



## 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 (ESR8) Plant and soil metabolome in a warming subarctic

### 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

CREAF is a public research and education institution for terrestrial ecology and sustainable management of the environment. CREAF is attached to both the Autonomous University of Barcelona (UAB) and the University of Barcelona (UB). The primary objective of CREAF is to generate knowledge and create new methodological tools in the field of terrestrial ecology.

The GEU team gathers around forty researchers in the fields chemical ecology and ecometabolomics. Global ecology, global change, climate change, atmospheric pollution, biogenic volatile organic compounds emissions (VOC), remote sensing, plant ecophysiology, functioning and structure of terrestrial plants and ecosystems, biodiversity, macroecology and biogeochemistry. GEU is specially recognized for its research on climate change impacts on organisms and ecosystems and is currently funded by an ERC-Synergy grant among several others.

## Task description

### Your PhD project

Soil microbiota and “soil metabolome” is expected to change with warming. Stress protection in plants changes their metabolic activity. Studying the metabolome profile will allow assessing changes in C and nutrient use and the effects on element stoichiometry, as well as plasticity and adaptation capacity of different species. The PhD student will use HPLC-MS/MS, GC-MS/MS and P31-NMR metabolome profile analysis to determine the most active metabolic pathways. She/he will examine whether short-term and long-term warming allow assessing the role of evolutionary processes in the metabolome and also the elementome. She/he will conduct a multidimensional analysis of metabolic pathways triggered in different species and soil under different temperatures, explaining shifts in plant community functioning, soil functioning and carbon and nutrient metabolism, and distinguishing short-term plasticity and long-term adaptation

### Secondments

She/he will be seconded by other FutureArctic partners 1, 3 and 4 (UCPH, UIBK and IMEC), to link metabolomics and carbon balances and figure it out the source of that carbon. She/he will also use machine-based learning and developing algorithms for complex metabolomics analysis (with ESR 8 and 13)

### 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 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 (CREAF- Universitat Autònoma de Barcelona).

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 (Spain) 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

More information and other vacant positions can be found on [www.futurearctic.eu](http://www.futurearctic.eu)  
[josep.penuelas@uab.cat](mailto:josep.penuelas@uab.cat) [rosa.casanovas@uab.cat](mailto:rosa.casanovas@uab.cat)

## Additional information

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

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