THE CLIMATE

The LSCE throughout the world

LSCE technicians, engineers and researchers travel to the most remote places on the planet to take samples (sediment, water, ice, air, rocks, organic material) in which past or current variations in climate have been recorded and to install instruments to monitor the current environment.

- Oceanographic expeditions (coring of marine sediments)
- Instrumented flights (planes, microlights)
- Ice core drilling (poles, glaciers)
- Continental samples (lakes, caves, rivers, etc.)

LSCE's geochemistry platform

The samples brought back to the laboratory are analysed using instruments (mass spectrometers and lasers mainly) on a technical platform at the cutting edge of research, linked to the IDES laboratory and open to collaborations and partnerships. (CNRS-UPSud).
One of our specialised areas is the ultra-precise measurement of chemical elements and their stable or radioactive isotopes for the dating and quantification of physical, chemical and biological processes, and the production of high-resolution recordings that help our understanding of the functioning of the climate system.
All the instruments are grouped together on a platform open to collaborations and partnerships and connected with the IDES laboratory (CNRS-Université Paris-Sud)

IPSL's digital climate model

The climate model developed at IPSL is among the top ten in the world in terms of results. It contributes to the simulations of the Intergovernmental Panel on Climate Change (IPCC, IPCC) which are produced based on "trajectories" of changes in greenhouse gas concentrations based on a range of socio-economic scenarios (www.ipcc.ch). LSCE contributes to the development of the full model (the parts concerning atmospheric chemistry and the continental and marine biospheres). It applies its expertise in high performance computing, code parallelisation, and innovative numerical methods.

Rising concentrations of greenhouse gases (GHGs) in the atmosphere is the main driver of ongoing climate change.

Predicting future climate change and demonstrating the effectiveness of mitigation policies requires understanding the phenomena that control the flows (sources and sinks) of greenhouse gases.

Understanding and anticipating climate change

Predicting the evolution of the climate and anticipating future climate change linked to increased greenhouse gases requires an understanding of the natural variability of the climate.

Numerical simulations of past climates are compared to reconstructions obtained from

natural archives. Numerical models used to explore future climate changes are also tested against information from the past. Information collected includes:

- Quantification of natural and anthropogenic sources (inverse modelling)
- Monitoring of greenhouse gas concentrations (RAMCES / ICOS networks and satellite information)
- Understanding of the natural variability of the climate
- Quantification of the changes in our environment under the pressure of human activity and climate change, whether in the air, on land or in the ocean (pollution, water and carbon cycles).
- Continental pollution (radionuclides, continent-ocean transfers and erosion)
- Ocean acidification and its impact on marine ecosystems
- Air pollution (ozone, aerosols) and weather extremes

A network for high-precision measurement of greenhouse gases in the atmosphere. The large ICOS infrastructure (Integrated Carbon Observation System), a European network, enables continuous measurement of CO2 and other greenhouse gases from more than 50 sites in Europe. Measurement methods and tools have been standardised and data processing has been centralised.

LSCE operates the Atmospheric Data Integration Centre. Atmospheric transport models coupled with ecosystem models allow high-resolution calculation of greenhouse gas flows (sinks and sources).

Interview with François Dulac, researcher at LSCE, on TV78

LSCE - Open exchanges with industry

LSCE is developing numerous collaborations with public bodies (Ineris, Météo-France, etc.), manufacturers (EDF, Thales, Veolia, Astrium, etc.) and SMEs (Aria Technologies, Leosphere, Climpact, Noveltis, etc.).

Monitoring of radionuclides in the environment

Among the environmental impacts linked to human activity, accidental releases of radioactive contaminants are among the most worrying.

LSCE specialises in measuring radionuclides in the field and using them as "tracers" of processes through their diffusion in the environment.

Within the framework of various projects, the LSCE has participated in several campaigns in Chernobyl and Fukushima to understand and predict the dispersion of radioactivity in the natural environment.
This expertise is the basis for many industrial collaborations.

Climate Service

Predicting climate change and the intensity and frequency of extreme events is of growing importance to our societies for the areas of tourism and agriculture, but also urban planning, infrastructure, energy production and public defence.
The LSCE collaborates with Météo-France to establish national and European climate services. It contributes its expertise in the analysis of simulations carried out by IPSL within the framework of the IPCC, for a correct interpretation of model results (especially taking uncertainties into account).