Overall comments

Overall the manuscript is well-written and with some minor improvements will be a nice contribution to the field. The manuscript could use more discussion about the significance of the results. As written it is not really clear why it matters that there is a morphologic distinction between gullies carved into bedrock and mantling. Most of the discussion is about comparing the morphometry of martian gullies with gullies on Earth, and doesn't really involve the bedrock/LDM distinction at all.

The authors should be clearer about how they distinguish a gully incised into LDM and a gully incised into bedrock that is later mantled. You mention in Section 4.1 (second paragraph) that the gully systems in four craters appear to have incised prior to being mantled. Shouldn't these be in a separate class rather than being included with the LDM craters? A related question is whether there are any constraints on the depth of mantling material. One would imagine that a gully eroding into one meter of mantle over bedrock would be morphologically different from a gully eroding into hundreds of meters of mantle over bedrock.

"Melton ratio" should be capitalized throughout.

"LDA" is never defined.

Line comments

47: I suggest defining "viscous flow features (VFF)" as an umbrella term for glacial-type formations (https://doi.org/10.1007/978-1-4614-9213-9_596-1). Debris flow deposits could be considered are "viscous flow features" but presumably are not what you are referring to.

114: Suggest changing "the features listed in 1" to "LDM or glacial features"

152: "which may eventually influence the morphometric measurements" suggest changing to "which may have influenced the morphometry".

153: "gully fans" should this be "gully systems"?

155: How certain are you that the gullies are incised into LDM material rather than being incised into bedrock and then later mantled by LDM material? You mention some of the latter in Section 4.1.

156: "At first,"-> "First,"

180: "generation" -> "generations"

185: "Gullies incised into LDM/VFFs are found to have a distinctive V-shaped cross section" As written it is unclear if this applies to just the 20 or the 24 craters (including Raga, Roseau, unnamed crater in Newton basin, and unnamed crater-1 in Terra Sirenum)?

185: "distinctive V-shaped cross section" You might add a figure showing the differences in cross sections between a gully incised into LDM/VFF and a gully incised into bedrock.

217: "167 gullies" I suggest adding a column to Table 1 that contains the number of measured gullies in each crater

264: "viz. grain size" What is "viz"?

289: "V- shape of the incision" this was never really demonstrated in the manuscript

342: "combinations of Melton ratio" I think that you need to specify the significance of the Melton ratio here. Why not use some other metric like form factor or elongation ratio on the x-axis?

356 "debris-flow like process" What was the fluid source? You mention sublimation of CO2 ice in the conclusions but I think you need to elaborate more here.

Figure comments

Figure 2: Are the examples shown in Figure 2 representative of all of the study craters you examined? Were there craters where the distinction between bedrock and LDM/glacial was more ambiguous?

Figure 2d: On line 148 you say that you only selected gully systems that were "not superimposed by or interfingering with the fans from the neighboring channels" and had "no evidence of extensive cross-cutting". This does not appear to be the case for the gullies shown in Figure 2d (see portion of HiRISE image ESP_056668_1345_RED below. North is toward the left). You should replace 2d with an example of a bedrock gully that you collected morphometric measurements for (or if you did collect measurements of the system shown in 2d, revise the text on line 148).
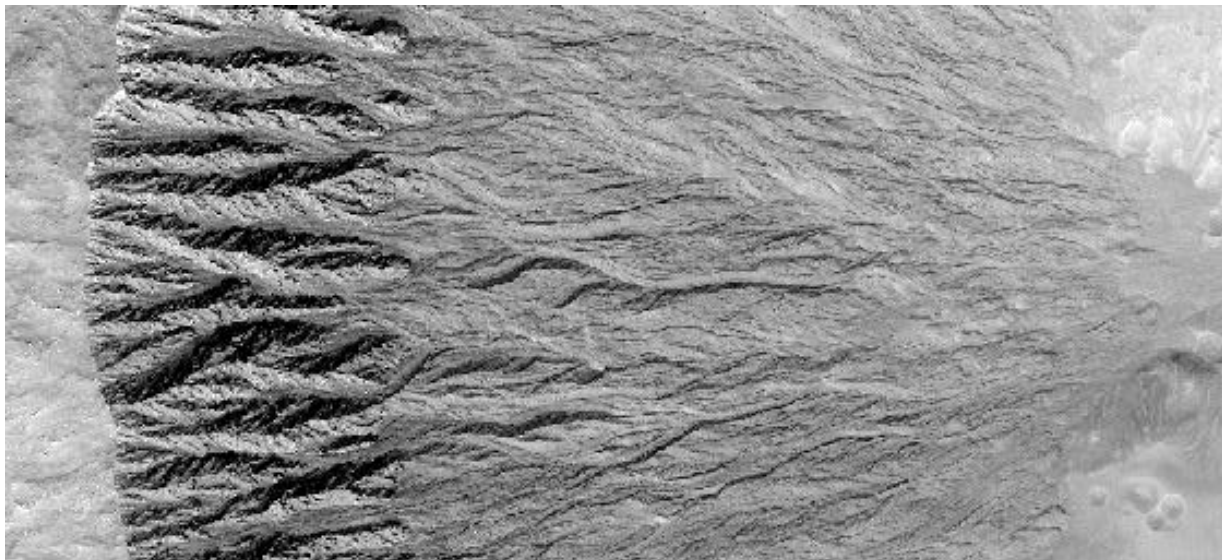
Figure 3: Consider changing "Alcove top" to "alcove crest" in left frame for consistency with text on line 133

Figure 4b: Same commend as 2d. The fans appear to partially overlap.

Figure 5: I suggest making this figure smaller by reducing the space between the green and pink boxes in each frame. Also make the order of the figures match the order in Table 2 (e.g., "Melton ratio" should come after "Fan area" instead of "Alcove relief"). "RCI" is never defined in the text - add it to "Relative concavity index (RCI)" in Table 2

Figure 6: This figure does not add much to the paper. The main finding of the paper (that gullies formed in bedrock and LDM are morphologically distinct) is presented in Figure 5. It doesn't really matter for the paper's results which metrics correlate with which other metrics. Furthermore many of these metrics are related making the correlation (or lack thereof) somewhat meaningless (e.g., length and area, or length and form factor).

Figure 6: Same comment as Figure 5 - make the order of the figures match the order in Table 2. I would rotate the labels along the diagonal by 90°. The number of significant figures should be consistent in (a) and (b) (a is all 2, but b varies). There only needs to be one red-blue scale bar.

Figure 8: The green triangles and blue circles are very difficult to distinguish from eachother. Use the same pink and green colors as Figure 5. Also I suggest using filled circles/triangles rather than outlines. What are the dray areas (question mark in figure below)?