

Laboratoire des Sciences du Climat et de l'Environnement



Laboratoire des sciences du climat et de l'environnement aims to understand climate evolution at all time scales and to predict the changes our planet will have to face in the next decades and centuries because of the fast increase in greenhouse effect gases.

Organisation

LSCE is a mixed unit between CNRS, CEA and the Université Versailles Saint-Quentin (UVSQ). It is located at two sites near Paris (Saclay, Orme des Merisiers, and Gif-sur-Yvette, CNRS campus). LSCE, a part of the Pierre Simon Laplace Institute (IPSL), employs more than 250 people (150 permanent).

Main research topics

Scientists at LSCE study climatic evolutions over different time scales, to make predictions of climatic changes in the next decades and centuries. This phenomena is clearly related to the fast and large increase of greenhouse gases in the atmosphere.

Scientific strategy combines experimental studies of natural archives, such as polar ice, marine sediments, with systematic observations of the present day evolution of the atmosphere (content in greenhouse gases, etc?), and with numerical simulations of climate changes and biogeochemical cycles evolution.

- Natural climate variability at different time scales; interactions between climate, environment, and human activities.
 - Biogeochemical cycles (CO₂ and other greenhouse gases, aerosols): impact on climate and ocean acidification.
 - Geochronology and geomarkers analyses, to better understand both past and present-day exchanges between the oceans, the continents, and the atmosphere, in relation with climate evolution.
 - Numerical simulation of climate evolution, with the development of intermediate complexity models, and also of tri-dimensional models able to compute the coupling of atmospheric and oceanic circulations, and the interactions with the continental surfaces and the ice cover (climatic warming, future evolution of ice caps?)
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Main international projects

LSCE coordinates, or is strongly involved, in various international projects, among which :

- Polar ice drilling projects (European program EPICA in Antarctica and several oceanographic cruises in the frame of the IMAGES and EUROCORES / EUROCLIMATE programs.
- Atmospheric composition and carbon cycle : European programs GEOMON, IMECC, EPOCA, CARBOCEAN, GEMS, CARBOAFRICA and CARBOEUROPE.
- Since 2008, coordination and building of the ICOS infrastructure (Integrated Carbon Observation System), to measure precisely sources and sinks of greenhouse gases.

Collaborations

Beyond IPSL laboratories, close collaboration is developed with the french Polar Institute (IPEV), the « Laboratoire de Glaciologie et Géophysique de l'Environnement » (LGGE) in Grenoble (France), the laboratory « Environnements PaléOCéaniques » (EPOC) in Bordeaux (France), and many other laboratories in different countries (Europe, USA, China, etc...).

Tools - Instrumental developments

Experimental researches at LSCE required the development of high tech instruments, in particular for monitoring atmospheric aerosols and greenhouse gases. New LIDAR are developed in collaboration with industry. Thanks to their strong expertise in atmospheric measurements, LSCE research teams have participated to major national (AMMA, CERES) and international (YAK, OOMPH) projects about the global atmosphere evolution or the pollution in big cities like Beijing or Cairo.

For the reconstruction of paleoenvironments, LSCE has a strong expertise in isotopic and trace elements measurements in ice, marine and lacustrine sediments. Main techniques are mass spectrometry, paleomagnetism and environmental magnetism, pollen analyses... Studied samples are issued from corals, tree rings, carbonate concretions, and sediments.

Paleoclimatic studies and reconstructions of paleoenvironment require precise and absolute age models. This is obtained by using several dating techniques based on carbon-14, Potassium-Argon and Argon-Argon, Uranium and Thorium families, and thermo-luminescence (archaeology). Finally, numerical simulation is developed. Supercomputers installed at CEA and CNRS are used for computing tri-dimensional simulations coupling continents, oceans, and atmosphere over long periods of time (several climatic cycles). Engineering and development of codes for models that

stimulate the climate evolution in the future for the IPCC is under the responsibility of computer specialists working in close collaboration with the modeling pole of IPSL.

Management team

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Contacts

Access to **LSCE website**
