Offer for a Ph.D.position at IPSL/CEA

Modelling water isotopes with the IPSL coupled climate model to improve understanding of paleodata reconstructions

(Laboratoire des Sciences du Climat et de l'Environnement, LSCE)

Within Laboratoire des Sciences du Climat et de l'Environnement, excellence laboratory of the Institut Pierre-Simon Laplace, we offer a three years Ph.D. position fully funded by CEA, aimed at simulating water isotopes within the coupled IPSL General Circulation Model to better understand paleoclimate records, also measured at LSCE.

Context:

The water cycle has a major impact on the climate system of the Earth. In the perspective of climate change, there is a need to predict and anticipate changes caused by anthorpogenic activities. At the forefront of these, we need a better understanding of the feedbacks and non-linear aspects of the evolution of the water cycle. Numerical modeling of the Earth System is a unique tool to quatify these processes that play a major role in the variability of the climate system. The Earth System Model of the IPSL was and is developed with such a target in mind and has already been participating in numerous Modelling Intercomparison projects, both for the future (CMIP) and the past (PMIP). Water stable isotopes are bringing important additional constraints to the water cycle processes. Since their abundances reflects change of phase (solid, liquid, gaseous) it allows characterizing critical processes affecting the water vapor such as the origin of evaporation, cloud microphysics and convective processes. There are large sources of data for isotopes in the water cycle (liquid and vapor) that are measured today from in-situ measurments and teledetection. Past variations of the isotopic composition of water is traced in many natural archives (ice-cores, speleothems, oceanic sediment cores etc.) allowing to characterize quantitatively pas variations of the water cycle. Water isotopes hence provide a unique tool for better constraining the past climates simulated in climate models. So far, water isotopes have been implemented in the atmospheric (LMDZiso), soil-vegetation (ORCHIDEEiso) and oceanic (NEMOiso) components of the IPSL general circulation model.

Objectives

The main objective of the Ph.D. position is to implement the necessary evolutions to perform fully coupled simulations including the water isotopes in the coupled IPSL-GCM model. Particular emphasis on the air-sea exchange will be needed to correctly represent water isotopes in the full system.
Furthermore, simulations performed will be evaluated againts recent historical observations for water isotopes in the atmosphere and oceans. Paleoclimate applications will then be undertaken on different topics covering the last glacial cycle, with a link to the PMIP program and other isotopic enabled paleoclimatic simulations performed at LSCE.

The ideal candidate will hold a master degree in climate science, geophysics (atmosphere or ocean) and should show a strong interest in paleoclimate.

Supervision team:

The position is funded by CEA and CEA will be the employer.
The successful candidate will work with experts in palaeoclimate modelling at LSCE, in close collaboration with experts in water isotopes at LSCE and IPSL. The main supervisors will be Didier M. Roche and Didier Paillard at LSCE

Duration and salary: The Ph.d. candidate will be recruited for 36 months with a net monthly salary around ~1,600 euros. This includes social services and health insurance.

Contact for applications: Applications should include a vita, a statement of research interests and the names of at least two references including e-mail addresses and telephone numbers. Applications should be submitted by e-mail to Didier Roche, LSCE (didier.roche@lsce.ipsl.fr).