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Preliminary results of chronostratigraphic field work, OSL-dating and morphogenetic reconstruction of an alluvial apron at Alborz southern foothill, Damghan basin, Iran

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Here we present preliminary results of a chronostratigraphic study of an alluvial fan in the Damghan Basin, northern Iran. The basin sediments date back to the Mio- and Pliocene and therefore represent the starting point of alluvial fan aggradation. Today, the still active alluvial fans prograde from the Albors Mountain ranges and sit on the older sediment bodies. In this study, our focus is on the late Pleistocene to Holocene alluvial fan sedimentation history.

The upper stratigraphy of the alluvial fans and intercalated lake deposits is characterized by six individual layers of gravels and fines, representing six different stratigraphic units. These units are described and classified by detailed geomorphological and stratigraphic mapping. To establish an alluvial fan chronology, six profiles were sampled for OSL dating.

As expected, due to the high-energy transport system of alluvial fan aggradation in semi-desert environments, OSL dating of these sediments is challenging due to the problem of insufficient bleaching. Consequently, most of the samples are interpreted as maximum ages. However, the measurements show a consistent internal age structure and the overall OSL-based chronology is in agreement with the age model derived from our geomorphological analysis.

As a first interpretation, based on surveyed geomorphological features and chronological analysis, we could identify seven morphodynamic phases, leading to a genetic model of alluvial fan aggradation. The oldest Pleistocene age estimate is derived from a former lake terrace. The following ages represent ongoing lake sediment deposition and the development of a proximal and mid-fan gravel cover. After the youngest lake deposits were accumulated within the Holocene, the lake starts to retreat and small alluvial fans are filling up the former lake bottom. This last sedimentation phase can be divided in at least two sub-phases, probably coupled to a lateral shifting of the active depositional lobe and to the abandonment and shallow incision of mid fan surfaces.