Near Real Time Carbon Emission Monitoring using Satellite Data.

Young scientist position

The Laboratoire des Sciences du Climat et de l'Environnement (LSCE) and Kayrros (a Paris based EO startup), are looking for a motivated postdoc / young scientist candidate for a joint project focused on ground-breaking methods to quantify global carbon emissions using satellite imagery and machine learning.

Background

Global carbon inventories track CO2 emissions worldwide by aggregating a number of data sources: industrial sites, energy production, residential consumption, transport networks, etc. Many of these sources are not direct emission measurement but estimates based on inferred relationships between activity and emissions. Furthermore, only a fraction of countries reliably report their carbon footprint with sufficient detail and timeliness.

On the upside, the remote sensing landscape is changing at a very fast pace. Existing satellite constellations such as the Sentinel already track emissions of pollutants such as NOx and certain potent greenhouse gases such as methane. A considerable number of new sensors are being launched right now, spurred by a collapse in launch costs and the generalization of low cost, low orbit earth observation satellite constellations, including a number of missions specifically focused on greenhouse gases and CO2 in particular.

Overall Goals

Together with University of Tsinghua and University of California Irvine, the LSCE has co-designed and built a near real-time inventory of carbon emissions for major industrial countries, whose numbers are published online at

https://carbonmonitor.org

Our objective in this project is to use remote sensing to track industrial emissions in locations for which the numbers are either unavailable or unreliable. Large (and typically hot) industrial sources such as cement plants or steel mills can be tracked using infrared satellite imaging combined with direct emission measurements from satellites such as Sentinel 5P, thus giving a more reliable picture than statistical models based on activity alone. The objective here is thus to use remote sensing to paint a more accurate, near real-time picture of CO2 emissions worldwide, and incorporate it in https://carbonmonitor.org.

In practice, this will mean for example deriving automatic procedures to detect an classify infrastructure on the ground and solve inversion problems to estimate emission rates for pollutants such as NOx or

CO2. The project will also involve more reconciliation of remote sensing based indicators, which at first will more finely capture trends, with inventories which provide a larger picture of total emissions. This will mean working from a variety of sources, including multiple satellite constellations, and public databases. For many of these sources however, much of the preprocessing work has already been performed at Kayrros, and the project will be able to take full advantage of this infrastructure.

Requirements

- Programming skills, preferably in Python.
- Some background in machine learning or statistics.

Selection Criteria:
- PhD in a field such as signal processing, remote sensing, machine learning or statistics.
- 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 Kayrros and the LSCE can offer you:

LSCE is a world-class research laboratory established and a collaboration between CEA, CNRS and the University of Versailles Saint-Quentin (UVSQ). 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. The purpose of this joint position between LSCE and Kayrros is to develop R&D that becomes sustainable and could lead to a permanent position opening at Kayrros during or after the position duration.
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.

Kayrros is an earth observation startup founded in 2016. It now employs about 150 people between Paris, New York, Houston, Singapore, Bangalore and London. Kayrros' mission is to track carbon using satellite imaging and alternative data sets, following oil & gas production, storage, demand and finally emissions and sequestration. The postdoc will involve constant interactions with the Paris team. Much of the R&D is located in offices on rue Lafayette, in the center of Paris.

Contract duration: Up to 24 months**.**

Starting date: The position is available from Nov 2020 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 most important recent publications, (2) statement of motivation (3) answers to the selection criteria above (4) names, addresses, phone numbers, and email addresses of at least two references.

Contact

Philippe Ciais, philippe.ciais@lsce.ipsl.fr
Alexandre d'Aspremont, aspremon@ens.fr

https://www.lsce.ipsl.fr
https://www.kayrros.com