

# ***Interactive comment on “Deep-seated gravitational slope deformation scaling on Mars and Earth: same fate for different initial conditions and structural evolutions” by Olga Kromuszczńska et al.***

## **Anonymous Referee #1**

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### GENERAL COMMENTS:

The paper evaluates the evolution of deep-seated gravitational slope deformation (DS-GSD) processes on both Earth (Tatra Mountains) and Mars (Valles Marineris). The approach of analogue studies is very interesting, and the text is generally in a good condition. But there are still some minor improvements I recommend to consider.

### SPECIFIC COMMENTS:

#1 (Page 2): I recommend to extend the introduction by a small chapter providing

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definitions and basic information about DSGSD and the motivation of this work. The paper immediately starts with a relatively specific chapter about the hillslopes of Valles Marineris.

#2 (Page 3 Line 14-18 and Page 4 Line 25-28): The hypothesis of a glaciated Valles Marineris is not that common. So it is necessary to provide better citations. Laskar et al., 2004 only provides information about the variations of solar insolation on Mars. It does not mention anything about a glaciated Valles Marineris. Moreover, high obliquity excursions may cause a cold climate; but this does not necessarily mean, that there is enough ice/water causing the development of glaciers. Please cite Mège and Bourgeois, 2011 and Gourronc et al., 2014 already here.

#### TECHNICAL CORRECTIONS:

#3 (Page 1 Line 24): “The large offsets make necessary reactivation of the DSGSD fault scarps in Valles Marineris, . . .”. Do you mean “The large offsets necessarily reactivate the DSGSD fault scarps in Valles Marineris, . . .”? Please clarify.

#4 (Page 2 Line 13): “streams erosion”, maybe “fluvial erosion” would be better.

#5 (Page 2 Line 16): Usually, the maximum depth of Valles Marineris is given with 7 km, not 10 km.

#6 (Page 2 Line 16): “. . .whereas typical mountain slopes on Earth are hundreds to a few kilometres high.” It should be “. . . whereas typical mountain slopes on Earth are hundreds of meters to a few kilometers high.”

#7 (Page 3 Line 25): Please add where the Socompa rock avalanche took place.

#8 (Page 4 Line 12-13): I guess the sentence “The ridge material that makes the lower part of the ridges are usually covered by debris slopes.” should be “The ridge material that makes the lower part of the ridges is usually covered by debris slopes.”.

#9 (Page 5 Line 8): “resolution” into “resolution”.

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#10 (Page 10 Line 3 and 9): “A few uphill-facing normal faults scarps” into “A few uphill-facing normal fault scarps”.

#11 (Page 16 Line 15): “Because DSGSD is observed at surface...” into “Because DSGSD is observed at the surface...”.

#12 (Page 18 Line 5-7): It guess “..., which suggests that this conclusion...” should be “..., suggesting that this conclusion...”.

#13 (Page 18 Line 21): Please cite Mège and Bourgeois, 2011 and Gourronc et al., 2014 here too, besides Laskar et al., 2004.

## IMAGES:

#14 (Fig. 1b and 5): It would be nice for a better comparison to present a shaded relief map of the Tatra study area too, instead of a satellite image. In Fig. 5 I would add a shaded DEM too (but keep the satellite imagery here!). Maybe you can put the shaded DEM here on the right side of each related image. And maybe you put the perspective photographs in a separate figure, so they can be presented much larger.

#15 (Fig. 2): The white box indicating the HiRISE image on the right is not accurately placed. It should be more left. Moreover, it would be better if the images are aligned as CTX photo/CTX DEM/HiRISE.

#16 (Fig. 2, 4, and 6): I recommend to add the approximate coordinates where each image is centered at. This makes it easy for readers to find these areas themselves. Moreover, you can consider adding the image numbers of the used images too.

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Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2018-27>, 2018.

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