

Distinct snow algae communities on an elevational gradient



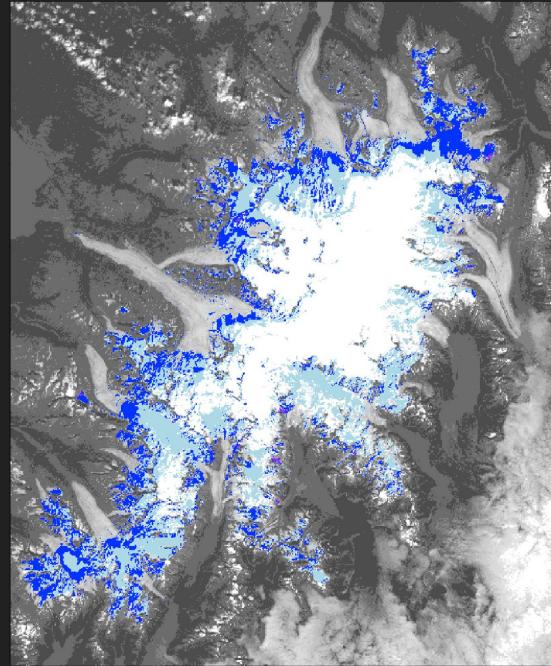
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Small algae, big effect

-13% albedo¹



+18% snow melt rate²

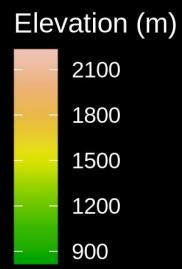


1. Lutz, S. et al. The biogeography of red snow microbiomes and their role in melting arctic glaciers. *Nat. Commun.* **7**, 1–9 (2016).
2. Ganey, Gerard Q., Michael G. Loso, Annie B. Burgess, and Roman J. Dial. 2017. "The Role of Microbes in Snowmelt and Radiative Forcing on an Alaskan Icefield." *Nature Geoscience* **10** (10): 754–59

Estimated snowmelt on Harding Icefield due to snow algae on 29 July 2013. Pixels with NDI ≤ 0 (and non-icefield snow) shown as composite Landsat-8 image¹

Approach

- 309 samples
 - 13 mountains
 - 33 dates
- Microscopy
- Sequencing
 - 33 samples
 - *rbcL* and 18S amplicon Illumina



*note: points jittered to reduce overlap

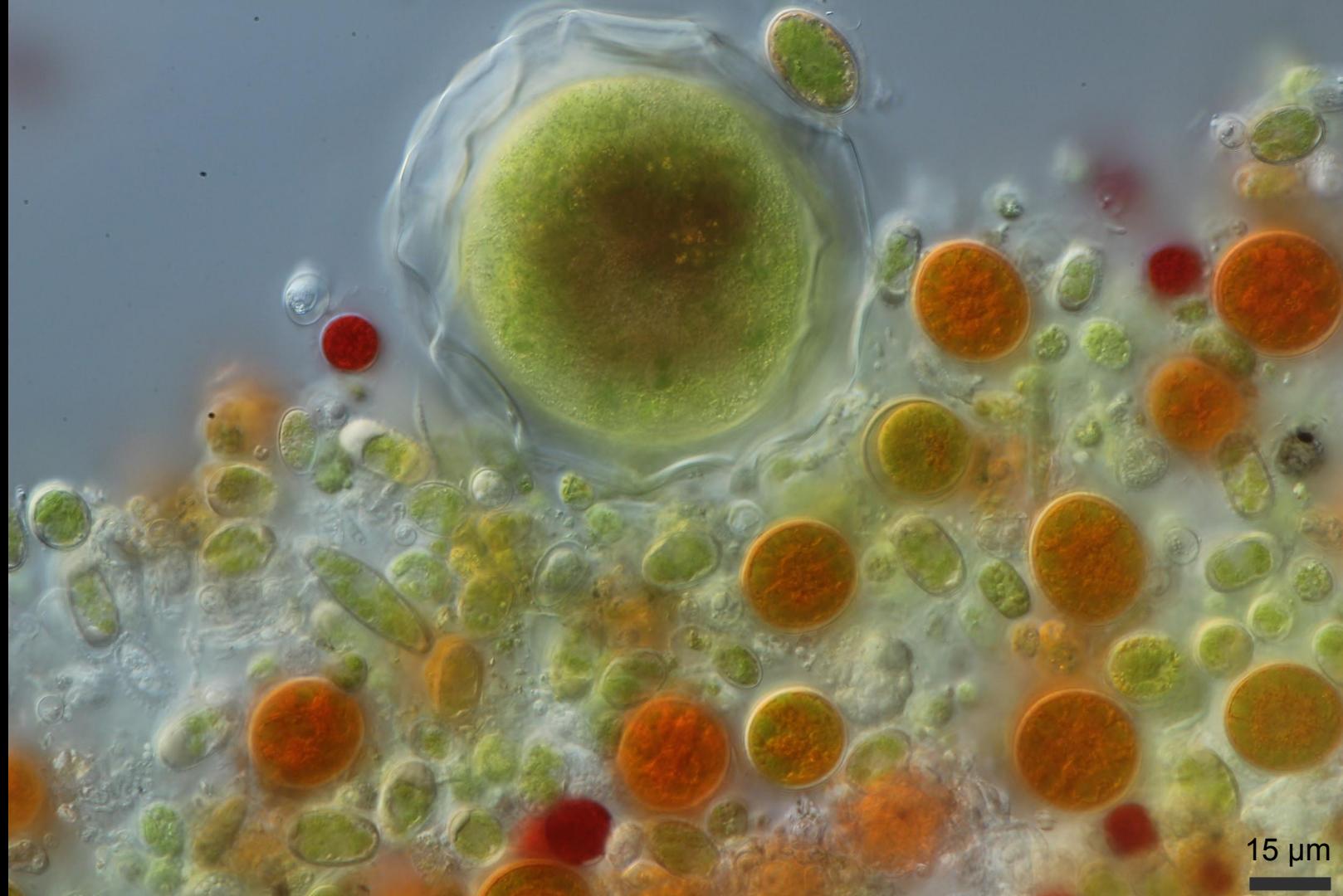
© Google





15 μm





15 μm

A wide-angle photograph of a mountainous landscape. The foreground is covered in white snow, with several distinct reddish-brown patches of earth or rock scattered across it. In the middle ground, there's a mix of snow and dark, rocky terrain. The background is filled with a dense forest of tall evergreen trees, extending towards the top of the frame.

Mt. Brew

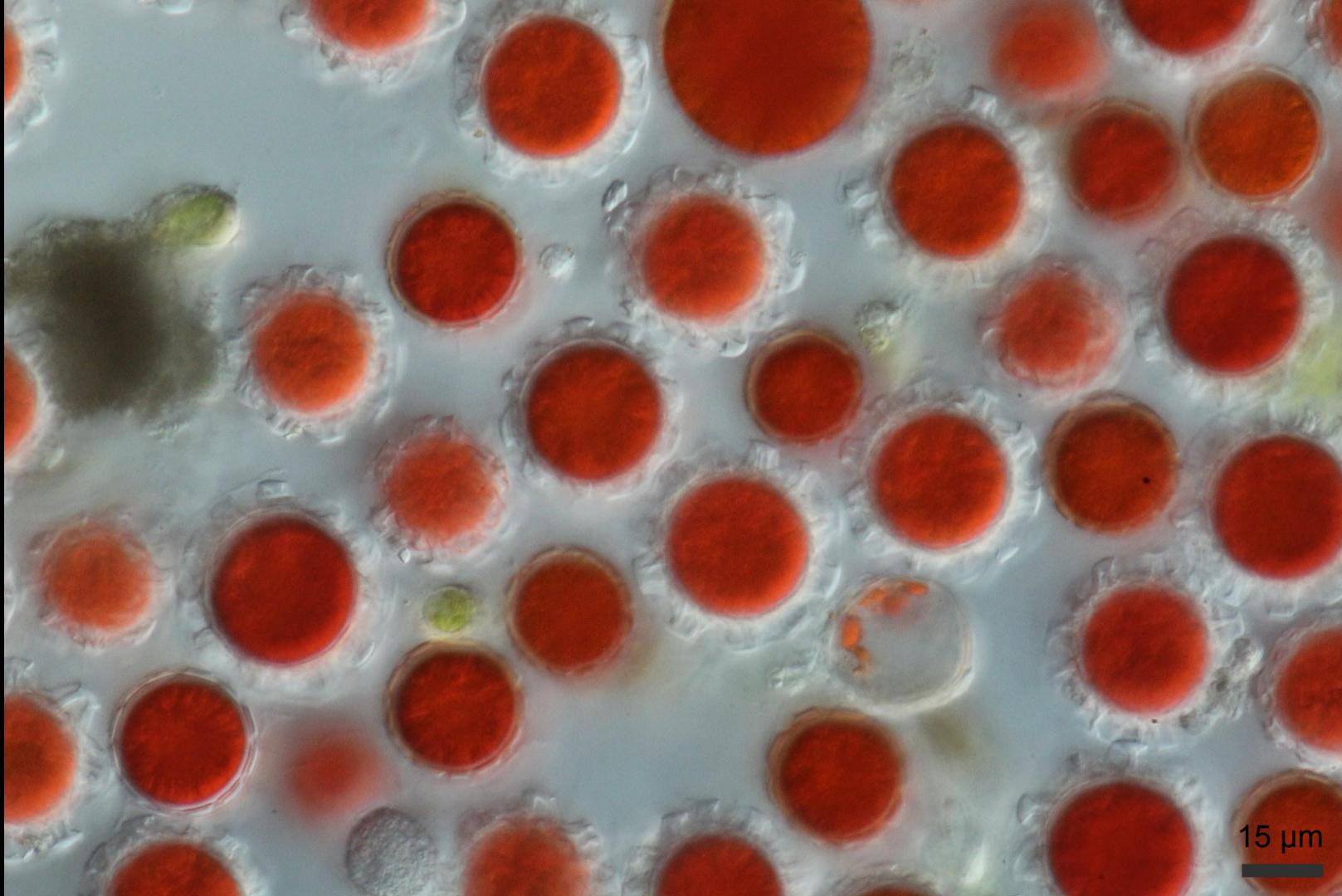
15 μ m

10



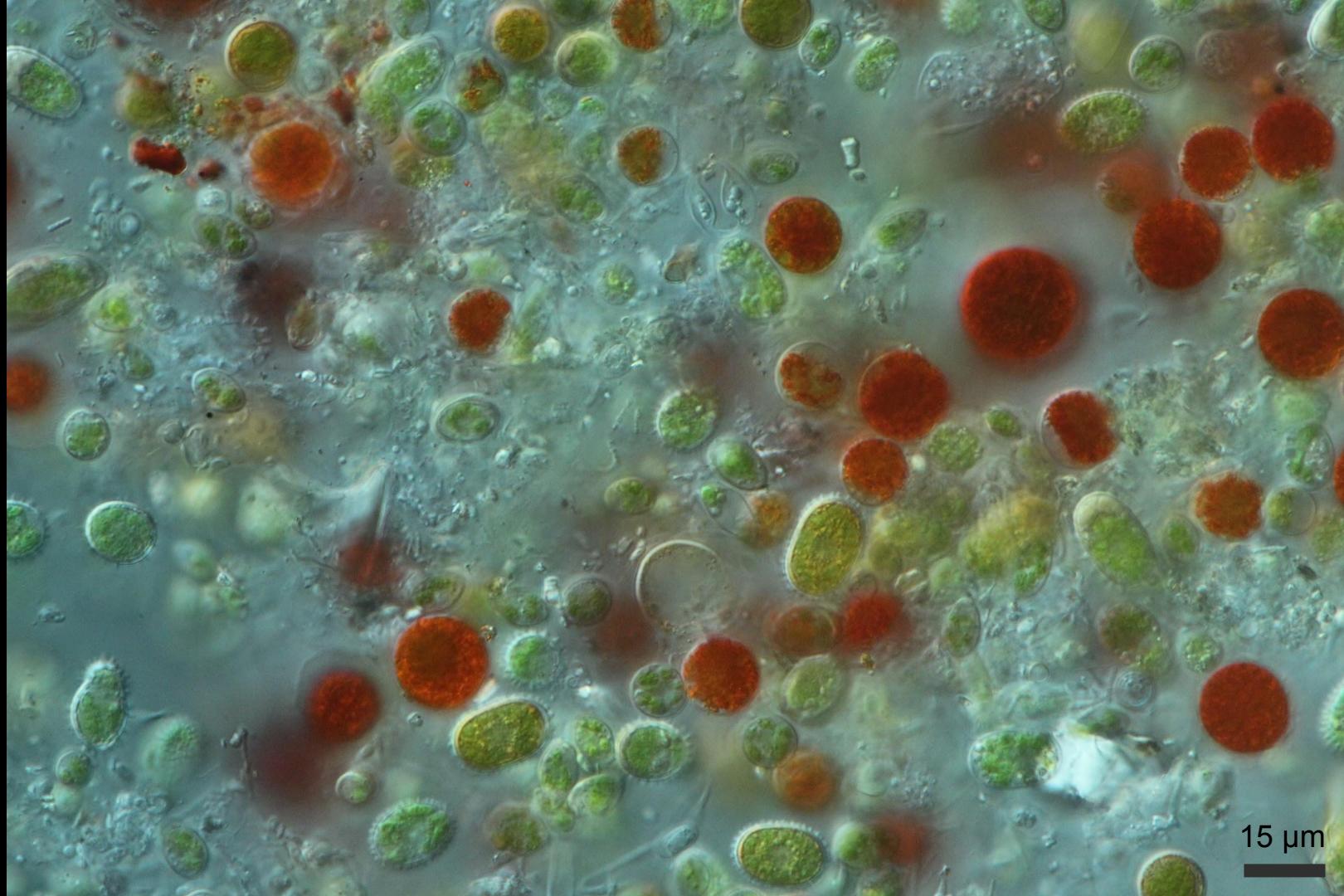


Panorama Ridge



15 μ m

12



15 μ m

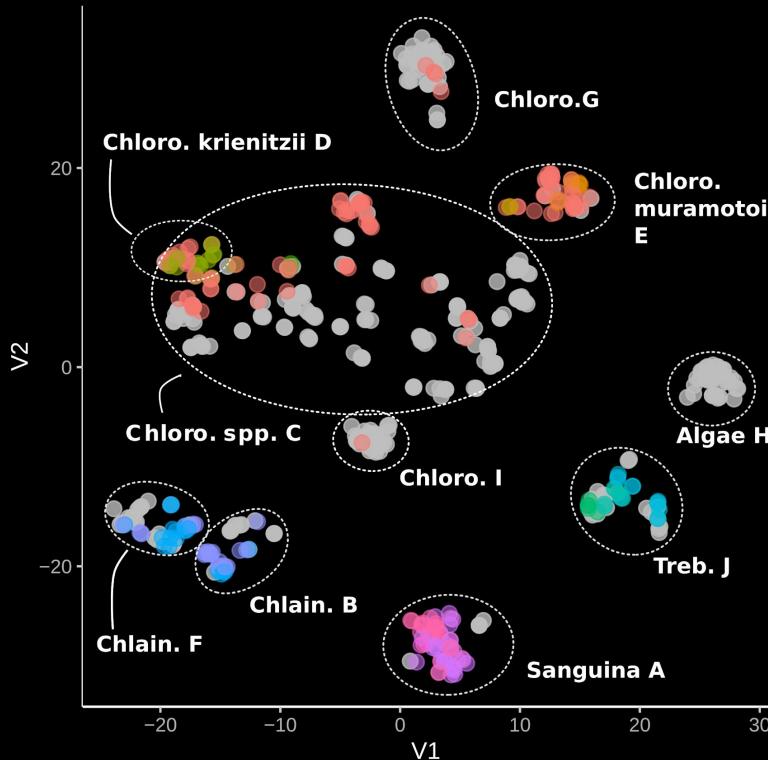
13

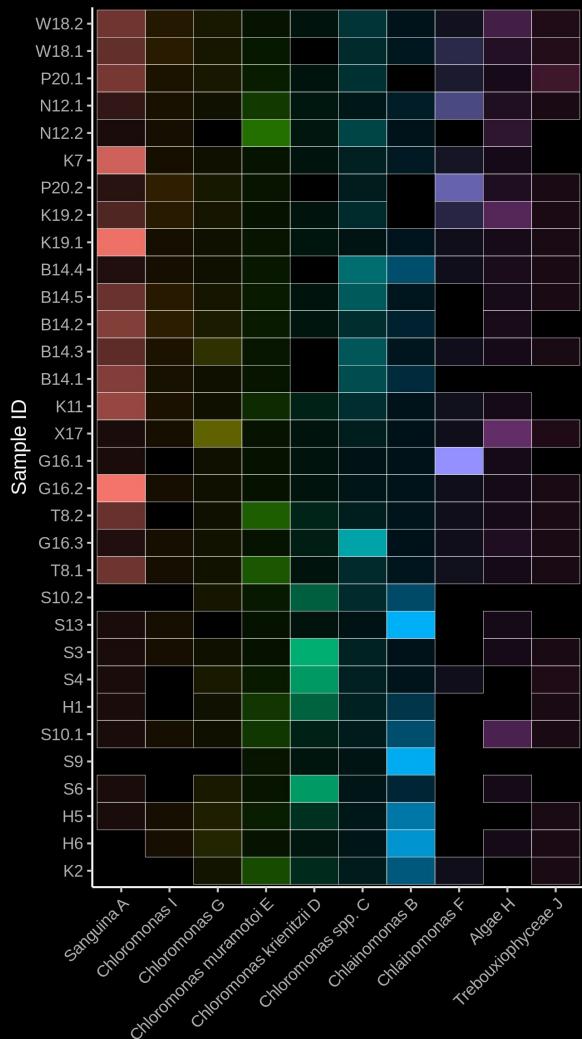
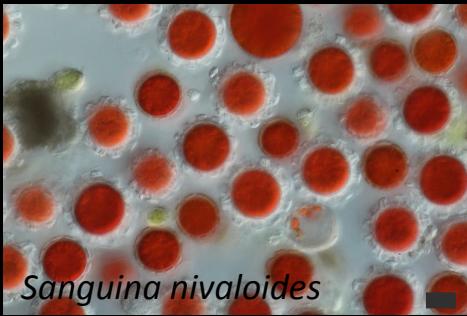
Putting names to sequences

rbcL
amplicon
library



- *Chloromonas*
- *Chloromonas muramotoi*
- *Chloromonas hohamii*
- *Chloromonas krienitzii*
- *Chloromonas Group B*
- *Raphidonema nivale*
- *Stichococcus*
- other Trebouxiophyceae
- *Chlainomonas*
- *Chlainomonas rubra*
- *Sanguina*
- *Sanguina aurantia*
- *Sanguina nivaloides*





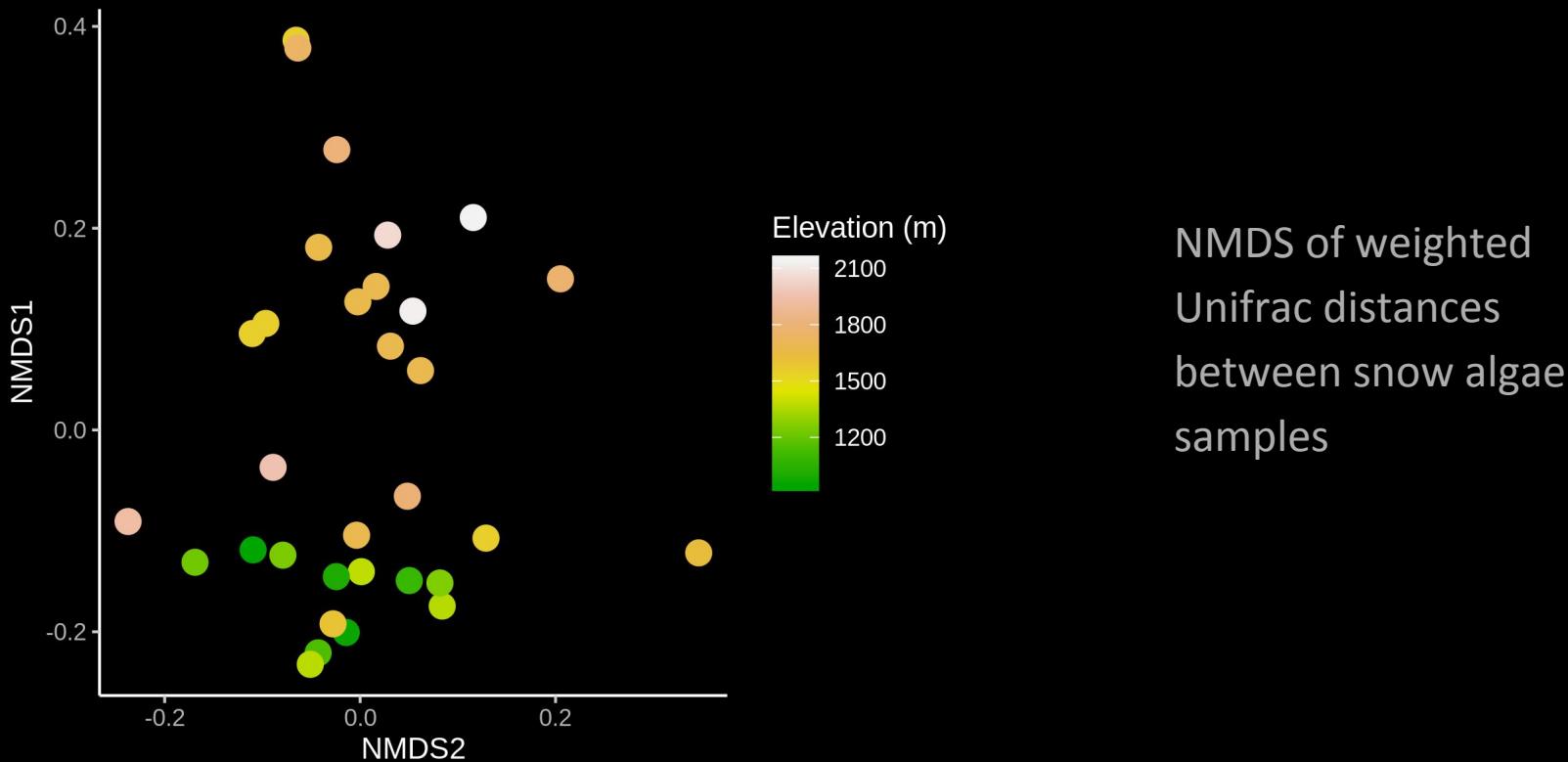
Community composition

Relative abundance of *rbcL* OTUs in snow algae samples. Samples on y-axis ordered by elevation from low (850 m) to high (2200 m).

Relative abundance



Sample similarity



Future directions

- Link environmental factors with species distribution
- ID unknown species
- Extent and timing of bloom
- Triggers of cell division and pigment production

Acknowledgements

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- Help us collect samples summer 2020! email cengstro@sfu.ca

