

Referee #2

Dear reviewer,

Thank you for your very detailed comments! We performed a major revision and improved the paper presentation. Here is our point-by-point responses:

1. The paper seems to be written very fast.
Yes, we admit that the manuscript was written in haste, after collecting and discussing material for quite a while. We believe that the manuscript has now much improved.
2. More citations would be needed.
We added quite a number of citations. However, as a kind of “overview review” that we were invited to contribute, we do not aim at an exhaustive coverage of the literature.
3. Tables are sometimes not easy to read.
Table 1 (there is only 1 table): additional vertical spaces inserted to make it more readable. We believe the editor will typeset it even better.
4. Language is often too colloquial for a scientific paper.
Right, this was fixed.
5. Line 18: Citations in the abstracts should follow a different style, see editorial guidelines
We did not find any particular rules for citations in the abstract, rather the editor requested to use numerical style (everywhere TBC). We now have switched to numbered citations and bibliography, reference numbers in square brackets [], and placed before the punctuation, also for the one citation in the abstract.
6. Line 27: “the material a comet is made of” Change in “cometary materials”
Done
7. Lines 28-31: Review punctuation in this paragraph to make it more clear.
Done
8. Line 36: Why capital letters?
Typo. Corrected!
9. Line 40: It is based on the current state of art, do not need to specify is incomplete.
Corrected
10. Line 53: add space after bracket
Done
11. Eq. (1): Since you are defining bulk porosity, the first equation to insert is the second one. Then you specify the relation between bulk, macro and microporosity, explaining the reason why it is necessary to consider the denominator term (1-e_{micro}).
Right! Re-ordered.
12. Lines 60-62: add references
We added references for the dense and loose random packing state porosities. A general reference would be Dullien, 1991, p. 73.

13. Line 67: clarify what reported in the brackets
We now expanded this, because it is quite important
14. Line 99: recall here these strength definitions
We do not understand this suggestion...
15. Line 105: needS to be given...
Corrected
16. Line 109: add references
Done
17. Line 115: change in “tensile and compressive strength are 10-20 times lower”
changed in *the compressive strength is of the order of 10-300 MPa, tensile strength and shear strength are 10-20 times smaller.*
18. Line 117: add example
Example added
19. Line 119: “that” is repeated2
Corrected
20. Line 123: typo in “capacity”
Corrected
21. Section 2.3.1. Highlight subsection titles
OK, now underlined, but ultimately up to the editor
22. Lines 140-142: all the symbols in the equation are not defined.
Now all symbols are defined
23. Lines 149-150: add references
References added
24. Line 157: “remove “of course!”
Removed. Also changed d to D to make it consistent to figure 3, and “scale” of intrinsic inhomogeneities
25. Line 168: define “failure envelope”
Now it is defined
26. Line 187: change in “with uncertainty of about 10%”
No, 10% would be much too accurate! We wrote now: ...led us to estimate the quasi-static tensile (or shear) strength of cometary material in the dm- to m-range as of the order of 1-10 kPa, while the compressive strength was estimated as of the order of 10-100 kPa with an uncertainty: of at least one order of magnitude. The upper limit of compressive strength was estimated as 100 kPa.
27. Line 191: add reference
References added
28. Line 193: remove “quasistatic, size scale...”
Moved to table 1 caption
29. Table 1 is difficult to read, add horizontal delimiters
Done
30. Line 202: “factor 4” -> “4 times”
Done

31. Figure 4 is not referenced to in the text.
Wrong reference to figure in line 200 corrected.
32. Lines 219-221. There are many references about the 67P nucleus porosity. Add a number of them.
References added
33. Line 231-232: "that are something else". I suggest rewording, saying that different definitions of strength are adopted in literature, and a particular care is needed when comparing results.
Now: Different definitions of strength are adopted (or implied) in literature, and particular care is needed when comparing results.
34. Line 232: includes
, cratering physics models include an
35. Lines 240-241: language is too colloquial.
Rewritten
36. Line 249: cliff and spires are prominent features...
Done
37. Line 266: add reference
The strength of consolidated material was estimated by analyzing the terrain characteristics of the steep cliffs, where the material is exposed on the surface. Based on these observations, the tensile strength of the material is in the range from 1.5 to 100 Pa; the shear strength, from ~13 to ≥30 Pa; and the compressive strength, from 30 to 150 Pa, possibly up to 1.5 kPa [35].
38. Lines 275-277: private communication does not add information with respect to cited papers. I suggest removing it.
Removed
39. Lines 284-285: add references for both Rosetta and Deep Impact.
References added for both
40. Line 288: reference missing
Reference added
41. Line 314: reference missing³
Reference added
42. Line 323: I understand that it is beyond the scope of the paper, but a few words about possible explanations may be useful
We now provide some possible explanations
43. Line 325: Is this a new subsection? Or part of the previous subsection?
Wrong formatting, now corrected. Shall read
4.3 The Abydos site of 67P: Review of the putative hard material
44. Figure 5 is not referenced to in the text.
Now it is: At the final landing site, the MUPUS hammering penetrator experiment (see figure 5)
45. Introduce what is the MUPUS, CASSE and SESAME experiments before to mention its main results.
Done
46. Line 355: by -> be
This we do not understand. Nothing changed.

47. Lines 393-399: references are needed for the values given here.

Reference added (repeated Knapmeyer, Fischer et al. 2018)

48. Line 419-426: How is large the obtained thermal conductivity on Abydos with respect other comet terrains? It should be one order of magnitude larger. Then, how much does it depend on the assumptions made on dust-to-ice ratio and thermal inertia? How much would it change if we consider other values among those suggested in literature?

Now this is discussed.

49. Line 430: explain what Digby theory is.

Done

50. Figure 6 is not referenced to in the text.

Was not resolved, now written explicit reference just below the figure.

51. Line 472: WE believe

Corrected

52. Summarize in the conclusions the values found for different strengths (and reported in Figure 6).

Done