REGARD
RechErche d'analoGues climAtiques pour sélectionneR Demain
Search for climate analogs to select tomorrow

Climate-induced changes in suitable areas for wheat production: statistical climate analog approach
Young scientist position

The Laboratoire des Sciences du Climat et de l'Environnement – LSCE – is looking for a motivated postdoc / young scientist for a project focused on the **adaptation of winter wheat to climate change in France** via the use of **climate analog methods**. Work will be performed in collaboration with researchers of the French agronomic institute (INRAE[1]) in Avignon, Grignon and Australia and with scientists of the ARVALIS Plant Institute[2].

Background

Climate change is characterized not only by positive trends in temperature, changes in key climate variables such as precipitation and radiation, but more importantly by changes in their seasonality, variability and extremes. This challenges crop growing and thus production. Projecting the potential impacts of climate change on production can be done using specific crop models but also pheno-climatic indices that calculate the various meteorological stress crops experience during their different phenological stages throughout their growing cycle[3].

Our recently funded project, REGARD, has chosen to explore the potential future conditions for growing winter wheat in France using the "climate analog" statistical method applied to pheno-climatic indices. The objective is to illustrate and quantify the geographical displacements of the suitable areas of wheat production, as well as the potential for the appearance of new conditions in France. These new situations will be compared with the climates currently known in some reference sectors of wheat breeding in other parts of the world.

Overall aim

The successful candidate will start computing the spatio-temporal evolutions of specific pheno-climatic stress designed by INRAE for different wheat breeds, for historical climate and various global scenarios of future climate change. All scenarios have been bias-corrected and downscaled at about 50km resolution[4] and even 11km for some.

From today's distribution in time of the pheno-climatic stages and climatic conditions during those stages, he/she will code and apply the "climate analog" methodology, in order to characterize the spatial distribution of favorable wheat growing conditions in France.

Analysis of future climate-based indicators will allow to identify the potential geographical displacement of areas suitable for growing wheat as well as how climatic conditions will evolve within today's areas. In case of significant changes in France, analogs of future growing conditions will be

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[1] https://www.inrae.fr/

[2] https://www.arvalisinstitutduvegetal.fr/

[3] Caubel, J., García de Cortázar-Atauri, I., Launay, M., de Noblet-Ducoudré, N., Huard, F., Bertuzzi, P., & Graux, A.-I. (2015). Broadening the scope for ecoclimatic indicators to assess crop climate suitability according to ecophysiological, technical and quality criteria. Agricultural and Forest Meteorology, 207, 94–106. https://doi.org/10.1016/j.agrformet.2015.02.005 ; Caubel, J., Garcia de Cortazar-atauri, I., Vivant, A. C., Launay, M., & de Noblet-ducoudré, N. (2017). Assessing future meteorological stresses for grain maize in France. Agricultural Systems. https://doi.org/10.1016/j.agsy.2017.02.010

[4] Noël, T., Loukos, H., Defrance, D., Vrac, M., Levavasseur, G. (2021) High-resolution downscaled CMIP5 projections dataset of essential surface climate variables over the globe coherent with ERA5 reanalyses for climate change impact assessments. https://doi.org/10.31223/X53W3F

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sought elsewhere in the world. This search for analogs is important as it can help breeders identify areas for selecting tomorrow's French breeds.

Requirements:

- Programming skills, preferably in R, although other languages are possible
- Understanding of climate and impact sciences
- Skills in statistics
- Interest and motivation in modeling

Selection criteria:

- PhD
- Demonstrated experience working with complex codes and/or large datasets.
- Autonomy, ability to work in a team and time management skills.
- Experienced in multidisciplinary team-based activities with the ability to effectively communicate with colleagues and with staff from the partners of a project.

What LSCE can offer you:

LSCE[5] is an established, world-class research laboratory, representing a collaboration between CEA, CNRS and the University of Versailles Saint-Quentin (UVSQ), all three now being part of the new Paris-Saclay University. It is part of the Institute Pierre Simon Laplace (IPSL). LSCE hosts approximately 300 researchers, engineers and administrative staff including many PhD and master's students. This project will provide the employee with the opportunity to work directly on advanced methods with researchers from the LSCE and other institutions.

Location: Laboratoire des Science du Climat et de l'Environnement (https://www.lsce.ipsl.fr) located about 20 km from the heart of Paris in the Orme des Merisiers green area.

Contract duration: 18 months

Starting date: The position is available <u>from June 2021</u> and will remain open until filled

Salary: Competitive salary with full social and health benefits, commensurate with work experience

How to apply: Applicants should submit a complete application package by email. The application package should include (1) a curriculum vitae including the publications, (2) statement of motivation, (3) names, addresses, phone numbers, and email addresses of at least two references.

Contacts:

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[5] https://www.lsce.ipsl.fr

Call for proposal opened since February 24, 2021