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Why small size matters – A new view on the last glacial maximum in the Eastern Alps

Heidi Bernsteiner (1), Joachim Götz (2), Jürgen Reitner (3), and Bernhard Salcher (1)

(1) Department of Geography and Geology, University of Salzburg, Salzburg, Austria (heidi.bernsteiner@stud.sbg.ac.at), (2) Department of Geography and Regional Science, University of Graz, Graz, Austria, (3) Department Sedimentary Geology, Geologische Bundesanstalt, Wien, Austria

A complex ice stream network occupied the European Alps during the last glacial maximum (LGM, MIS 2, Würmian Pleniglacial) with large valley glaciers extending as piedmont lobes into the northern and southern forelands. A completely different situation is reported for the easternmost Alps, where only a patchy pattern of isolated glaciers, confined to minor valleys, localized cirques and small plateaus could develop.
Although the Alpine LGM glaciation was intensively studied, data sets vary considerably in the easternmost Alps (e.g concerning the numbers of local glaciers as well as extents) and systematic analyses of the glacial record are missing for the entire region. Consequently, equilibrium line altitudes (ELAs) and ELA depressions (ΔELAs) for these paleo glaciers remain unknown as well, though such data can be extremly useful to provide information on the variance of atmospheric circulation patterns over glacial to interglacial timescales. Characterized by relatively simple geometries and obviously rather simple source area relations (compared to the ice-stream network in the central Alps), they are most suitable for paleo-glacier reconstruction and ELA modelling – and can provide a robust dataset on ELA depression variabilities during the LGM. Such analysis is hardly possible for the ice-stream network occupying most of the central Alps at the same time.
To fill this gap, we provide a new GIS-dataset of the LGM glaciation at the Eastern Alps based on the principal work of van Husen (1987), a number of case studies, geological maps, and the analyses of multiple orthophoto and DEM data. First systematic analyses on ELAs and ELA depressions of these low elevated isolated glaciers highlight the highly variable glacier response across the Eastern Alps to topographic and climatic forcing.