

# ***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.**

## **Anonymous Referee #4**

Received and published: 11 March 2019

Dear colleagues,

Thank you for your mail. I have already submitted my review on the manuscript entitled “Exploring Geomorphic Processes and Martian Gale Crater Topography on Mars using CTX and HiRISE Express Image Dataset”. I read another manuscript mentioned in your mail by Anderson and Bell to verify the actual similarities between the two. While comparing the manuscripts, I found that author did not study both manuscripts seriously. The detailed comparison of the manuscripts is discussed here:

First of all, the objectives of the both papers are different from each other. Anderson and Bell (2010) focused on the geologic characteristics of the Gale crater and poten-

[Printer-friendly version](#)

[Discussion paper](#)



tial landing site for Mars Science Laboratory landing. Therefore, they studied surface features on the crater for probable landing site. However, Kumar et al. primarily focused on the surface features and their geomorphic processes on the Gale Crater. They used their knowledge and understanding of surface processes for identification and delineation of geomorphic features present in the crater.

After comparing the results and findings of the both papers, it is clear to me that both have different dimensions and thoughts. Anderson and Bell (2010) analysed their results based on the mathematical findings. Their analysis was based on the numerical values of elevation, length, CTX albedo and Thermal Inertia. With the help of these factors, morphology of the crater topography was studied for potential landing site. Their prime objective was to identify a location which is fit for four primary criteria. This includes diversity, context, habitability and preservation potential. Their study found suitable landing site for MSL where rover could explore numerous geomorphic features. The diversity of the topographical features, geological and chemical evidence for the past for habitability are of paramount importance to their study for site selection.

Kumar et al. studied the surface processes and identified landform formation based on their knowledge on geomorphic processes and some earlier studies. Their results and findings are theoretical in nature. Mars is a celestial body where in situ data for result validation is not possible for every researcher. Therefore, based on the earlier study and the knowledge from the evidence of the earth's surface processes were used here. They have studied about the distribution of ejecta layer formation based on the spatial distribution of different latitudes. This formation is based on the theory of asteroid impact where Anderson and Bell (2010) focused on the volcanism for their study. In this way both manuscripts have different dimensions from each other.

Anonymous author of the mail may be confused by the Figure 3 of Kumar et al. with Figure 7 of Anderson and Bell (2010). There are some similarities and dissimilarities in the figure and have reasons:

[Printer-friendly version](#)[Discussion paper](#)

Similarities: Dark toned layered yardangs, dark toned dunes and upper mound of Anderson and Bell (2010) have similarities with Kumar et al. Figure 3. These units are very large in Gale Crater which can be easily identified from Mars obiter image. Therefore, it is not an issue as per my understanding.

Dissimilarities: Various small features were mapped by Anderson and Bell (2010) which are absent from Figure 3 of Kumar et al. Anderson and Bell (2010) mapped every detail from inside and outside of the crater for their possible landing site of MSL. However, Kumar et al. focused on the inside geomorphic features which makes it different from Anderson and Bell (2010).

Kumar et al. cites Anderson and Bell (2010) many times in their paper as an evident of earlier researches in Gale Crater. The work by Anderson and Bell is an extensive study on different aspects and is different from the manuscript by Kumar et al. The anonymous person should come forward for interactive discussion as the other scientific community is participating. If anybody has doubt and belief of any research related query, it can be confirmed either from the authors or through open discussion platform.

My submission is that the authenticity of the anonymous person should be ascertained and checked.

I think that the manuscript submitted by Kumar et al. be accepted for publication.

---

Interactive comment on Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2019-4>, 2019.

[Printer-friendly version](#)[Discussion paper](#)