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Sedimentation model of gravel-dominated alluvial piedmont fan, Karaj-Shahriar plain, Iran

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The Piedmont Zone of the Karaj-Shahriar Plain contains numerous alluvial fans. These fans can be divided into gravelly proximal fan (0–4 km down-stream), gravel-sand rich mid fan (4–10 km) and sand–mud dominated distal fan (10–30 km). The fan succession is composed of several fan expansion cycles. Separated by an erosional contact of regional extent, some cycles (Class 1) are characterized by river borne clast-supported gravelly deposits, and the overlying fan expansion some other cycles (Class 2) by matrix-supported gravely debris flows. The main process behind fan development has been lateral migration of channels over the fan surface probably due to rapid sedimentation caused by increased sediment supply, and the fluctuating water budget in response to changing climate. The water laid expansion first class cycles represents a humid phase. The debris flow deposits of expansion second-class cycles suggest a dry phase. The second Class Cycles also indicate a phase of tectonic instability in this area forming the mountain front. The tectonic activity caused incision of rivers into the fan surface, and in turn resulted in reduced fan-building activity. The complex grain-size distribution is governed by various processes. At present the fan surface is accreting by sheet flow processes. Some portions are occasionally modified by running water in form of sheet floods or incipient channelized flows, with current action, however, being often only slight to even negligible as revealed by the absence of imbrications. The gravel units low-viscosity stream deposits and some other units originate as medial or longitudinal bars in broad shallow channels of braided river systems with marked high and low discharge stages.

Key words: Karaj-Shahriar, Sedimentology, Alluvial fan, and Gravel.