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Post-doctoral researcher in data assimilation for wildland fire modeling (M/F)

GENERAL INFORMATION

Workplace: CECI (Cerfacs / CNRS / IRD), 42 avenue Gaspard Coriolis, 31100 Toulouse
Type of contract: CDD
Contract period: November 2025 to September 2027
Proportion of work: full-time
Salary: Between 2992 and 4167 euros gross based on experience
Level of education required: Ph.D.

Contact person: Dr. Mélanie Rochoux
E-mail: melanie.rochoux@cerfacs.fr
Application deadline: 26/08/2025

Anticipating wildfire behavior has recently become a key operational and scientific issue due to the emergence of extreme wildfire events, resulting from the combined effects of topography, meteorology and biomass fuel complexity on a wide range of scales. To assist in fire crisis management, there is a need to develop an on-demand simulation capability able to represent the complexity of wildland fire behavior, involved in both the fire spread and the fire plume, and to estimate the plausible fire scenarios at the scale of an event. Such a capability requires the assimilation of all available sources of information on a given wildland fire event: i) the best physically-based models such as the coupled atmosphere-fire model Meso-NH/BLAZE jointly developed by CECI/Cerfacs and CNRM/Météo-France; and ii) the available infrared measurements, and iii) their associated uncertainties.

As part of the ANR FIREFLY project, the postdoctoral researcher will contribute to the development a data assimilation framework relevant for wildland fire modeling combining coupled atmosphere-fire modeling and infrared imaging data. The postdoctoral researcher will be part of the CECI team responsible for developing and evaluating a data assimilation workflow relevant for wildland fire behavior prediction. He/she will work under the supervision of Mélanie Rochoux within the framework of the ANR FIREFLY project.

The novelty of the postdoctoral work lies in the development of an efficient and robust ensemble-based data assimilation process capable of correcting uncertain biomass fuel input parameters and the fire front position, and of handling fire front position errors to produce more accurate coupled atmosphere-fire model predictions for a given fire event.

The postdoctoral work is organized in four steps:
1) Sensitivity analysis to identify the most influential biomass fuel parameters on fire spread and fire-induced wind and that are the most important to infer through data assimilation
2) Emulation of the coupled atmosphere-fire model using machine learning
3) Building the data assimilation approach that integrates the emulator
4) Applying the data assimilation approach to a real wildfire for demonstration

More information are available here:
https://emploi.cnrs.fr/Offres/CDD/UMR5318-MELROC-002/Default.aspx?lang=EN

SKILLS

We are seeking a motivated and enthusiastic early-career researcher to join our team at CECI/Cerfacs and making progress on wildland fire modeling through data assimilation.

Candidates must hold a recent PhD in atmospheric science or related discipline with experience in applied mathematics, or a recent PhD in machine learning and/or data assimilation with strong interest in atmospheric and fire science questions.
Candidates must have proven research skills evidenced by a least one publication as the first author relating to the subject or activities of the project. Other essential criteria for this job are a sound knowledge of computer skills and numerical modeling.
Candidates must have a very positive attitude to working in a team. Fluency in spoken and written English is a requirement.

CONTEXT OF WORK

The CECI research unit is a joint laboratory between the European Center for Research and Advanced Training in Scientific Computing (**Cerfacs)**, the French National Center for Scientific Research (**CNRS**) and the French National Research Institute for Development (**IRD**).

CECI includes about 30 researchers and early-career researchers with strong expertise on climate and environmental models, high-performance computing, simulation workflows and data management. We conduct cutting edge research spanning from climate variability and prediction, oceanography and polar science, air-sea interaction, climate change detection and attribution and its impacts, to extreme events such as heat waves, intense precipitation events and droughts as well as environmental risks such as atmospheric pollutant dispersion, wildland fires and floods. We use a wide range of numerical models from large-eddy simulation to global Earth system models and associated algorithms (data assimilation, uncertainty quantification, machine learning, code coupling) to tackle our science challenges.

On the wildfire topic, CECI closely works with CNRM/Météo-France and more recently with CNES. CECI also benefits from collaborations with University of Corsica, Polytechnic University of Catalonia (UPC), INRAE and CESBIO (Observatoire Midi-Pyrénées).

APPLICATION INSTRUCTIONS

Applicants are asked to send a CV, a cover letter, and the names and e-mail addresses of two professional references through the CNRS job portal (https://emploi.cnrs.fr/Offres/CDD/UMR5318-MELROC-002/Default.aspx?lang=EN). An initial selection phase will be based on the application. Selected applicants will be contacted to an interview early September 2025.