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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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Doubt of anonymous author of mail regarding the novelty and originality of the manuscript:

The study provides the first analysis of the distribution of craters with displaying MLE morphologies. The study finds that MLE craters concentrate along the dichotomy boundary and in areas displaying channels such as those near Elysium and Tharsis.

Anonymous author says that most of the findings in the paper seems a duplicate version of the paper by Anderson and Bell (2010):

The location of geomorphological features of an area will be the same but in case of Mars it is necessary to find out the mode of origin. Various authors presented their views and reviews towards the same features in different way since the origin of the Gale Crater formation cannot be changed but its evidence can be explained in different ways. Single layer ejecta (SLE) is the most common ejecta morphology over the entire Martian surface. Martian impact craters display a variety of ejecta and interior features differing from those seen on dry and atmosphere free bodies like the moon.

Anderson and Bell (2010) were examined the geological and geomorphic characteristics of Gale crater to identify the potential landing site for MSL.

In our study the geomorphic features mainly of aeolian and fluvial origin were identified and delineated.

Below are the points to discard the duplication of Anderson and Bell version:

1. Anderson and Bell (2010) carried out their research about geologic mapping and characterization of Gale Crater using mathematical explanation and earlier published work.

2. We used the information contained in the Barlow catalogue of Large Martian Impact Craters to discuss the major geomorphic features and chronological description of fluvial and aeolian processes. The Catalogue contains information on 42,284 impact craters >= 1.7 km diameter distributed across the entire surface of Mars. The catalogue was compiled from digitization of the Viking 1:2,000,000-scale photo mosaic produced by the U.S. Geological Survey in the 1980s (Barlow 1987). Catalogue 1.0 can be accessed through the U.S. Geological Survey's Planetary Interactive GIS on the Web Analyzable Database (PIGWAD) (http://webgis.wr.usgs.gov).We also identified significant ejecta morphologies on Martian surface.

3. Anderson and Bell (2010) used visible (CTX, HiRISE, MOC), infrared (THEMIS, CRISM, OMEGA) and topographic (MOLA, HRSC, CTX) datasets and data products to

conduct a study of Gale Crater, with a particular focus on the region near the proposed Mars Science Laboratory (MSL) landing site and traverse.

4. We used only visible (CTX, HiRISE) and topographic (MOLA) datasets to explore the Martian surface and the crater deposition on Northern site of Mars with Single Ejecta.

5. Anderson and Bell (2010) explained fluvial and aeolian weathering through mathematical explanation and earlier studies.

6. In our study geomorphic features were identified using the visual interpretation and catalogue information. It has also been suggested thatafter the impact of a meteorite the soils got loosen and susceptible to both fluvial and aeolian weathering. No duplication in the findings of fluvial processes and landforms rather it was in accordance with Pelkey et al. (2004).

7. Anderson and Bell (2010) studied a detailed geomorphic feature on the Gale Crater for possible MSL landing site.

8. While our findings revealed that significant canyons were identified in the eroded north western rim of theGale crater. Peace valley fan situated in north western part of the Gale crater were delineated in our study. These fans were formed due to denudation of Aeolis mons and crater rim were also reported by Palucis et al. (2014), Anderson and Bell (2010). These have been cited in the manuscript.Our study revealed that inverted channels must have been active and received enough sand through aeolian process. Low erosion along the channels has resulted in the formation of highlands.

9. Anderson and Bell (2010) were unable to rule out a lacustrine or aeolian origin for the lower mound using presently available data.

10. Our study revealed deposition of various layers to aeolian work. Malin and Edgett (2000) also advocated lacustrine origin of the mound by emphasizing thickness and sequential nature of many layer deposits. Our analysis indicated that the surface of the crater mound shaped by the action of the aeolian process and it is the main driver

for shaping the surface. In our study dunes are formed by erosion of sedimentary rockswhile Anderson and Bell (2010) suggested the basaltic composition of the dunes.

11. There was no mention of Ejecta morphologies in the work of Anderson and Bell (2010).

12. We have provided separate figures (Figure. 9,10 and 11) and a paragraph for the ejecta morphologies in the manuscript.

How our work is different from Anderson and Bell (2010):

a) We have used limited data and different methodologies.

b) Java Mission-planning and Analysis for Remote Sensing (JMARS)was used in our study to generate the spatial datasets as a CTX image stamp map.The required images for Gale crater were identified in JMARS and acquired from the Mars Orbital Data Explorer website.

c) We have used Barlow crater catalogue (Barlow, 2003).

d) Origin of geomorphological features were correlated with ejecta and has been provided in the supplementary file.

e) Relationship was established between Crater diameter and pit diameter in single layer ejecta for the formation of the mound.

f) Our study is confined to aeolian and fluvial features only.

Dissimilarities in Figures:

a) Anderson and Bell (2010) in the Figure 7 have shown various geomorphic features on the Gale Crater.

b) While in our manuscript the Figure 3 is representing only the fluvial and aeolian features identified on the Gale Crater.

c) All the Figures from 4 to 9 in our manuscript are different from the Figures of Anderson and Bell (2010).

d) In our study we suggested the impact of ejecta in the formation of the fluvial and aeolian features on the Gale crater. Our study suggested that meteorite effect may have led to the origin of fluvial and aeolian process on the Gale crater.

e) Anderson and Bell (2010) usedmathematical explanation for explaining the identified geomorphic features on Martian Gale Crater.

f) While in our manuscript Barlow Crater catalogue (2003) was used containing information of all the Martian craters.

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