EGU21-2923
https://doi.org/10.5194/egusphere-egu21-2923
EGU General Assembly 2021

Post-LGM evolution of the Dora Baltea glacial system and paleoclimatic implications in the Western Italian Alps

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Alpine glaciers repeatedly advanced and retreated from the high Alps to the forelands during the Quaternary and most recently reached their maximum extent and thickness during the Last Glacial Maximum (LGM, 26.5-19.0 ka ago) [1]. After the LGM, glaciers abandoned the Alpine foreland and retreated within the internal valleys. However, post-LGM withdrawal was not continuous but interrupted by stages of ice stasis or re-advance (stadials [2]), related to episodes of temporary climatic cooling. Glacial landforms and deposits associated to post-LGM ice stadials have been recognised across the Alps [2]. Our study contributes to this line of research by quantitatively reconstructing the age and configuration of several ice stages from the LGM to the Holocene, within the Dora Baltea (DB) catchment (SW Alps, Italy).

Following a detailed geomorphological mapping of glacial landforms and deposits, sixteen erratic boulders and two glacially-polished bedrocks were sampled along the DB valley for *in-situ* ^{10}Be surface-exposure dating, and five samples for luminescence dating were collected from fluvio-lacustrine and fluvio-glacial deposits. The obtained chronologies, combined with recalculated ^{10}Be surface-exposure ages from previous works in the study area [1, 3, 4, 5], constrain seven post-LGM ice stages in the DB valley. The first three retreat stages occurred between the end of the LGM and the early Lateglacial, probably with rapid ice decay. The following three stages correspond to the well-known Gschnitz, Daun and Egesen Alpine Lateglacial stadials [2], while we also identified a late-Holocene ice re-advance in the upstream DB catchment.

Paleo-ice configurations of each stage (including the LGM) were obtained with a semi-automatic ArcGIS routine (similar approach to GlaRe ArcGIS toolbox [6]), based on the areal interpolation of 2D ice surface profiles generated through Profiler v.2 [7]. Glacier equilibrium-line altitudes (ELAs) were computed for the eight 3D ice surface reconstructions [8], with the aim of deriving potential paleoclimatic implications of the different reconstructed ice stages in comparison to other paleoclimatic proxies.

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