



## **Linking pollen deposition and snow accumulation on the Alto dell'Ortles glacier (South Tyrol, Italy) for sub-seasonal dating of a firn core**

Daniela Festi (1), Luca Carturan (2), Werner Kofler (1), Giancarlo dalla Fontana (2), Fabrizio de Blasi (2), Federico Cazorzi (3), Edith Bucher (4), Volkmar Mair (5), Paolo Gabrielli (6,7), and Klaus Oeggl (1)

(1) Institute of Botany, University of Innsbruck, Innsbruck, Austria, (2) Department of Land, Environment, Agriculture and Forestry, University of Padova, Padova, Italy, (3) Department of Agriculture and Environmental Sciences, University of Udine, Udine, Italy, (4) Autonome Provinz Bozen Südtirol, Landesagentur für Umwelt, Biologisches Labor, Bozen, Italy, (5) Autonome Provinz Bozen Südtirol, Amt für Geologie und Baustoffprüfung, Bozen, Italy, (6) Byrd Polar and Climate Research Center, The Ohio State University, Columbus, USA, (7) School of Earth Sciences, The Ohio State University, Columbus, USA

Dating of ice cores from non-polar glaciers is challenging and often problematic. Yet, a proper timescale is essential for a correct interpretation of the proxies measured in the cores. Here we present a multi-disciplinary approach developed to obtain a high resolution timescale for a 10 m firn core retrieved from the Alto dell'Ortles Glacier (Italy). Results indicate that the core encompasses five accumulation years. A high resolution timescale was established by means of statistical analyses, comparing glacier pollen assemblages with daily pollen monitoring assemblages from Solda (base of Mt. Ortles). Ortles snow samples are characterised by their depth and pollen spectra, while Solda's samples are characterised by their pollen spectra and specific date. Thus, by finding for an Ortles sample the most similar Solda's sample according to their pollen content, we established a direct depth-to-day link. In this way every snow sample containing pollen has been dated. Finally, the timescale was compared with results from a mass balance model run at the drilling site. The comparison of the two independent dating methods enabled a better understanding of depositional and post depositional processes affecting pollen,  $\delta D$ , snow and firn at the study site. Finally, we provide an example of useful application of the timescale related to the direct comparison of measured meteorological parameters and the stable isotopes composition of the core.