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# Seismic and core-based glacial sequence stratigraphy of an overdeepened valley fill in northern Switzerland

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In the context of the DOVE (Drilling Overdeepened Alpine Valleys) project, supported by the International Continental Scientific Drilling Program (ICDP), a series of boreholes were drilled into buried overdeepened glacial troughs situated in the northern forelands of the Central and Eastern Alps. The sediments infilled into these troughs provide relatively complete sedimentary records of the Mid- and Late Pleistocene and help to better understand past glaciations, paleoclimate, and landscape evolution. As part of this project, an over 250 meters thick succession of unconsolidated Quaternary lacustrine and glacio-to-glaciofluvial sediments was successfully cored from the Basadingen Trough (ICDP 5068_2, NE Switzerland). This overdeepend trough is located in the NE sector of the former Rhine glacier's foreland lobe and is associated with an SSE-NNW valley system that connects the present-day Thur Valley with the Rhine Valley. This association, absent in the current surface morphology, is believed to have been active solely during the Middle Pleistocene.

The correlation of the core with two lines of high-resolution 2D seismic data (acquired during a pre-drill site survey) directly links seismic facies, the petrophysical data of the core (obtained from MSCL- and wireline-logging), and sedimentological properties. This link allowed us to develop a glacial sequence stratigraphy, based on which the overdeepend valley fill could be grouped into three glacial sequences (S1 – S3), enabling a more detailed reconstruction of the glacial advance and retreat history.

Furthermore, integration of the 2D seismic lines with the local geological information (e.g., drill cores, bedrock map, topography, model of the Quaternary sediment cover) has facilitated the establishment of a three-dimensional model of a segment of the Basadingen Trough. This model visualizes the shape of the initial bedrock incision, the multiphase trough-infill architecture, and the emplacement of fluvial channels overlaying the overdeepend basin. This three-dimensional approach overcomes inherent limitations in two-dimensional representations, providing a more accurate mapping of actual geometries. This study thus contributes to the development of a local glaciation model for the Basadingen Trough and a model of subglacial erosion of overdeepened basins in the northern Alpine foreland.