Earth Surface Dynamics Discussions

Earth Surf. Dynam. Discuss., referee comment RC1
https://doi.org/10.5194/esurf-2022-19-RC1, 2022

Comment on esurf-2022-19

Patrice Carbonneau (Referee)

Referee comment on "Grain size of fluvial gravel bars from close-range UAV imagery – uncertainty in segmentation-based data" by David Mair et al., Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2022-19-RC1, 2022

This is a welcome addition to the UAV literature and should be accepted with very minor changes. The method is sound and very robust. Outcomes are clear as are some recommendations. There is a good acknowledgement of previous litrature. I've uploaded an annotated manuscript with a small number of small issues.

The main comment I would like the authors to consider relates to the practical implications of their recommendations. 1 element that is missing from table 1 and survey description is some indication of survey duration or drone velocity. The authors are proposing a method where the drone flies at 5-7m and still acquires images at a high overlap as per SfM guidelines. To make things more difficult, they are recommending that imagery be acquired in raw format, ie much bigger files. Most readers might not realise this, but flying at such low altitudes and still getting photogrammetric coverage, compounded by the need to give the CPU bus on the drone time to write large files to the card, leads to very low forward velocities, ie, it takes a lot of time to acquire the data. This is not made clear. I'd like some explicit detail about the time and battery cost of the recommendations. This will help the reader get a better sense of the true cost of these methods should they wish to adopt them.

My underlying concern is that these recommendations are limiting the scale of application of UAVs. For example, in Carbonneau et al 2020 ESPL (Using UAVs to train fuzzy classification algorithms for Sentinel 2 imagery) and recently in Marchetti et al 2022 ESPL (Using UAVs to calibrate grain size estimation from Sentinel 2) we were using 5 sites, some with very large river bars that apporached 1Km2. We used the Robotic Photosiving method which was explicitely designed to avoid image overlap at low altitudes, speed up acquisitions and allow for work on larger scales. To my knowledge this dataset remains the largest area coverd by UAV work (about 5km2, with at least 2 repeat acquisitions per site). It would not have been possible to follow the recommendations here and work at this scale. There is nothing implicitely wrong with work at small scales, but my sense is

that the direction of travel for airborne fluvial remote sensing should be upscaling, not downscaling. I would therefore like the authors to reflect and comment a bit more thoroughly on the practical implications of their findings and their meaning for the wider field of UAV applications in geomorphology.

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Please also note the supplement to this comment:
https://esurf.copernicus.org/preprints/esurf-2022-19/esurf-2022-19-RC1-supplement.pdf