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LSCE

**PhD topic: "Reconstructing the evolution of European paleoclimates since the LGM: implications for the future of continental climates"** (*application deadline: June 15<sup>th</sup> 2023*)

**Background:** Constraining the evolution of past climate is key for improving predictions of future climate change. To this end, polar ice and oceanic sediment core data have been extensively used and compared with climate model outputs. Large uncertainties however exist regarding the spatial structure of continental climate changes, especially at mid- to high-latitudes where climate changes are most pronounced and most spatially heterogeneous. Despite the widespread occurrence of continental paleoclimate proxies, these data have been overlooked in most data assimilation studies. As a result, the magnitude and dynamics of past climate changes in terrestrial regions that are heavily populated today, remain uncertain. Moreover, the response time of climatic changes is shorter on the continents than on the ocean, meaning that continental proxies may record key processes that are not visible through the lense of oceanic proxies.

**Project:** This PhD thesis will focus on the use of continental paleoclimate proxies as a way to better constrain the magnitude, the sequence of events, and the spatial structure of on-land climate change over the last deglaciation. This project will consider (i) Europe as a case study for investigating the fate of climate change across mid- to high-latitude land surfaces, and (ii) the last glacial maximum (LGM, ~26 ka) as a benchmark time period for investigating the response of continental climates to increasing radiative forcing. The objectives of this PhD thesis will be dual, with analytical and computational challenges. The analytical part will aim at providing new quantitative reconstructions of European paleoclimates using concentrations of dissolved noble gases in groundwater as a proxy for past land surface temperatures. The other part of the project will require a cross disciplinary approach to build an exhaustive compilation of LGM and late glacial paleoclimate records in Europe, which shall be made available for the community. Outcomes of this proxy compilation will be combined with simulations of the intermediate complexity climate model iLOVECLIM to investigate the interactions and feedback mechanisms between the European ice sheet complex and European climates. Model-proxy data comparisons will also be used to assess which models of the *Coupled Model Intercomparison Project* best simulate European climates, and ultimately reach a comprehensive assessment of spatial gradients of equilibrium warming across Europe.

**Candidate:** The candidate shall have a strong background in geochemistry, a great interest in climatology and environmental sciences, and an advanced level in mathematics/programming.

**Location:** Most of the work will be carried out at CRPG (Nancy), with possible time periods spent at LSCE (Saint-Aubin) for the modelling aspects of the proposed work.

**Funding:** 3 years, from ANR-22-CPJ2-0005-01, starting October 2023.

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