



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

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PhD student - Early Stage Researcher (ESR5)

Diel, synoptic and seasonal variability in sources of soil CO₂ emissions

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

The University of Innsbruck was founded in 1669 and is the biggest and most important research and educational institution in western Austria. Today it is comprised of 28,000 students, 40% of whom are international students, and more than 4,500 staff and faculty members. 16 faculties provide a broad spectrum of programs in all fields of study. Academics teach and research in the diverse scientific fields of humanities, science, economic and social sciences, theology, law, architecture, engineering, and teachers' training.

Contributing to the University Research Area on Mountain Regions, the Department of Ecology (<https://www.uibk.ac.at/ecology/index.html.en>) is dedicated to the study of ecological effects of global changes (incl. changes in climate and land use) on mountain ecosystems. Prof. 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. He is head of the research group 'Plant, Soil and Ecosystem Processes' and is speaker of the University of Innsbruck Doctoral Program 'Alpine Biology and Global Change'.

The PhD will be co-supervised by Ivan Janssens (IJ) at UAntwerp, Klaus Steenberg Larsen (KSL) at University of Copenhagen (UCPH), Josep Penuelas (JP) at CREAM and Damien Weidmann (Mirico). IJ is an expert in research on the ecosystem carbon cycle. KSL is an expert in ecosystem carbon dynamics, flux measurements and instrumentation. JP is an expert ecosystem response to climate change, nutrient impacts on ecosystem functioning, plant-soil interactions and plant ecophysiology and stoichiometry. DW is Mirico's Chief Scientific Officer and the leader of the earth observation group at the Rutherford Appleton Laboratory.

Task description

Your PhD project

The goal of your PhD project is a comprehensive assessment of the sources of soil CO₂ emissions and their individual and combined responses to climate warming. You will attribute autotrophic, heterotrophic and geogenic sources of soil CO₂-production and analyse their seasonal variability. You will also perform pulse-chase labelling experiments with highly ¹³C enriched CO₂, linking photosynthetic carbon uptake, as well as litter decomposition, with soil CO₂ fluxes, both in the lab and the field. Your PhD project will interface with other PhD projects on ecosystem CO₂ fluxes, and on root and microbial processes. You will also optimize a recently developed CO₂ isotopologue (MIRICO) analyser for in-situ monitoring of iso-fluxes of CO₂.

Secondments

You will embark on secondments to other FutureArctic partners (MIRICO, CREAM and UCPH), to optimise MIRICO's continuous isotopologue analyser for ForHot lab and field performance. And market-ready solutions for online CO₂ source assessments and linking metabolomics and carbon balances: who's the source of that carbon? (with ESR 6 and 8)

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, ecology, biology or a related discipline
- Applicants must have a solid knowledge of the carbon cycle and CO₂ fluxes 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 enrol 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 (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 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 by contacting Prof. Dr. Michael Bahn
Email: michael.bahn@uibk.ac.at



Applications should be submitted by 20th November 2019 and should include
(1) a letter of motivation,
(2) a CV, and
(3) the names and email addresses of at least two professional references.

Expected starting date: February 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:

Prof. Dr. Michael Bahn
Email: michael.bahn@uibk.ac.at

