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

PhD student - Early Stage Researcher (ESR2)

Visual, NDVI and hyperspectral assessment of grassland plant and vegetation traits

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 Research Institute for Agriculture, Fisheries and Food (ILVO) is a Flemish institute, belonging to the Flemish Government's Agriculture and Fisheries Policy Area. ILVO conducts strategic-basic, policy-supportive and practice-oriented scientific research. The ILVO-Plant Sciences and Technology and Food Sciences Units combine expertise in agronomy, soil sciences, plant physiology, genomics (NGS), bioinformatics, (hyperspectral) imaging, UAV and agricultural engineering to develop advanced phenotyping tools and precision farming solutions. A main focus of the team is the cultivation of healthy crops in healthy soils. Peter Lootens is a specialist in (UAV) image analysis, precision crop phenotyping and plant/eco physiology and will supervise the PhD on a day-to-day basis. The PhD will be co-supervised by Greet Ruysschaert (soil scientist at ILVO) and be embedded in a team of experts in the field of grassland research and smart digital and precision farming. The PhD will also be co-supervised by Ivan Janssens (University of Antwerp) who is a world-leading researcher in research on the ecosystem carbon cycle, and among the most highly-cited researchers in ecology. He is also one of the co-founders of the ForHot consortium. Victor Madrigal (SVARMI) is a specialized in UAV solutions and analyses based on artificial intelligence and will ensure the interactions with ESR10, working on image based ecosystem climate response assessments.

Task description

Your PhD project

Fast methods are needed to assess grassland biomass production and compositional traits. You will develop protocols and algorithms for RGB, multispectral and hyperspectral UAV imaging to detect spatial and temporal variability of plant and vegetation traits (biomass, persistency/density, etc.) and species composition (grasses, legumes, forbs) in grasslands. You will apply these algorithms both in the natural ecosystems of the ForHot sites in Iceland to assess changes in ecosystem functioning in relation to climate change, and in grassland agro-systems in Belgium to enable specific management measures (e.g. fertilization, weeding) based on detailed spatiotemporal assessments of grassland quality and composition. The results will be linked to controlling variables (e.g. climatic environment, soil characteristics) and results of other ESRs.

Secondments

You will embark on secondments to other FutureArctic partners (UAntwerpen, SVARMI), to translate common agro-assessments into trait-based assessments of vegetation functioning in natural ecosystems and to market-optimize UAV assessments of plant and vegetation traits, applying newly gained knowledge (with ESR10).

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 agriculture or biology related to plant sciences, and have knowledge of remote sensing
- Applicants that can use GIS related software (ArcGIS, QGIS, …) and are familiar with plant physiology, and production/natural grasslands are preferred.
- 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 and to write scientific articles and finally a PhD thesis.
- 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 through the link below
https://www.ilvo.vlaanderen.be/language/en-US/EN/Work-at-ILVO.aspx#.XJNSpOSWw0k

Applications can be submitted until: August 31 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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