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

PhD student - Early Stage Researcher (ESR1)
Microbiome structure of warmed grasslands

About FutureArctic

The EU-funded Innovative Training Network FutureArctic aims to quantify how much carbon will escape from the Arctic in a 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

The University of Antwerp is a young, dynamic and forward-thinking university. In 2016 it ranked 10th in the "Top 50 Universities Under 50 years". The University has over 1700 PhD students, over 620 tenured professors, over 300 assistants and over 2900 tenured researcher and education staff members. It produces over 4000 peer-reviewed scientific publications per year. The European Commission has awarded the University the "HR Excellence in Research" quality label.

The Global Change Ecology Centre (GCE)has a 40-year experience with the study of responses of plants, microbes and vegetation to environmental changes. Different hierarchical levels are being examined: from the leaf and root and its interaction with soil microbes, the vegetation and ecosystem levels, up to the continental scale. Ivan Janssens is a world-leading researcher in research on the ecosystem carbon cycle, and among the most highly-cited researchers in ecology. He has been a co-founder of the ForHot site. Erik Verbruggen is an emerging young expert on interactions between soil microbiota, plants, and the environment. The PhD will be co-supervised by Jane Debode at ILVO. The ILVO-Plant Sciences and Technology and Food Sciences Units combine their expertise in (hyperspectral) imaging, plant physiology, soil science, agronomy, data analysis, UAV and agricultural machinery and next generation sequencing (NGS) to create smart digital and precision farming solutions and grow healthy crops in a healthy soil.

Task description

Your PhD project

Fungal and bacterial community composition change from approximately 3 to 5 degrees warming in sub-Arctic grasslands. Seasonal variability and interactions with plant roots (e.g. turnover, exudation, symbiosis) remain unknown. Your PhD focuses on the determination of the microbiome through time, and how it is associated to root-mediated plant responses to temperature. You will establish a transplant experiment where soil monoliths are moved from un-warmed sites to warmed sites to assess immediate warming effects. You will thus develop a detailed seasonal microbiome map, linked to the presence of plant roots, soil temperature and plant dynamics. Data will be linked to the multitude of environmental variables assessed in the project and will be compared to modelling predictions performed by other PhD students.

Secondments

You will embark on secondments to other FutureArctic partners (ILVO, UNIVIE and UTARTU), to establish a common methodological pipeline to analyze microbiome networks from agro- and eco-science, and to integrate soil microbiome and rhizobiome functionality in a microbial soil organic matter turnover model

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, chemistry or a related discipline
- Applicants must have a solid knowledge of microbial functioning in ecosystems.
- 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 program at the host institution (or at a designated university in case the host institution is a non-academic organization).

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 organization (Belgium) 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 organization, 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 organization for 48 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 program offered by the host organization and the consortium.
- You will participate in international secondments to other organizations 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.
Instructions for applications can be found here. Deadline for application Sept 20 2019
Expected start date: January 2020

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:

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