

Interactive comment on “Exploring Geomorphic Processes and Martian Gale Crater Topography on Mars using CTX and HiRISE Express Image Dataset” by Pavan Kumar et al.

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General comment

The topic of the paper is surely interesting and stimulating. I am not sure if the results provide evidence really new for the specific area and relevant for the knowledge of the shaping of the Martian surface. In case, the Authors should stress the novelty and the relevance of their results. Geomorphologic and geologic terminology in some points is inadequate. Description of erosive and depositional landforms is minimal, and mutual relations between surface features of different origin should have been more described. English is not my native language, but along the text I found many

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Discussion paper



points hard to be understood. Here below some specific comments, while others are reported as annotations to the PDF file of the manuscripts (attached)

Introduction What seems problematic is the apparent mix of results referred both to the Mars' surface in general and the Gale crater. Moreover, some references are lacking. In general, the relevance of the paper's goal is not stressed enough. **Materials and Methodology** There are some sentences that belong to the results section (see Crater morphology identification). Indeed, figure 3 should be better placed after the illustration of every mapped landforms. **Results** There are many unclear sentences, affirmations that needs to be supported by evidence, and some descriptions incomplete or lacking. I understand that the origin of mounds is complex, but I was expected to find an authors' opinion even prudent and not conclusive. About the Aeolian process and landforms, it is not so evident by the figure 8 that the material forming the dune is coming from eroded sedimentary rock. Please provide a better explanation. The result section 4.3 **Distribution of ejecta layers** appears disconnected from the motivation of the paper, because, despite a distribution extended to the total Mars surface, no evidence are presented in the study area. I suggest to eliminate this part, or to add some images and descriptions coming from Gale Crater

Conclusion Conversely to what reported, clear evidence of mutual relations between fluvial and aeolian features suggesting a temporal sequence are not presented in the paper. It would have been interesting to see an image where fluvial landforms are overlapped by aeolian sediments. The 4.2.1 paragraph says that dunes are formed by material eroded by sedimentary rocks (fluvially eroded? however not so evident by the figure 8), and then shaped by wind action in yardangs. It is not clear if fluvial processes were dominating the earlier stage of surface shaping. I think that there is a confusion between sedimentary structures and depositional landforms, which are not synonyms.

Best wishes

Please also note the supplement to this comment:

<https://www.earth-syst-sci-data-discuss.net/essd-2019-4/essd-2019-4-RC6-supplement.pdf>

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