



UNIVERSITY OF  
LIVERPOOL

MANCHESTER  
1824  
The University of Manchester



National  
Oceanography Centre  
NATURAL ENVIRONMENT RESEARCH COUNCIL

# Microbial community stability and functioning in glacier forelands

**Supervisors:** Franciska de Vries (FLS, UoM), Richard Bardgett (FLS, UoM), Bart van Dongen (SEAES, UoM). **Contact:** [franciska.devries@manchester.ac.uk](mailto:franciska.devries@manchester.ac.uk)

**COLLABORATION PARTNERS:** Wolfgang Wanek (University of Vienna)

## Introduction

Soil microbial communities play an important role in processes of carbon (C) and nitrogen (N) cycling – processes that underpin ecosystem services such as food production and climate mitigation. However, little is known about how soil microbial communities and their functioning will be affected by climate



change. Previous work has shown that microbial communities dominated by slow growing microbes (K-strategists), such as oligotrophic bacteria and fungi, might be more resistant to climate change-related drought.

When glaciers retreat, they expose barren substrate on which the process of primary succession begins. Thus, the forelands of retreating glaciers provide a sequence of sites of increasing age since they were covered in ice, and are commonly used for studies on primary succession. Here, we hypothesise that microbial communities, and their functioning, become more slow growing, and thus more resistant to drought

and warming, with successional stage.

## Project Summary

This project will investigate controls on the stability of soil microbial communities and their functioning under climate change (drought and warming), using the Odenwinkelkees glacier foreland in Austria. The student will perform a range of laboratory and field experiments both in Manchester, Vienna, and at the Odenwinkelkees glacier (travel funding is available through De Vries' and Wanek's Royal Society International Exchanges Scheme Grant), and will have access to world class facilities in the newly formed Soil and Ecosystem Ecology Laboratory in the Faculty of Life Sciences and the Williamson Research Centre for Molecular Environmental Science in the School of Earth, Atmospheric and Environmental Sciences. The student will be trained in the use of methods for measuring microbial communities and C and N cycling in soil, including molecular techniques and compound specific and bulk isotope analyses, and in the analysis and interpretation of resulting data and statistical modeling.

## References

De Vries, F.T. and A. Shade (2013) Controls on soil microbial community stability under climate change. *Frontiers in Microbiology* 4:265; Bardgett, R.D., Richter, A., Bol, R., Garnett, M.H., Bäuml, R., Xu X., Lopez-Capel, E., Manning, D., Hobbs, P.J., Hartley, I.R. and Wanek, W. (2007) Heterotrophic microbial communities use ancient carbon following glacial retreat. *Biology Letters*, 3 487-490; De Vries, F.T., M. Liiri, L. Bjørnlund, M. Bowker, S. Christensen, H. Setälä, and R.D. Bardgett (2012) Land use alters the resistance and resilience of soil food webs to drought. *Nature Climate Change* 2:276-280