

Eveline Krab

Interview. November, 2020.



Eveline Krab
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“I am a soil ecologist interested in understanding how environmental changes affect soil organism communities and soil processes in cold ecosystems. My main interests are to understand how environmental changes may induce changes in soil organism communities and assess the consequences of community changes for soil processes. More specifically, I am interested to what extent environmental changes affect interactions between soil fauna, microorganisms and plants, and if changed interactions lead to changes in carbon and nitrogen cycling. Most of my current projects are situated in arctic ecosystems, but I am expanding my research into boreal forests as well.”

What is the motivation behind your project?

The arctic region provides one of its most important services by storing over a third of the world's soil carbon (C) into its soils. This C may increasingly be released into the atmosphere because of climate change. A major difficulty in improving our predictions of the magnitude of this C-release is that the direct effects of temperature on biochemical processes often fail to explain field observations, as decomposition processes that largely underlie soil C-release, can be strongly mediated by biotic interactions.

To be able to accurately extrapolate the effects of climate warming to larger scale C-dynamics, it is therefore essential to get a better mechanistic understanding of climate effects on C-release by studying its impacts on soil decomposer organisms (e.g. bacteria, fungi, soil fauna) and their interactions.

What is the main purpose of your project?

My project aims to explore how climate warming and (altered) interactions in the decomposer community affect C-cycling in subarctic tundra soils and to study this at different spatial scales. My project will underpin the importance of opening the 'black box' that soils up to date still are. Not only for my fellow (and future) scientists to acknowledge this in their research and carbon cycle models, but also to encourage informed management and preservation of arctic tundra ecosystems to maintain the globally important C-storage in their soils.

What are your hypotheses and what methods are used?

The hypothesis that will be tested in the project are:

Hypothesis 1. The impact of climate warming on decomposer communities and C-mobilization and the relation between these will differ between tundra soil types.

Hypothesis 2. Changes in soil fauna density will affect the functional composition of the microbial community, thereby impacting on C-mobilization.

Hypothesis 3. On a landscape scale, variation in C-release from different tundra soils is better explained by including decomposer dynamics than by temperature alone.



I will test the hypotheses by using a complementary suite of methods including (i) lab incubations, (ii) a field experiment using natural temperature changes with altitude as a space-for-time substitute for climate warming and (iii) a large-scale field survey.

All fieldwork in this project is in the areas around the [Abisko Scientific Research station](#), one of SITES field stations.

The project will cover a range of spatial scales and presents an innovative multidisciplinary approach by bringing together state-of-the-art knowledge of biogeochemical cycling, soil fauna ecology and molecular microbial ecology for disentangling the mechanistic basis of climate-induced changes in C-cycling.

Are there any results already available?

The project is still ongoing. The field experiment is now completed, but I am still waiting for most of the data, although some is already available. The lab incubations will be carried out this fall/winter, and the field survey is planned for summer 2021.

SITES stations offer researchers support in various ways, in what way has the station been support for you and your project?

We use the SITES station ([Abisko](#)) in many ways, for example as a base for field/labwork during the practical work and also office space in my case.

We have also 'rented' time from one of the stations staff for a number of weeks in 2018, run some laboratory analysis supported by the Stations staff and got support from the Stations staff with applying for permits for fieldwork (Länsstyrelsen). The support I get from the stations staff has worked very well with their willingness to help with administrative issues, provide data, think through logistics in fieldwork etc. and of course create a welcoming atmosphere.

We will also use (and have used in former projects) climate data from the station. Our plan for this project is to specifically explore the possibilities to use [STES Water](#) and [SITES Spectral](#) specific measurements located in field areas around the station.

We will also explore possibilities to use [SITES generated data](#) during a field survey in 2021.

Have you collaborated with other researchers within you project?

There are several other scientists involved in this work, most importantly my postdoc [Dr. Sylvain Monteux](#) (at SLU Uppsala). We are both affiliated researchers to the [Climate Impacts Research Centre](#) (Umeå University) and work at [Abisko Scientific Research Station](#), one of SITES stations.

How could the results be applied in society and utilized by different stakeholders?

To underpin the importance of belowground soil organism interactions for the functioning of ecosystems under climate change in the wider society, I distinguish different target stakeholder groups.

Fellow scientists

My work assesses the importance of including soil organism interactions into C-models. I will advocate including my acquired information in already existing models. I will reach out to my colleagues through my scientific publications and by presenting my work on international conferences (such as e.g. the Arctic Science Summit), but also by giving regular seminars and by personal communication at ANS/CIRC, where I will do most of my experimental work. Furthermore, I discuss my work during seminars at SLU.

MSc and BSc students

Including my and other work in the classroom underpinning the importance of including biotic interactions in biogeochemical cycling in teaching will make the students aware of the importance of belowground biota and stimulate them to include this information in their future work.

Visitors of the arctic region

Abisko National Park Naturum (the County Administrative Board in Norrbotten) welcomes over 35 000 visitors per year, both from Sweden and abroad. In 2015, CIRC has started an elaborate outreach program named 'Arctic perspectives: Public Engagement through Teaching and Outreach'. Through this program collaboration between CIRC, ANS and Abisko National Park Naturum was established to present an outreach program to all visitors that come to Abisko.

International stakeholders

I will attend and present my work at least one '[Arctic Science Summit Week](#)' during the proposed project. This is a multidisciplinary annual meeting of national and international organizations focused on arctic research and exploitation, which includes academia, government agencies, local communities, industry, and non-governmental organizations. In this way I reach a range of international stakeholders who have an interest in the preservation of the arctic region on a global scale.

How do you see that SITES could be developed in the future based on the needs of your research?



Overall, I am a terrestrial ecologist and SITES thematic programs – SITES Water, [SITES AquaNet](#) and SITES Spectral do not focus on soils.

I am very interested in temporal dynamics in soil organism communities but never have had the opportunity to collect a time series myself. If SITES would monitor soil diversity (e.g. by taking frequent (e.g. monthly) DNA samples from soils I would be interested to use the data generated by this. Of course, it's not easy to decide in such case where to take the samples and how frequent but it would still be very valuable.

Even better would be to take physical soil samples and store them longer-term (archive) to be used by researchers like me. It would be awesome to link a time series of soil biological or other properties (of your own interest) on multiple SITES across Sweden and combine these with the richness of metadata available.

All pictures owned by: Eveline Krab

If you want to find out more about Eveline's background and current research topics and projects, please visit [her website](#).