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Reconstructing the evolution of the Chamoson alluvial fan (Swiss Rhône Valley) from outcrop observations and geo-radar survey.

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Following the withdrawal of the Wurmian glacier occupying the Rhône Valley (Swiss Alps), a complex of glacial sediments, alluvial fan deposits generated form tributary valleys, and lacustrine sediments were accumulated. Here, we focus on the Chamoson alluvial fan, the largest (ca. 8 km2) fan in the area , characterised by frequent floods (4 to 6 event per year) which are confined within its incised channel. The study aims to understand the spatial and temporal evolution of the fan in particular with respect to the larger trunk of the Rhône Valley.

The methodology includes (1) the description of sedimentary logs and photo mosaics along both 400 metre-long walls in the incised channel, (2) a Ground Penetrating Radar (GPR) survey designed to obtain a 3D model for identifying the internal architecture and geometry of the alluvial fan complex, and (3) carbon-14 age-determinations on suitable material in order to constrain a chronological framework of the sedimentary events observed in outcrop.

The Chamoson alluvial fan largely consists of a vertical stack of amalgamated waterline debris flow deposits alternated with graded gravels and coarse sandstones associated with bedload processes.
Intercalated within the coarse debris flow succession, field observations revealed the presence of a ca. 2 m-thick lacustrine silty and clayey interval containing wood fragments and well-preserved fresh-water gastropod shells. The AMS 14C-dating on gastropods indicates a Late Bronze Age for the formation of these deposits.

The GPR data also show the wide 3D spatial extension of a sharp horizontal reflector, which was interpreted to be the lacustrine deposit within the fan by correlation with the sedimentological logs. These lacustrine deposits are situated 40 m above the current altitude of the Rhône Valley, which may suggest a very different depositional and physiographic setting in this part of the Rhône Valley at the end of the Late Bronze Age.

The finding of these extensive fine-grained deposits raises lots of questions on the origin and existence of a presumed upper Rhone Valley lake. Such a lake, if confirmed, will have to be explained within the context of the known Holocene climatic variations, the well-known history of habitation in the region at that time, and the geology of the Rhone Valley in order to explain the genesis of the inferred lake (e.g. valley damming by landslide, frontal moraine).