Postdoctoral Researcher in Physically Informed Supervised Methods for Solar Radiation Forecasting from Satellite Images

Fixed-term contract (CDD) for 18 months, available immediately

Institution: **MINES Paris (Ecole Nationale Supérieure des Mines de Paris)**
Assignement: **Centre Observation, Impacts, Energie (O.I.E.)**
CS 10207 - F-06904 SOPHIA ANTIPOLIS CEDEX, France
Site Web: http://www.oie.minesparis.psl.eu

As part of the **Fine4Cast** project within the Program and Priority Research Equipment TASE (Advanced Technologies for Energy Systems), MINES Paris - PSL is opening a postdoctoral position focused on the development of physically informed supervised methods for solar radiation forecasting from satellite images. The objective of Fine4Cast is to enhance very short-term forecasts (from a few minutes to a few days) of renewable energy production and consumption (wind, solar) at the local level. The Fine4Cast project relies on an integrated approach for the modeling chain, from observations and meteorological forecasts to the use of forecasts for decision-making.

1. JOB PROFILE DESCRIPTION

The sought-after candidate is a postdoctoral researcher who has demonstrated capabilities in data science and the utilization of solar resources, atmospheric science, or meteorology. The candidate will work collaboratively with all team members in a highly collaborative and multidisciplinary environment. He or she will conduct a literature review on physically informed supervised methods, develop innovative approaches to inform supervised algorithms for short-term forecasting based on satellite images. In doing so, the candidate will be required to identify and mathematically express physical constraints applicable to satellite images and handle large volumes of data (satellite images and outputs from meteorological forecast models) for implementing the approach.

Candidate Profile Specifics

This position is open to a researcher with a degree from a university or a prestigious school and a Ph.D., with a strong interest in data science, solar resource assessment, and its utilization in the field of renewable energy. Prior skills in Python programming and a strong expertise in data science are important assets for this position. The candidate should also have previous knowledge in solar resource assessment, atmospheric science, or meteorology, demonstrate autonomy, and show a strong inclination for conducting scientific work.

Proficiency in both spoken and written English is imperative.

2. APPLICATION FILE

The application file should include the following elements:

- A detailed cover letter.
- A comprehensive curriculum vitae (CV).
- An annotated list of works and publications.

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3. THE CENTER OBSERVATION, IMPACTS, ENERGY (O.I.E), MINES Paris - PSL

Context:

In coherence with its educational mission, MINES Paris - PSL engages in a broad spectrum of research activities covering a wide range of scientific disciplines. The eighteen research centers are organized into five departments: Earth and Environmental Sciences, Energetics and Processes, Mechanics and Materials, Mathematics and Systems, and finally Economics, Management, and Society.

The research at MINES Paris - PSL aims for both academic excellence and socio-economic impact. This research-oriented model is developed in close interaction with the socio-economic world, including private or public sector companies, as well as institutions and public administrations. MINES Paris is the leading Grande Ecole in France in terms of volume of partnership research contracts with industries, supported by ARMINES, the MINES Paris Foundation, or MINES Paris itself. This unique positioning has allowed MINES Paris to expand its teams (through the recruitment of lecturers/researchers on indefinite-term contracts funded by its own resources via the contractual research association ARMINES) and enables it to maintain long-term experimental and digital platforms that are both unique and recognized for their quality by its partners.

The Center for Observation, Impacts, Energy (O.I.E.), located on the Pierre Laffitte campus of MINES Paris – PSL in Sophia Antipolis. The center's personnel consists of 8 permanent scientists, 8 postdoctoral researchers, 8 doctoral candidates, and an administrative assistant. The O.I.E. Center is a joint research team between MINES Paris and ARMINES. Its activities lie at the intersection of energy, the environment, and Earth observation. The center studies and models "renewable energy" resources and the environmental impacts associated with their utilization, drawing on fundamental and applied scientific disciplines (mathematics, metrology, physics, environment, etc.) and information and communication technologies. Databases and web services are crucial channels for disseminating the team's knowledge.

The O.I.E. Center's work aligns with strategic axis No. 3 of the Energetics and Processes Department (DEP) of MINES Paris, focusing on the integration of renewable energies.

The O.I.E. Center contributes to three main areas of activity:

1. Development of energy-specific meteorology for the assessment and prediction of renewable resources, particularly solar energy.
2. Analysis and decision support in terms of reducing environmental, social, and economic impacts of transportation, production, and energy usage.
3. Dissemination of scientific data through web services in an international collaborative environment (OGC, GEOSS, IRENA, IEA).

The center's research is linked to the assessment, modeling, and utilization of renewable energy resources, addressing temporal and spatial aspects through data science. The goals include improving the precision and reliability of estimates from Earth observation data (satellite and airborne data, in-situ, and models), enriching existing databases, and expanding the number of estimated variables for different energy conversion methods.

The general objectives of O.I.E. are to address scientific challenges related to spatiotemporal variability, precision, and uncertainty propagation in the assessment of renewable energy resources. The aim is also to facilitate the transfer of knowledge to students, the scientific community, industry professionals, and decision-makers involved in renewable energies and the energy transition.