EUCOP4

4th European Conference on Permafrost

18-21 June 2014

Évora, Portugal

EUCOP 4

Book of Abstracts

Gonçalo Vieira, Pedro Pina, Carla Mora and António Correia (eds.)

U LISBOA UNIVERSIDADE DE LISBOA

UNIVERSIDADE DE EVORA

IGOT UNIVERSIDADE DE LISBOA

CEG

CGE

TÉCNICO LISBOA

permantar-3

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

Evidence of rock glacier melt impacts on periphytic diatoms in Alpine headwater streams and lakes

Monica Tolotti, IASMA Research and Innovation Centre, Edmund Mach Foundation, Italy

Renate Alber, Biological Laboratory, Environmental Agency, Autonomous Province of Bozen/Bolzano, Italy

Birgit Loesch, Biological Laboratory, Environmental Agency, Autonomous Province of Bozen/Bolzano, Italy

Ulrike Nickus, Institute of Meteorology and Geophysics, University of Innsbruck, Austria

Danilo Tait, Biological Laboratory, Environmental Agency, Autonomous Province of Bozen/Bolzano, Italy

Hansjoerg Thies, Institute of Geology, University of Innsbruck, Austria

Bertha Thaler, Biological Laboratory, Environmental Agency, Autonomous Province of Bozen/Bolzano, Italy

Active rock glaciers are highly sensitive to increasing air temperature in high mountain areas due to their location near the lower altitudinal boundary of permafrost (Haeberli et al., 2006). Though still sparse, there is first evidence about a climate related impact by rock glaciers on high mountain lake water chemistry in the Alps (Thies et al., 2007).

A first study on the potential effects of rock glacier melt waters on the ecological quality of alpine headwater streams was recently conducted at high alpine freshwaters in the Oetztal Alps (Tyrol, Austria). It revealed pronounced differences in chemical properties, species composition and biodiversity of epilithic diatoms in streams emerging from two active rock glaciers and in adjacent unaffected reference streams (Thies et al., 2013). The streams impacted by active rock glaciers are characterized by high electrical conductivity (EC) values, but differ in acidity, heavy metal concentrations and by the proportion of acidophilous and acidobionthic diatoms. On the contrary, all reference streams exhibit low EC and circumneutral to slightly acidic pH values (characteristic for surface waters on crystalline bedrock), with no detectable heavy metals and a diatom composition typical for high altitude softwater streams. Differences in diatom diversity between impacted and reference streams are not univocal, as they largely depend on the abundance of a set of taxa with different tolerance toward water acidity and mineralization level.

Within the project Interreg IV Italy-Austria PERMAQUA (ID5302) the study was extended to permafrost impacted running waters and lakes located in different siliceous mountain districts of North and South Tyrol, in order to better understand diatom responses to melting permafrost. Due to their remoteness these headwaters can be characterized as almost pristine without any direct anthropogenic impact like domestic sewage, mining, agriculture or settlements. Land use is restricted to summer grazing by some sheep or horses. Both permafrost affected and reference springs, streams, lakes and ponds were investigated in late summer for water chemistry, species composition and diversity of periphytic diatoms. The study confirms a clear response of diatom species composition to permafrost driven changes in water mineralization level and acidity.