Background

Rock glaciers (RGs) are geomorphological features widespread in high-elevation alpine environments, consisting of slow-moving mixtures of rocks and ice, and are considered indicators of ice-rich permafrost presence. Due to their capability to influence waters passing through and originating from them, RGs have the potential to influence connected alpine water bodies, both in terms of water geochemistry10 and as, pointed out mainly in the last years, overall ecosystem ecology11,12.

Objectives

• Describe prokariotic communities inhabiting the sediments of an alpine RG-associated pond with serpenticrnic minerology
• Investigate the potential influence of RG inputs on prokariotic community and sediments geochemistry, by analyzing lacustrine sediments along a distance gradient from the RG front

Methods

Col d’Olen rock glacier pond, Valle d’Aosta (Italy)

Sampling:
• 3 sampling points
  - distance gradient from RG front
  - Top 10 cm of lacustrine sediment
  - 2 water depths (1m, 3m)
• 2 sampling times
  - September 2015, July 2016

Analysis:
• 16S rRNA abundance (qPCR)
• 16S rRNA diversity (Illumina MiSeq)
• Sediments geochemistry
  - DOC, TN, NO3, NH4, pH, major anions and cations
  - KCl extracts

Results - Archaea

- Lower richness and evenness in 53 and S3
- Clear separation among sampling points in terms of beta diversity (excluding 53-2016)
- No horizontal differences in 2015
- 2016 abundances follow depth profile

Results - Bacteria

- Lower richness in S2 and S3
- Lower evenness in S2
- Clear separation among sampling points in terms of beta diversity (excluding 53-2016)
- No significant horizontal differences in 2016
- In 2015 higher bacterial 16S abundance in central shallower sediments

Results - Geochemistry

- Separation among sampling points (but main differences in chemical properties are found in samples 2015)
- Central sample: higher DOC, TN, pH, Si an Cl
- ST: higher concentration of Ca++, Mg++, Na+ and K+
- S3: in 2015 reported a peak in NO3- concentration

Conclusions and future directions

Our results suggest that a complex net of environmental factors, such as water depth, in addition to the environmental gradient derived from icemelt waters, can have a significant impact on the distribution of the prokariotic community and geochemistry along the sediments of the Col d’Olen Rock Glacier Pond.

References
