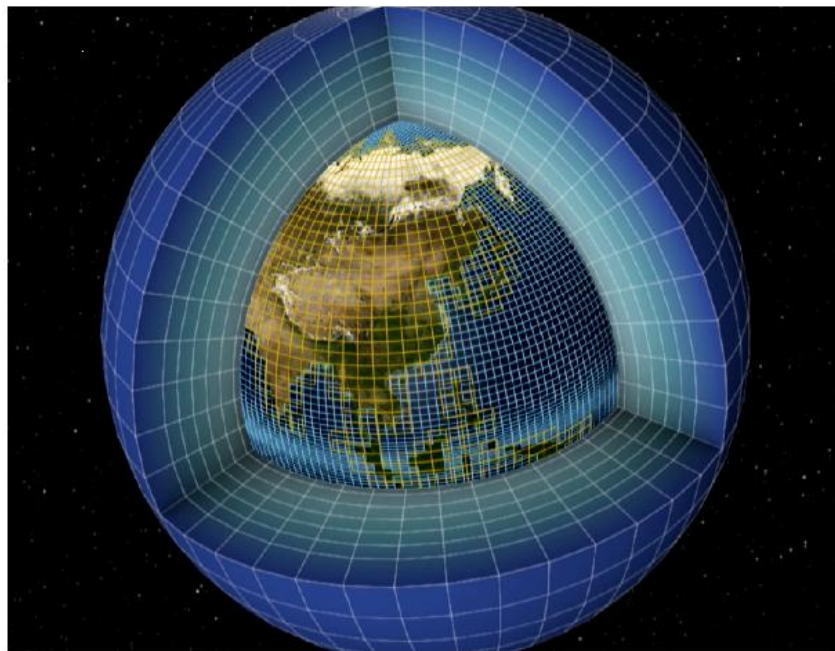


LSCE Platforms: 3. The IPSL Earth system model



LSCE

A large community model to simulate global climate including ocean, atmosphere, cryosphere, land surfaces and their interactions with the biogeochemical cycles, vegetation, ocean biology, atmospheric chemistry, ...



Long-term Strategy : Society needs



- An increased knowledge on climate evolution (from past to future)
 - More **basic research** needed
 - More observation and **long-term monitoring** needed
- Strategies for adaptation
 - More **inter-disciplinary research** for impact studies
 - Development of **climate services**
- Strategies for mitigation
 - **Integration of climate science** in the development of mitigation research (ex: biofuels, renewable energy resources, urban planning...)
 - New opportunities for innovation and emerging markets
-  → Climate Knowledge and Innovation Communities & National Institute on Climate – Air and Energy



LSCE

Research programs & assessments

- IPCC 5th report, 8 authors / review editors
- Global Carbon Project
- World Climate Res. Program, Int. Geosph. Biosph. Program
- International lead on Paleoclimate Modeling, Land Use scenarios
- International observation programs (marine & ice cores)
- EU FP7 & soon FP8 : presently > 30 projects, lead on 3
- National funding (ex ANR) : presently > 50 projects

Research infrastructures, monitoring

- Participation to the ICOS, LSCE leads the preparatory phase
- Lead of IS-ENES for climate modelling
- GMES Atmosphere : lead on GHGs (MACC project)



LSCCE

- Xiamen
- Tongji
- Beijing

Spring temperature change and its implication in the change of vegetation growth in North America from 1982 to 2006

Xuhui Wang^a, Shilong Piao^{a,1}, Philippe Ciais^b, Junsheng Li^{a,1}, Pierre Friedlingstein^{b,c,d}, Charlie Koven^e, and Anping Chen^f

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Edited by Robert E. Dickinson, University of Texas at Austin, Austin, TX, and approved December 6, 2010 (received for review September 27, 2010)



Innovation : The Climate KiC



- Develop training and innovation for fostering climate change adaptation and mitigation

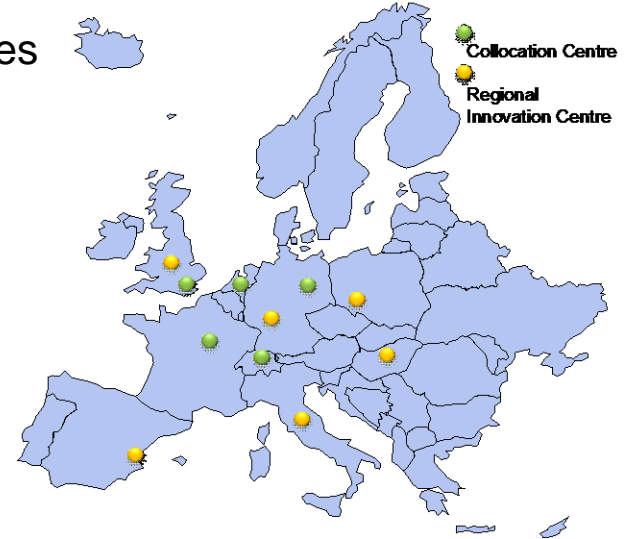
L S C E

- An ecosystem approach with research and industries

- Saclay is the french node

• Themes

- → Carbon cycle monitoring systems
- → Increase knowledge for businesses
- → Extreme events « products » for energy industry
- → Other themes on low-carbon city etc...



1



CLIMATE-KiC

Creating a Knowledge and Innovation Community
to address Climate Change Mitigation and Adaptation

Innovation : Institute CLAIRE, Climate – AIR – Energie



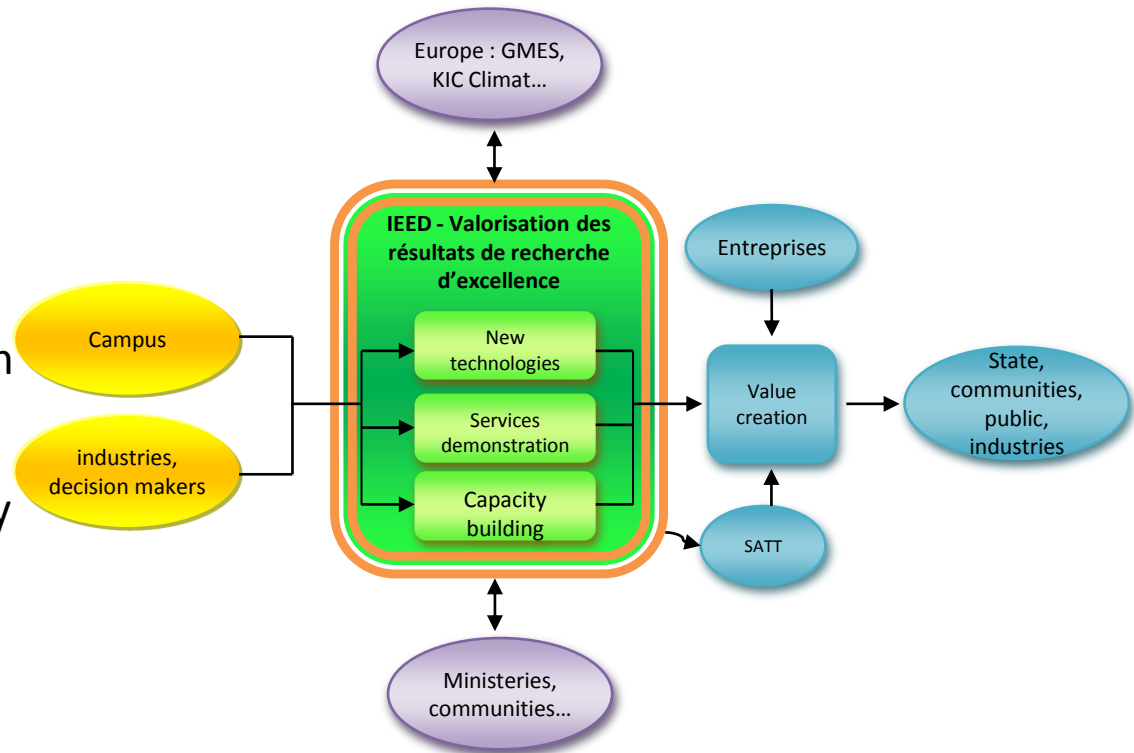
→ A new national **climate & air service center** for industries sensitive to climate and regulation, and policy, with goals to:

- Foster services for emission monitoring (air quality and GHG)
- Foster regional climate and air quality projection tools for scenarios (adaptation and regulation)

→ An innovation institute to develop new pilot integrative projects for **energy efficiency**

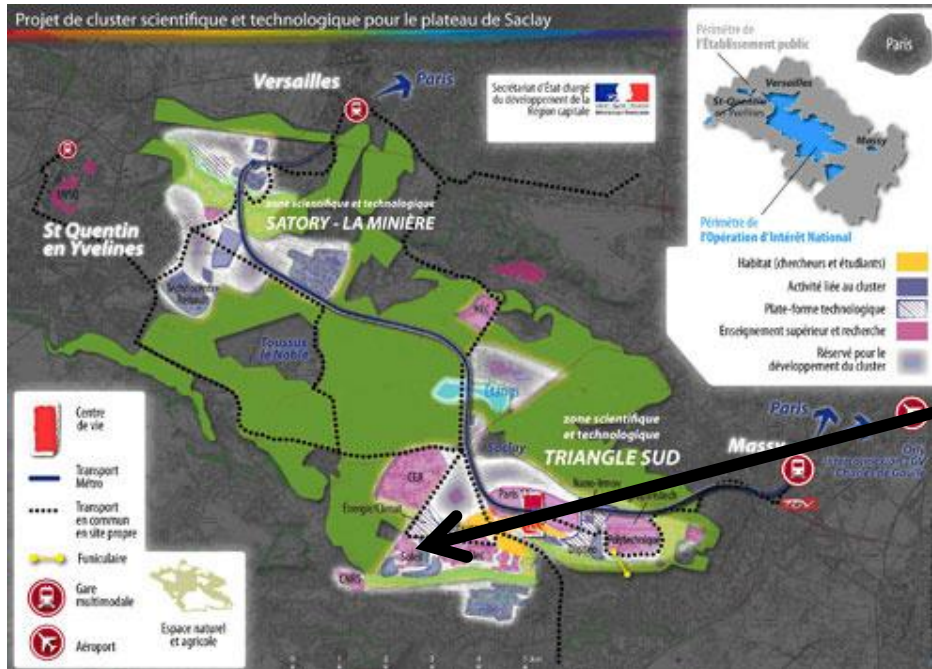
Themes :

- GHG and Pollutant emissions monitoring
- Anticipation of impacts (regulation and climate change)
- Attenuation of emissions & energy efficiency technologies
- Mediation et training ("capacity building")



Long-term strategy: The new Saclay Campus

- A new science cluster gathering 23 training, research and innovation organizations, schools and universities



ECLIPSE:

A new building dedicated to climate & environment, gathering:

- the LSCE
- the new research platforms
- the CLAIRE institute
- a facility for HPC research and training

