



Late Neogene and Quaternary alluvial fans give evidence for tectonic events at the eastern margin of the Eastern Alps

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The deposition of Neogene and Quaternary alluvial sediments along the southwestern margin of the Vienna Basin record significant tectonic events for the eastern margin of the Alps. After the early to middle Miocene marine sedimentation phase fresh-water environments prevailed in the Vienna Basin during the Pannonian (Lake Pannon). Unconformably above early to middle Pannonian sediments, a late Pannonian to Pliocene conglomerate succession, the Rohrbach Formation, was deposited, followed by Pleistocene gravels of the Mitterndorf basin. The Rohrbach Formation builds a fan-like sedimentary body from the southwestern margin of the Vienna Basin near Neunkirchen up to the city of Wiener Neustadt, where these conglomerates occur within a depth of about 40 m below Pleistocene gravels. Outcrops of these probably Pliocene (Dacian) conglomerates have been investigated at the quarry Rohrbach. Conglomerates are mainly coarse to fine-grained, crudely bedded, and display maximum particle sizes up to 10 cm. Erosive fluvial channels with dimensions from 1 to several meters are present. Sandstone intercalations are common and sometimes graded. Laterally extensive silt- and claystones layers are present in minor amounts. Clasts include mainly limestones, dolomites and sandstones, and minor amounts of mica schists, gneisses and quartzites. Heavy minerals are dominated by garnet, epidote and stable minerals like tourmaline. Minor amounts of chrome spinel and higher metamorphic minerals like kyanite and sillimanite are present in most of the samples. The Rohrbach Formation is interpreted as an alluvial fan-braided river system fed by source areas mainly in the Northern Calcareous Alps and subsidiary source areas in the Greywacke Zone and the Austro-Alpine basement units. Synsedimentary deformations may point to the activity of basin margin faults during the Pliocene/Dacian.

After a stable and tectonically quiet period, subsidence in the Pleistocene Mitterndorf basin started around 250.000 yrs BP. Subsidence created accommodation for alluvial fans (Piesting Fan, Schwarza Fan), which filled the basin and unconformably overlie the Rohrbach Formation. Calculated maximum subsidence rates show values of 0.7 mm/yr, largely corresponding to recent precise leveling values of around -1 mm/yr for that area. Although the stratigraphic architecture of the fans is largely controlled by climate cycles (Salcher et al., in press), the development of these mountain front alluvial fans calls for a renewed phase of tectonism which is still active today. As evidenced by pebble composition and heavy mineral assemblages the source areas for the fans are largely similar to that of the Rohrbach Formation.

Our investigations thus point to two significant phases of Late Neogene to Quaternary tectonism at the eastern margin of the Eastern Alps: A first tectonic phase in the Dacian (early Pliocene, ca. 5.3 – 4.6 Ma, but starting in late Pannonian) resulted in sedimentation of the Rohrbach Formation, a second phase in the Middle to Late Pleistocene resulted in subsidence of the Mitterndorf subbasin and formation of mountain front alluvial fans.