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Plant community evolution in a glacier foreland of the Central European Alps

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Glacier forelands are perfect for analysing the development of plant communities from zero onward. According to Matthews (1992), the chronosequence can act as a spatial representation of the temporal sequence. Therefore, it is ideal to analyse changes in landscape and land cover in time slices. Development of plant communities does not only depend on the age of the deposits, but also on topography, microclimate, soil development, and geomorphological processes as well as on biotic interactions. In the long term, permanent plots represent an adequate method to follow the colonisation on differently aged terrain throughout time.

The main research question of the study is: Do cryospheric changes influence plant community development in time and space? During the first study year we were focused on the following questions: i) How fast does a plant community evolve? ii) How many species do occur on different moraine stages? iii) How do soil parameters correlate with primary succession stages?

The study site is located in the southern part of the Central European Alps, Martell Valley (South Tyrol, Italy). We established 12 permanent plot clusters of 2 x 5 m on areas deglaciated between 1985 and 2018, two per retreat area. In each square meter of these clusters, species composition, cover, and number of individuals were sampled. On the ground moraines of the glacier stages 1911 and approximately 1850 we recorded species composition and cover on 10 x 10 m plots (four plots in total). In all plot clusters and plots on the old moraines, soil temperature and soil water potential as well as relevant soil parameters were measured.

We found up to two vascular plant species per square meter on areas ice free for one year and up to 16 vascular plant species per square meter on areas ice free since 1985.

On the moraines of 1911 were up to 39 vascular plant species per plot with a mean cover of 52.5 %. On the moraines of 1850 we found up to 43 vascular plant species with a mean cover of 40 %.

In the next step we will analyse the effects of pioneer, early and late successional species on morphodynamic processes and their response to these processes using functional traits.

Matthews, J.A. (1992): The ecology of recently-deglaciated terrain: a geocological approach to glacier forelands and primary succession. Cambridge University Press, Cambridge.

