

**RESPONSES TO REVIEWER #1 COMMENTS ON “ASSESSING THE QUALITY OF DIGITAL ELEVATION MODELS OBTAINED FROM MINI-UNMANNED AERIAL VEHICLES FOR OVERLAND FLOW MODELLING IN URBAN AREAS”**

- (1) The Authors state that one of the objectives of the research is to understand how UAV flight parameters affect the DEM quality, but within the article such aim is not adequately described. 14 DEMs have been produced (plus 2) with different flight parameters from flight altitude to weather conditions, and only one has been compared with the LIDAR DEM.**

**Answer:** We believe that we indeed did describe the aim in sufficient detail (section 1.4). The results of the statistical analysis involving four flight parameters and four qualitative metrics and four quantitative metrics did not show significant differences for the 16 flights analysed in this study. Based on this, we decided to carry out the comparison between the UAV DEMs and the conventional LiDAR DEM based only on one flight: flight no. 4. Flight no. 4 produced the best quality DEM based on the metrics considered in this study. As this has not been raised by any of the other reviewers, we would like to keep it as is.

- (2) The Authors state that the impact of the flight parameters on the DEM quality metrics was not substantial, but I believe some data should be presented.**

**Answer:** This is a very good point. We will include additional results from the statistical analysis in the revised version of the manuscript (plots summarising the statistical analysis) to support the conclusion that different flight parameters did not produced significantly differences in terms of the DEM quality (based on the metrics considered in this study).

- (3) In the discussion section, the comments are quite generic and not supported by quantitative data; some paragraphs of the discussion could be more suitable in the introduction section, hence I believe that introduction and discussion should be rearranged based on more results.**

**Answer:** as proposed in point (2), we will include additional results in the revised manuscript to support the findings of the study presented in the manuscript. These will also aim at addressing this comment. In addition, we would be grateful for more specific information on which elements of the discussion the reviewer finds too vague or subjective. In our view, a discussion can also, maybe even should, include subjective information of the authors which may be not countable or quantitative, but will help the readers to better interpret the obtained results.

- (4) 5637, first paragraph: it could be useful to report a small description on the surveying points, in terms of quantity and characteristics, since the DEMs comparison is based on such points.**

**Answer:** Thanks a lot for this suggestion. A brief description of the surveying points will be included in the revised version of the manuscript.

- (5) 5640, rows 10-12. It could be interesting to test a different flow routing scheme, in particular a multiple one, that can contribute to better represent the surface flow in particular within the urban context, often characterized by small slopes.**

**Answer:** In this paper, we used the D8 flow accumulation algorithm (Jenson and Domingue, 1988) to generate overland flow paths. We agree with the reviewer that there are many other algorithms to generate overland flow paths based on DEM (e.g., Lea, 1992; Tarboton, 1997; Leitão 2013, ...). However, the D8 algorithm is perhaps one of the most widely used algorithms to generate overland flow paths based on DEMs as it is implemented in most of commercial GIS software packages and thus most widely use in consulting or design work. As the focus of this study is less on the flow path analysis, and more on the UAV characteristics

we think it is justified to use D8 as standard algorithm and omit a sensitivity analysis for the sake of brevity and to keep the manuscript more concise.

**(6) 5648, row 23. J.B. Vilmer reference is missing. Reference section: Hutchinson and Gallant (2000) is not cited in the manuscript**

**Answer:** Thank you for spotting this. Please excuse our sloppiness on this point, we will provide a concise list of references with the revision version of the manuscript.

Lea, N. J. (1992). An aspect driven kinematic routing algorithm. In Parsons, A. and Abrahams, A., editors, *Overland Flow: Hydraulics and Erosion Mechanics*, pages 393-407. Chapman and Hall, New York, USA.

Leitão, J. P., Prodanovic, D., Boonya-aaronnet, S., Maksimovic, Č. (2013). Enhanced DEM-based flow path delineation methods for urban flood modelling. *Journal of Hydroinformatics*, 15(2), 568-579. doi: 10.2166/hydro.2012.275

Tarboton, D. G., (1997), "A New Method for the Determination of Flow Directions and Contributing Areas in Grid Digital Elevation Models," *Water Resources Research*, 33(2): 309-319.