

## Releasing bends along the Salzach-Enns-Mariazell-Puchberg (SEMP) fault (Upper Enns Valley, Austria)

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Quaternary glaciations combined with neotectonic activity formed the topography of the Upper Enns Valley (Eastern Alps), located along the sinistral Salzach-Enns-Mariazell-Puchberg (SEMP) strike-slip fault. The focus of this study is to describe a previously not known releasing, resp. restraining bend and to re-interpret the course of the SEMP fault. Geomorphology of the study area and the tectonic environment suggest the SEMP fault does not represent a simple straight fault line. Between Gröbming and Öblarn, the valley appears divided into two sections, a northern and a southern one with the Mitterberg block in between. Mt. Mitterberg exposes a relictic Pleistocene valley bottom and the overlying gravel infill between the paleosurfaces south and north of the Upper Enns Valley. Provenance analysis from Pleistocene Mitterberg conglomerate indicates the principal material flux across the SEMP fault from the south. The occurrence of carbonates derived from the Northern Calcareous Alps indicates bipolar transport directions. We conclude that the sedimentary pattern has undergone a change between Pleistocene and Holocene, forming a half-graben north of Mt. Mitterberg and a new fault zone. The conglomerate of Mt. Mitterberg also records tectonic deformation indicated by normal faults and primarily extensional regimes. A prominent NW-trending fault cuts the Mitterberg block in the west, geomorphic evidence argues for a dextral displacement. Structural data from the northern slopes of the Ennstal phyllite area also indicate dextral shearing. There is no evidence for sinistral strike-slip along steeply NNW-dipping normal faults as could be expected from the principal sinistral nature of the SEMP fault. The basins of Bramberg, Zell/See and Wagrain, the Miocene Ennstal basin and the basin between Liezen and Admont widen the valley, hence, they partly contribute to releasing step-overs of the SEMP fault. Simultaneously, Mt. Mitterberg and Mt. Frauenberg, between two faults restrained, enforce a step-over of the SEMP fault.