A glimpse into the Arctic future: equipping a unique natural experiment for next-generation ecosystem research

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 813114

PhD student - Early Stage Researcher (ESR6)

The carbon balance in sub-arctic ecosystems

About FutureArctic

The EU-funded Innovative Training Network FutureArctic aims to quantify how much carbon will escape from the Arctic in future climate. How do the multitude of ecosystem processes, driven by plant growth, microbial activities and soil characteristics, interact to determine soil carbon storage capacity? A group of fifteen PhD-students will study the Forhot ecosystem in Iceland, where a natural coincidence has provided us with the exceptional opportunity to actually look into the future.

Given the strong urgency of tackling and managing the climate challenge and the particularly important role herein of (sub)Arctic ecosystems, a rapid assessment of the ecosystem and ambient processes in this natural laboratory is essential. FutureArctic will achieve this challenge by adopting the fast advances made in the field of **machine learning and artificial intelligence** (AI), **unmanned aerial vehicles** (UAV) and (remote) **sensor technology** into **environmental research at the ecosystem scale**, into a new concept of an '**ecosystem-of-things**'.

FutureArctic thus aims to channel an important evolution to automated machine-assisted fundamental environmental research. This is achieved through dedicated training of researchers with profiles at the inter-sectoral edge of computer science, artificial intelligence, environmental and agricultural science, sensor engineering and communication and social sciences. FutureArctic training ensures the **development of unique enviro-technological job profiles**, all with their own specialty, embedded in holistic knowledge on connected high-data throughput ecosystem research, ready for machine-assisted environmental ecosystem science and modelling.

About the host organization

University of Copenhagen is the largest research and education institution in Denmark. Internationally, the University is highly competitive and is ranked as one of the leading universities globally with the most recent Shanghai rankings placed the University as No. 30 worldwide and No. 6 in Europe. This is also reflected by its membership of the prestigious International Alliance of Research Universities.
The Dept. of Geosciences and Natural Resource Management (IGN) has > 400 employees and 25 full professors. It has a broad basis in ecology, nature management, geology and geography, and a strong research focus on climate and environment. UCPH has a strong commitment to its doctoral programme and IGN recruits over 35 new PhDs annually, about half being foreign students, which ensures a multicultural, international environment. IGN has a number of highly instrumented large-scale field experiments and monitoring stations that will be used for local ERS training. Klaus Steenberg Larsen (KSL) at IGN will be the supervisor of the PhD. KSL is an expert in ecosystem carbon dynamics, flux measurements and instrumentation, i.e. has co-developed the gas exchange chambers to be used by this PhD.
The PhD will be co-supervised by Bjarni D. Sigurdsson (BDS) at the Agricultural University of Iceland (LBHI) and Michael Bahn (MB) at the University of Innsbruck (UIBK). BDS has a main research focus is on terrestrial ecosystem carbon and nutrient cycling and provides additional gas exchange chambers to be used by the PhD. Michael Bahn is an expert on effects of global changes on grassland biogeochemistry with a particular emphasis carbon cycle processes and their interactions with the water and nitrogen cycles.

Task description

Your PhD project

The primary objective is to quantify the C balance and the effect of warming on ecosystem-level CO2 and H2O fluxes. You will install two fully automated gas exchange chambers developed at UCPH and DMR to perform automated measurements of ecosystem-level gas exchange. Complementary field campaigns will be carried out using the automated NEE systems owned by LBHI, to cover spatial variability and effects of different warming levels. The goal is a detailed analysis of carbon uptake (photosynthesis) and carbon release (ecosystem respiration) along the temperature gradient and potential changes from net carbon uptake to net carbon source as the temperature increases. Campaigns with high-frequency measurements will provide pioneer insights into potential effects of geological (geothermal CO2) efflux influencing the carbon balance.

Secondments

You will embark on secondments to other FutureArctic partners to learn about I) how to operate automatic chambers (DMR), II) how to use data for ground-truthing remotely sensed hyperspectral data (Svarmi), and iii) to study the links between the carbon balance and metabolomics (CREAF; UIBK)

Benefits of working in an ITN

- You will be working within our international group of > 25 researchers
- You will get in contact with the other members of this international consortium and will benefit from the joint training platform to develop skills necessary for developing an “ecosystem-of-things”.

Profile and requirements

- Applicants must hold a MSc or equivalent in the field of environmental sciences, biology, geography or a related discipline
- Applicants must have experience with measurements of greenhouse gas fluxes between ecosystem and atmosphere.
- Applicants can be of any nationality.
- Applicants must have an ability to understand and express themselves in both written and spoken English to a level that is sufficiently high for them to derive the full benefit from the network training.
- Applicants must be eligible to enroll on a PhD programme at the host institution (or at a designated university in case the host institution is a non-academic organisation).

In addition:
H2020 MSCA Mobility Rule: researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organisation (Denmark) for more than 12 months in the 3 years immediately before the recruitment date. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status are not taken into account.

H2020 MSCA eligibility criteria: Early Stage Researchers (ESRs) must, at the date of recruitment by the host organisation, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctorate (either in the country in which the degree was obtained or in the country in which the researcher is recruited, even if a doctorate was never started or envisaged).

Benefits

- You will be employed by the host organisation for 36 months.
- A competitive salary plus allowances. Moreover, funding is available for technical and personal skills training and participation in international research events.
- You will benefit from the designed training programme offered by the host organisation and the consortium.
- You will participate in international secondments to other organisations within the FutureArctic network and in outreach activities targeted at a wide audience.

Please, find additional information in the *Information package for Marie Curie fellows*

Application

Interested candidates are invited to apply for this position through the link below.
https://employment.ku.dk/phd/?show=150114
Expected starting date: October 2019

More information and other vacant positions can be found on www.futurearctic.eu

Additional information

For additional information about the research project and this individual position, please contact:

Assoc. Prof. Dr.Klaus Steenberg Larsen
Email: ksl@ign.ku.dk