University of Copenhagen, Kayrros, Laboratoire des Sciences du Climat et de l'Environnement (LSCE), INRAE Bordeaux are looking for a PhD candidate who will be based at the Department of Geosciences and Natural Resource Management (IGN) in Copenhagen

**PhD topic**

Dynamic forest carbon maps from very high-resolution satellite data

**Background**

Carbon in forests is extremely important to climate but extremely difficult to measure. The problem is that currently no suitable tool exists for a rapid assessment of forest carbon change at the fine scale. Such a tool is crucial to inform smart management of carbon sequestration from a myriad of projects with highly diverse forestry practices. New satellites open a window to track carbon sequestration in individual trees. The new PlanetScope constellation of micro-satellites take a picture of every tree on Earth every day. These images have a very high spatial resolution of 3 meters over the whole globe. Moreover, the daily coverage of images from PlanetScope allows for the first time to take the pulse of carbon in forests in almost near real time

**Overall aim**

Apply high spatial and temporal resolution PlanetScope satellite data to produce annual forest and carbon stock maps for few selected region in Europe, e.g. France, Germany, Denmark

**Specific aims and working steps**

- Select a forest area in Europe with available plot data.
- Develop a framework for downloading/storing/mosaicing/processing multi-spectral PlanetScope satellite data.
- Develop a framework based on deep learning (convolutional neural networks) to map forests and specific parameters (e.g., tree density, management type, dominant species, forest age) using the capacities of the very high spatial and temporal resolution offered by PlanetScope. Training data is derived from national inventory plot data, own field surveys, and Lidar.
- Use above mentioned data sources to derive biomass carbon stocks at a 3-m resolution for 2018-2020.

**Requirements**

- Programming skills, preferably in Python
- Basic understanding of satellite images and spatial analyses
- Knowledge on machine learning, preferably deep learning

**Contacts**

At University of Copenhagen: martin.brandt@mailbox.org and at LSCE: philippe.ciais@lsce.ipsl.fr

UNIVERSITY OF COPENHAGEN INRAE LSCE KAYRROS