CALICE: Calibrating Plant Biodiversity in Glacier Ice

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The objective of the project is to reconstruct plant biodiversity and its trend archived in Alpine glacier ice by pollen and eDNA (environmental DNA) during the last five decades by analyzing a 40 m ice core. For our study we chose the Adamello glacier (Trentino - Südtirol, Lombardia) because of i) the good preservation conditions for pollen and eDNA in ice, ii) the thickness of the ice cap (270m) and iii) the expected high time resolution. The biodiversity estimates gained by pollen analysis and eDNA will be validated by historical biodiversity assessments mainly based on vegetation maps, aerial photos and vegetation surveys in the catchment area of the Adamello glacier for the last five decades. This historical reconstruction of biodiversity trends will be performed on a micro-, meso- and macro-scale (5, 20-50 and 50-100 Km radius, respectively). The results will serve as a calibration data set on biodiversity for future studies, such as the second step of the coring by the POLLiCE research consortium (pollice.fmach.it). In fact, arrangements are currently been made to drill the complete ice cap and retrieve a 270 m thick core which has the potential to cover a time span of minimum 400 years up to several millennia. This second stage will extend the time scale and enable the evaluation of dissimilarity/similarity of modern biodiversity in relation to Late Holocene trends. Finally, we believe this case study has the potential to be applied in other glaciated areas to evaluate biodiversity for large regions (e.g. central Asian mountain ranges, Tibet and Tian Shan or the Andes).