



Surficial erosion enhances the internal structure of a distributary fan in Coprates Catena, Mars: a sedimentological investigation using HRSC

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Using HRSC data we investigate a steep and stepped fan-shaped deposit at the entrance of a channel into one of the secondary troughs associated to Coprates Catena. The fan was fed by a 44-km-long sapping channel whose width and depth increase downstream up to 4.5 km and 1.3 km, respectively. The surface of the Coprates fan appears affected by eolian erosion and pitted by a few small craters. Its radius ranges from 4900 m, in the westernmost part, up to 8500 m in front of the valley mouth. The fan apex lies approximately 1 km above the trough floor and the mean slope of the deposit is about 7.4° . The morphology of the deposit is characterized by clear concentric and layered steps whose height seems to progressively decrease toward the distal part. Surficial removal of the fan loose components by eolian activity provides an upfront view of the lithified sediments forming the deposit and of their internal depositional geometries. This helps in understanding the processes that formed the fan and its overall sedimentary evolution. The internal bedding of the Coprates fan, its homogenous lateral extension and the lack of a channel system on its surface suggest that it was mainly deposited as an alluvial fan by successive and decreasing sheetfloods. We interpret the concentric steps as the relic of a retrogradational stacking pattern of the depositional sequences, enhanced by the removal of their fine materials mainly by eolian activity. The fan formation was likely characterized by the headward retreat of the sapping feeder channel with an associate retrograde movement of the fan intersection point, resulting in an upstream migration of the flows' expansion and in an overall retrograde evolution of the entire body.