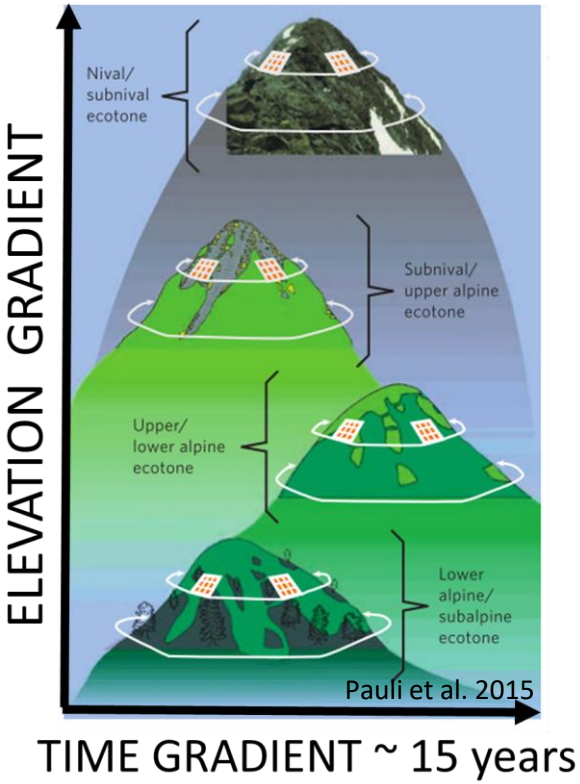
From vegetation cover to the reaction of single plant species: **What can GLORIA already tell us about the effects of climate warming on alpine vegetation?**

Nicklas, L., Walde, J., Mallaun, M., Unterluggauer, P., Wipf, S., Steinbauer, K., Lamprecht, A. Vittoz, P., Theurillat, J.P. & Erschbamer, B.

universität innsbruck
Institut für Botanik und Botanischer Garten

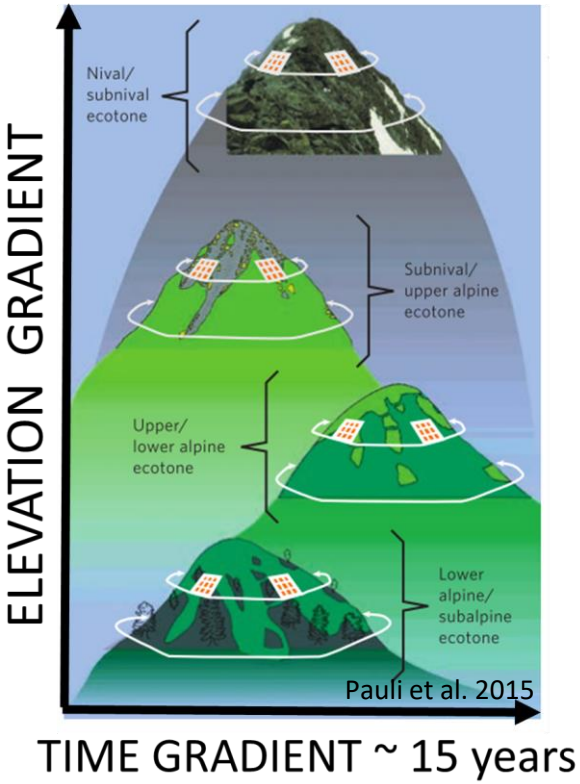
Long-term monitoring



→ Increase of species numbers at mountain summits
(Steinbauer et al. 2018, Carilla et al. 2018)

→ Thermophilization of summit flora

Long-term monitoring



→ Increase of species numbers at mountain summits (Steinbauer et al. 2018, Carilla et al. 2018)

→ Thermophilization of summit flora

BUT?

→ Threat for cold adapted species through competitive displacement or physiological problems (Lamprecht et al. 2018)

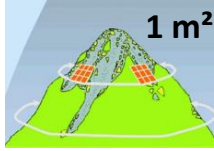
→ Increase in vegetation cover?

→ Increase of competition in dense communities?

universität innsbruck
Institut für Botanik und Botanischer Garten

GLORIA

6 mountain regions in the European Alps:



✓ 3 silicate regions

Texelgruppe (TEX)

Swiss National Park (SN2)

Valais (VAL)

✓ 3 calcareous regions

Swiss National Park (SN1)

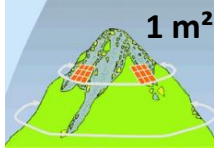
Hochschwab (HSW)

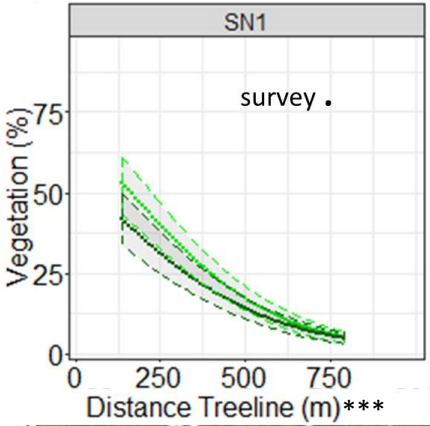
Dolomites (ADO)

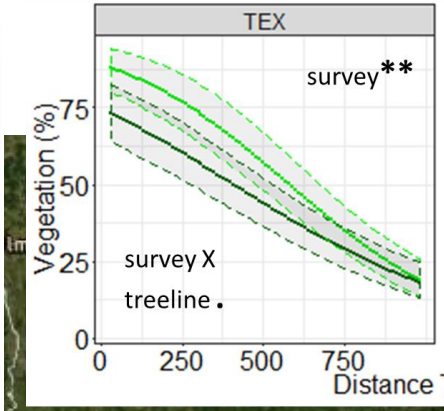
universität innsbruck
Institut für Botanik und Botanischer Garten

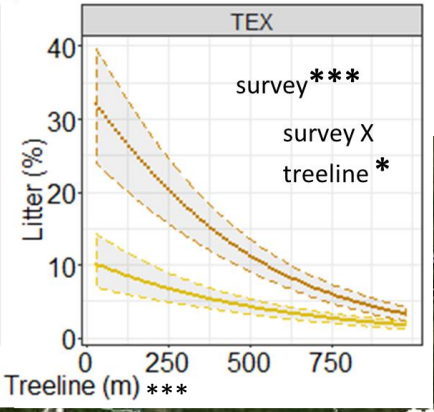
GLORIA

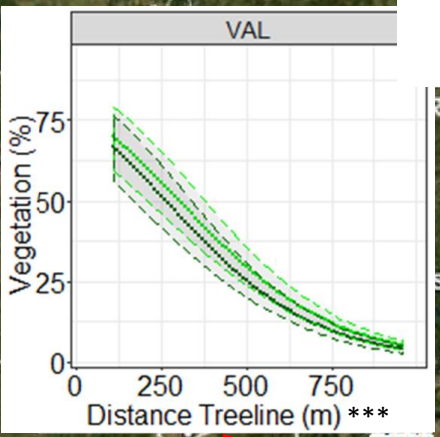
Vegetation cover

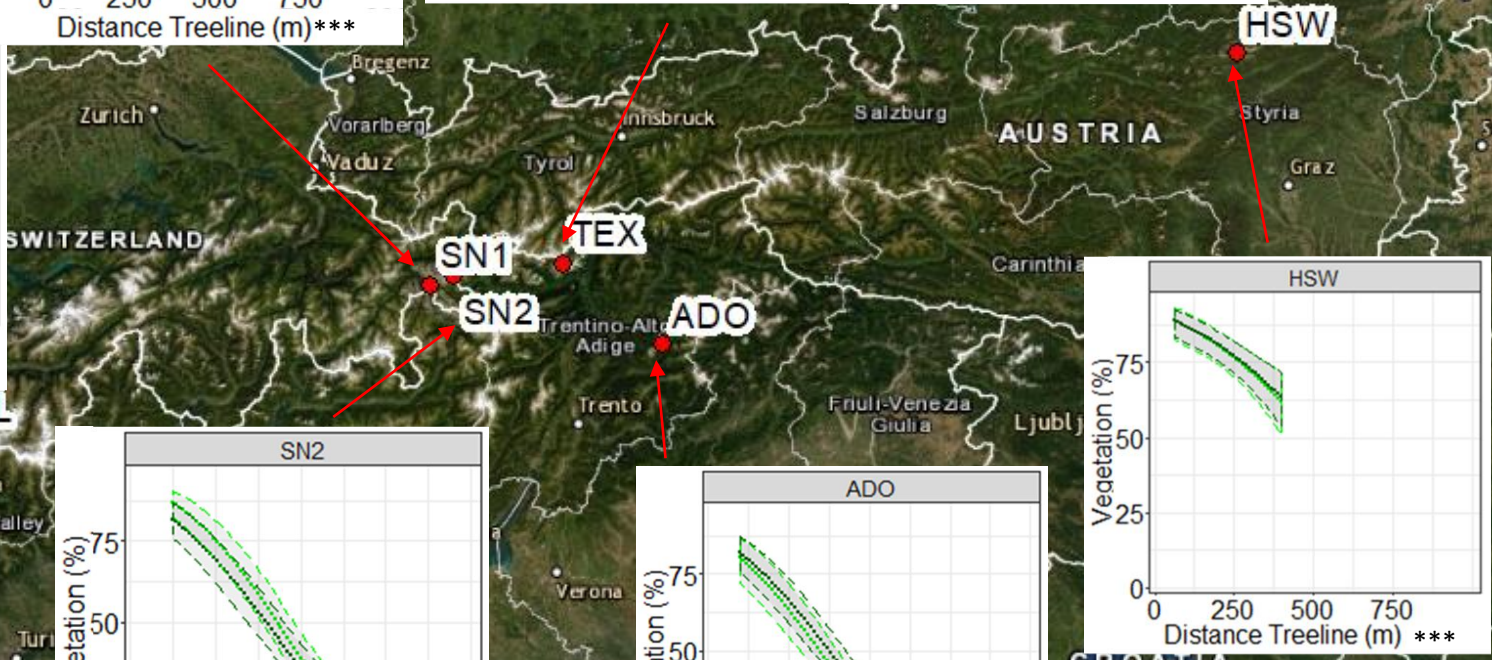


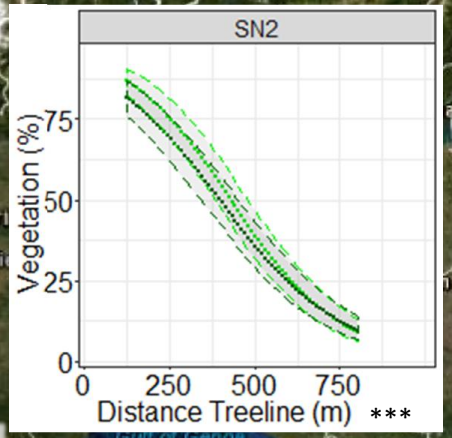


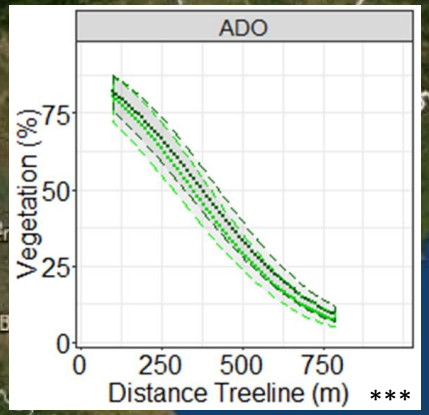












Survey
Resurvey

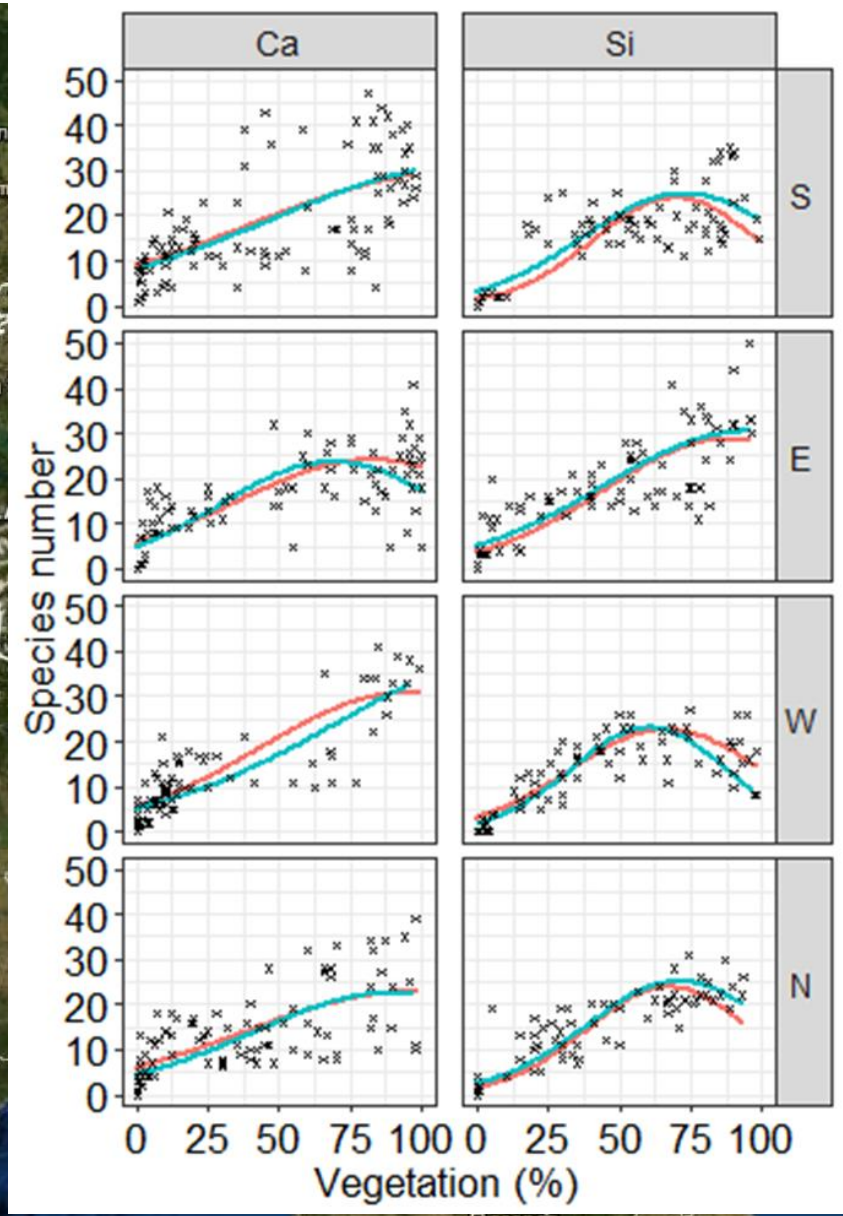
Silicate: VAL, SN2 & TEX;
Calcareous: SN1, ADO & HSW

World Imagery Esri et al. 2019

Silicate vs. calcareous bedrock

Species number and vegetation cover

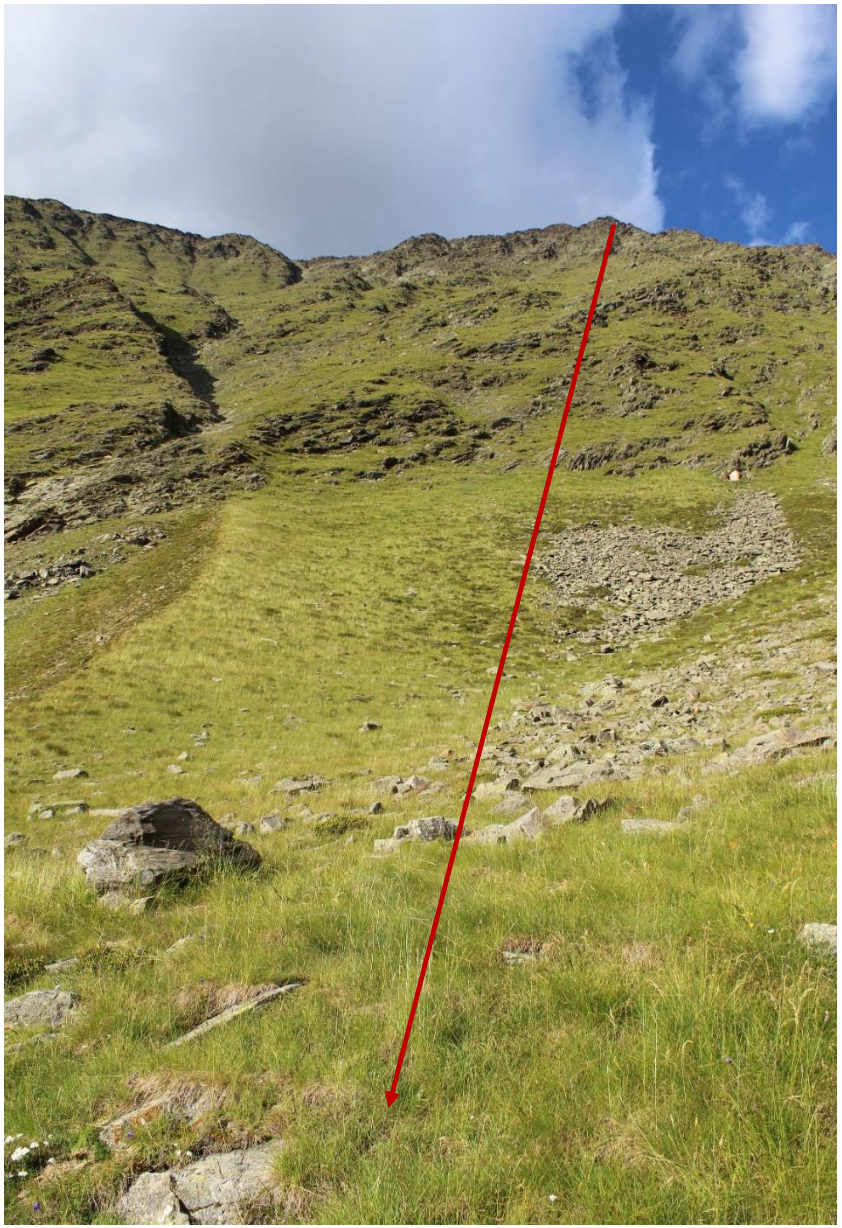
Silicate: VAL, SN2 & TEX;
Calcareous: SN1, ADO & HSW



World Imagery Esri et al. 2019

Reaction of single plant species

Outlook – Analyses of transects

→ Species of high conservation priority

→ Habitats of high conservation priority