Earth **Surface**
Dynamics
Discussions

Interactive comment on "Rapid and objective characterization of channel morphology in a small, forested stream" *by* Carina Helm et al.

Anonymous Referee #3

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This manuscript presents the results from an investigation to generate a high-resolution orthoimage / topographic survey of c. 3 km of channel that is beneath a forest canopy. The geospatial products are used to extract metrics to characterise channel morphology, which are subsequent used to characterise longitudinal variation in channel morphology and to assess these trends relative to those reported in wider literature. The survey effort is impressive and undoubtably novel in its ambition; I am not aware of a similar survey. However, there are aspects of the methodological description that are unclear. I also think that the authors are overselling the approach as rapid and are not sufficiently critical of how transferable the technique may be to other forested environments (e.g. where canopy densities vary, where launching the UAV from under the canopy may be more challenging, for forested rivers without unvegetated bars etc) and

thus a more critical analysis of the technique could be provided. Below, I expand upon these aspects.

Title. Is the technique really rapid? The survey effort is still considerable from both a UAV flight and ground control perspective, and there are still some data gaps where total station survey is needed. L9-11. More methodological detail could be provided here; reading the abstract alone I'm not able to decipher what exactly how the imagery were used (orthoimage, DEM etc). Can you give examples of the "variables". L101. More details are needed on the total station control network and associated errors (e.g. closure errors from traverses). How accurate are the control points? L104. How high was the canopy? Were the flight plans pre-planned or was the UAV operated manually? You are arguing that this is a feasible survey approach, so some more details on the logistical / technical challenges would be useful here. If you had a pre-programmed flight, then could you obtain sufficient GNSS "lock" for navigation? L135. Were any independent total station check points obtained to evaluate the accuracy of the bathymetric correction? L141. Insufficient detail is given on the photo-sieving technique and how images were acquired from 2 m above ground level. If topographic roughness was calculated then were the multiple images acquired to generate a point cloud using SfM? How was the point cloud georeferenced? What was the ground sampling distance to sample 0.0025 cm roughness (smallest sample on figure 3; this seems VERY small). Are the units correct here? Figure 5. It would be interesting to see elevation values for the raster. Why are bathymetry and elevation not mosaiced together (perhaps it is the legend labelling that makes this unclear)? For SA5, what explains the abrupt change in bathymetry value (shown as a vertical line) in approximately the middle of the reach?

I apologise for the delay in my review which has been caused by unexpected, urgent administrative workload related to the pandemic, which arose after I agreed to review this manuscript.

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