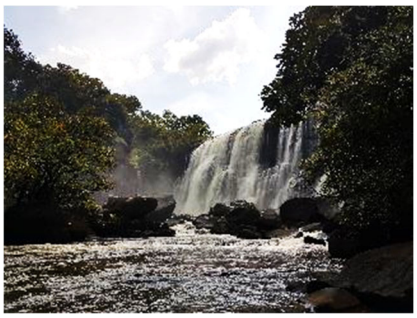
UNIL | Université de Lausanne
Faculté des géosciences et de l'environnement
Secrétariat du master en biogéosciences
bâtiment Géopolis
CH-1015 Lausanne

UNIVERSITÉ DE NEUCHÂTEL





Vegetation and carbon stock maps in Guinea

Context:

National parks in tropical climates are essential to protect their high diversity, including endemic species. Their conservation is often considered as a way to maintain their high carbon stock, and as potential carbon sinks. The *Moyen-Bafing National Park* (PNMB), established in 2021, is the first national park in West Africa that focuses its management on the socio-economic monitoring of local communities: it is home to 20% of West African chimpanzees, but also houses 40,000 people. To better understand and assess deforestation and natural regeneration of these critical habitats, the park's managers are interested in biomass dynamics and, consequently, carbon dynamics.

Aim of the study:

During almost 2 years of field work, plant species were exhaustively inventoried in 151 plots, and in each plot the trees were identified, measured, and tagged. Soil and vegetation samples were collected to measure their carbon content. In the near future, the plant inventories will be classified in plant communities and a carbon stock will be calculated for each plot.
The aim of the master project will be to extrapolate these results at the landscape scale to produce a vegetation map and a carbon stock map. If the candidate is interested, it should be possible to organize field remeasurements of the trees to calculate tree growth between both surveys and the potential carbon sink of the vegetation.

Desired Qualifications:

We are seeking candidates with a strong passion for statistics, specifically in the context of Geographic Information Systems (GIS), and a commitment to adopting holistic and interdisciplinary methodologies. The analysis will rely on machine learning techniques. To ensure a solid foundation in this area, applicants are encouraged to enroll in the "Machine Learning for Earth and Environmental Sciences" course at UNIL. If interested, candidates should be prepared for fieldwork in Guinea. While in the field, individuals will need to adapt to high temperatures; thus, physical resilience and adaptability are essential attributes.

Collaborative Environment:

The successful candidate will work closely with Camille Rieder, a PhD student affiliated with the Wild Chimpanzee Foundation, and Tom Beucler, an expert in applied machine learning for the environment.

Keywords: plant communities, vegetation map, carbon stock, carbon sink, tree growth.

Working place: potentially possible field work in Guinea; data analyses in Lausanne.

References:

1) Géron, A. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow. 2nd ed. (accessible via Moodle = https://moodle.unil.ch/course/view.php?id=27209)
2) Mariéthoz G. & Caers J. (2014). Multiple point geostatistics. Wiley (https://wp.unil.ch/gaia/mps/mps-book-multiple-point-geostatistics-stochastic-modeling-with-training-images/ for a book on the topic)
3) Aitkenhead M.J. & Coull M.C. (2016). Mapping soil carbon stocks across Scotland using a neural network model. *Geoderma*, *262*, 187-198.

Contact :

Camille Rieder, Université de Lausanne, IDYST, rieder@wildchimps.org
Tom Beucler, Université de Lausanne, IDYST, tom.beucler@unil.ch; 021 692 43 55
Pascal Vittoz, Université de Lausanne, IDYST, pascal.vittoz@unil.ch; 021 692 43 67