

Interactive comment on “Subglacial landforms beneath Rutford Ice Stream, Antarctica: detailed bed topography from ice-penetrating radar” by E. C. King et al.

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Referee #2

Work like this is needed especially in places perceived as stable to understand baseline changes in bedforms and compare against dynamic changes in more unstable environments. Overall a very solid work, well organized and smart. Indeed the release of this great represents the beginning of a new era for the development and testing of models of basal processes. While I would not have minded seeing more writing on the possibilities this dataset offers, I understand this to be primarily a data release paper and so leave such tasks to the work that follows.

C524

“Major” issues

A. There appears to be a “hole” in the survey grid, near (-1280000, 140000). I assume it had something to do with surface crevassing, but I had trouble locating text explaining why the area wasn’t covered. Section 3.1 is a great place to add this.

Yes, the gap in data coverage is due to surface crevassing, as noted in the caption to Fig. 1. Text added in section 3.1 to make this clearer (Page 4, lines 102–104).

B. Given previous studies citing rapid evolution of bedforms, what reassurance do we as the reader have that the bed did not change significantly over the course of this survey?

This is a valid concern. There are some profiles that were repeated at the overlap between the two sets of data. On these lines there were no discernible changes between successive field seasons. The changes observed in the seismic surveys (between 6 and 10 m) were seen over intervals of 6 and 7 years, so if rates of change at the bed of Rutford Ice Stream are uniform (there is no evidence for or against this), then changes over a one year interval would be below the resolution of the radar system.

C. Perhaps label the axes units in km rather than meters (I get lost with all the zeros)

Done – changes made to all the figures.

D. Also have the authors considered offering a version of the data set projected in structure parallel/structure perpendicular Cartesian projection?

Table 1 gives the necessary parameters to rotate and translate the grid to give a Cartesian version. We assume that users of the dataset will have the capability to do this simple manipulation if they require Cartesian coordinates for their analysis.

E. Migrating is definitely the way to go. I’d like to see a pre migration and post migration image in one of your figures.

Inset added to Fig. 2 to illustrate the fundamental difference that migration makes.

C525

Caption changed accordingly.

Line by line comments:

Page 914 line 23: Maybe I'm picky, but would it not be better to say "10's of meters" or "several meters" rather than "a few meters"? You're still a few orders of magnitude more detailed than pervious work in such environments and your horizontal / vertical resolution was 7.5 / 8.8m respectively.

Text changed – 'a few' replaced by 'several' (Page 2, line 27)

Page 914 line 25: Include a sentence or two explaining why processes that occur over small spatial scales can have major implications for larger scale ice dynamics.

Sentences have been added to make the link between the fast flow of ice streams (the large scale) and the properties of subglacial sediments (the small scale). Page 2, lines 35-38.

Page 915 line 1: this felt like a jump from the previous section. Some sort of connecting material is recommended.

Page 915 line 5: It would be good to see some language mentioning that MSGSLs have been seen in many formerly glaciated areas, but that work described in this paragraph is the first time detailing their existence in an actively evolving subglacial environment.

Additional text and references inserted to clarify these two points. Page 2, lines 29-43.

Page 915 line 19: The paragraph would do well to begin with a sentence along the lines of "The Rutford Ice Stream has been the site of considerable investigation over the previous XX years"

Change made – Sentence 'Rutford Ice stream has been the site of considerable investigation over the past three decades.' Added at start of paragraph. Page 3, line 56.

C526

Page 918 Line 4: To the best of my knowledge "Wow" cannot be induced, only inspired. That you brought "wow" to an antenna is a particularly noble accomplishment. Perhaps explain a bit more about this transcendence of known reality.

We thank the referee for such high praise. We have placed the word 'wow' in quotation marks to indicate that it in this context it is a technical term, which is explained in the same sentence. Page 4, line 117.

Page 921 line 1: Not everyone knows what a "cow catcher" is, though given the high crossover between readers of ESSD and the popular magazine "Elephants and Trains" I'm sure the reference will work just fine.

Sentence removed.

P 921 lines 3-7: It took me a few read-throughs to get that you applied a high pass spatial filter to the data and then subtracted the filtered data from the original.

Wording changed as recommended. Page 8, lines 211-212.

See response to Referee 1 for revised paper and figures (as supplement).

C527