Reply on RC1

Christopher D. Stringer et al.

Author comment on "Contemporary (2016–2020) land cover across major proglacial regions in West Antarctica and the McMurdo Dry Valleys" by Christopher D. Stringer et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-250-AC1, 2022

Thank you very much for taking the time to review our manuscript. We have provided some individual responses to the issues you have highlighted in our manuscript. We can see that you have provided the recommendation that our manuscript be rejected, but we hope that the responses below will encourage you and the editor to allow us the chance to revise our manuscript.

Comment 1: "Since their dataset only cover six sites and only one-year map (i.e., contemporary) was provided, which greatly reduces the application value of their dataset. I don't think this dataset will be widely used."

Response 1: These six sites represent the main proglacial regions in Antarctica, including the two largest sites of the Dry Valleys and the Ulu Peninsula of James Ross Island. These are regions that are currently without a unified land cover classification map. Knowledge of contemporary land cover is needed to further understand the ecological and sedimentological make-up of Antarctica. In addition, land cover maps have applications for climatology, since land cover affects albedo and surface roughness. As an indication of their potential value, we would point out that since being published as a preprint; this manuscript has had a "Research Interest Score" higher than 92 % of the articles published on Research Gate in 2022.

The regions not covered by this land classification are excluded because they are extensively covered by ice or cloud cover, or are nunataks that are largely unimportant in the context of a changing Antarctica. We would be happy to further signpost BAS datasets that provide polygons of ice cover and exposed bedrock/land in our manuscript; we could even include these into our dataset to produce a more amalgamated map of Antarctica. While we appreciate a time series would be interesting, this contemporary land classification still provides a much-needed data set and represents a first step towards realising that ultimate, and more comprehensive, analysis.

Comment 2: "Although the authors state that they used the Landsat data rather than other high-resolution data (e.g., Sentinel-2) for classification due to their consideration of its long-term series and ensuring future robust and seamless comparisons, I don't think this is a good reason, as only one-year land use map was provided in this manuscript and

the land use cover in this area has not changed much over the past few decades. In addition, considering that the spatial resolution of Sentinel-2 is significantly higher than that of Landsat-8, classification using Sentinel-2 data is a better choice."

Response 2: Whether the land cover of these regions has changed in the past or not, or indeed will change in the future, is very much unknown. Given the rapid changes in temperature and in the cryosphere observed in this region, we might suggest that change would be expected. Landsat, therefore, remains the most appropriate dataset to use, allowing for a seamless comparison using both past and future imagery. We are happy to clarify this further within the manuscript.

Comment 3: I didn't see innovation in their methods. In addition, the accuracy of K-mean classification largely depends on the choice of K value and the selected features. However, I didn't see any accuracy comparisons for different K values and classification features in the manuscript.

Response 3: The number of clusters was chosen based on trial and error and we found 40 clusters for the first-order classification, and 75 for the second-order, adequately allowed us to identify key land cover features (including streams, lakes, talus slopes, exposed bedrock and vegetation). Given this justification for choosing the number of clusters, and given the detailed accuracy assessment we conducted of our final classification, we are unsure what further analysis of the number of K clusters used would add to understanding the produced land classification. Ultimately, the key with this methodology, in our opinion, is the expert interpretation of what the pixels within each cluster represent; we have shown with our accuracy assessment that this has been done robustly, and we have high confidence in the quality of the output. Given the opportunity, we would be happy to add a few sentences to clarify that the final product is dependent on the number of clusters, and how they are interpreted, and that different numbers may be more appropriate at other sites (and will affect the final accuracy).

Comment 4: "Where are fig. 7 and fig. 8?"

Response 4: We would like to apologise for the references to fig. 7 (line 306) and fig. 8 (line 312). These were included in error. These should refer to figures 5 and 6 respectively. This can be easily amended.

Yours sincerely,

Christopher Stringer (on behalf of all co-authors)