

Offer for a 2 years Post-doctoral position at IPSL (Laboratoire des Sciences du Climat et de l'Environnement, LSCE)

Modelling biological paleoclimatic indicators to improve model-data comparison

In the framework of the « L-IPSL » LABEX “Large Project”, the excellence laboratory L-IPSL of the Institut Pierre-Simon Laplace offers a two-years post-doctoral position (with a possible one year extension) to better include biological paleoclimatic indicators in climate models, in order to improve model – data comparison in a paleoclimate context.

Context:

Modelling past climates very different from today can help understanding processes making these climate states so different from today, or at work during past climate changes. This is one of the only ways of evaluating these models for climatic contexts very different from the one they are initially adjusted to. However, caution should be taken when comparing paleo-climate simulations to paleo-climate reconstructions because these reconstructions are based on climate indicators, such as the ^{18}O or ^{13}C isotopes recorded by e.g. foraminifera, for the ocean, or vegetation for the land surface. Many indicators thus ultimately depend on a biological factor: either this is the indicator by itself, such as in pollen or foraminifera assemblages, or it records the indicators (such as the isotopic composition recorded in foraminifera). In this latter case, biological factors could have an impact on the climate signal which is recorded, e.g. if the foraminifera preferably lives at a given season or depth and it is important to evaluate the impact of these biological characteristics on the reconstructed climate. On land, the problem is different: vegetation is usually implemented to describe the physical characteristics of the surface and to address carbon cycle aspects. This description has to be refined for more pertinent comparison with pollen data.

Objectives and indicative schedule:

The objectives of this post-doctoral position are to account for these biological factors in the IPSL modelling tools, the IPSL coupled model and iLOVECLIM and to study their impacts on model-data comparisons. We have chosen to focus on foraminifera for the ocean part, through the use of the FORAMCLIM model, and on vegetation, through the use of the BIOME model.

We envisage two main tasks:

1- Implementation of a FORAMCLIM interface for the IPSL coupled model and iLOVECLIM

Currently, running FORAMCLIM with the IPSL coupled model requires many steps including corrections for present-day biases and regridding. The model must therefore be adapted for an easier use with large input files. Moreover, there are a few variables missing from the marine biogeochemistry model implemented in iLOVECLIM that are required input for FORAMCLIM. The objective here is therefore to compute these variables, either by working on the marine biogeochemistry model itself, or by building simple rules from available output from the IPSL model.

2- Implementation of the BIOME interface

Specific output from climate model usually require special post-treatment if we want to use a model such as BIOME. As for FORAMCLIM, we also have to deal climate bias correction issues, which in practice can be very time consuming. We aim here at creating an interface to use BIOME with IPSL and iLOVECLIM output and test different methods for these bias corrections. The tool will also enable the study the influence of single factors (CO_2 , single climate variables) on the vegetation so that the processes leading to its evolution are better understood. The outcome can be compared to more complex dynamical vegetation models such as ORCHIDEE but our aim here is really to build a tool with which we can easily compare with pollen data.

The ideal candidate will hold a PhD in climate science, vegetation or marine biochemistry and should show a strong interest in paleoclimate.

Supervision team:

The position is funded by LABEX L-IPSL and IPSL will be the employer.

The successful candidate will work with experts in palaeoclimate modelling at LSCE, in close collaboration with experts vegetation and ocean biological model at LSCE and IPSL. The main supervisors will be Didier M. Roche and Masa Kageyama at LSCE

Duration and salary: The post-doctorate will be recruited for 24 months with a net monthly salary around 2000 euros, commensurate with experience, with a possible extension of up to one year. 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 Masa Kageyama, LSCE (Masa.Kageyama@lsce.ipsl.fr) and Didier Roche, LSCE (didier.roche@lsce.ipsl.fr).