

Interactive comment on “Technical Note: Advances in flash flood monitoring using UAVs” by M. T. Perks et al.

Anonymous Referee #2

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This paper describes a technique to measure flow velocities from UAVs films. The approach is based on the Kande-Lucas-Tomasi algorithm to quantify the velocity of patterns on the surface of the flow. Geometric rectification of the velocity vectors is obtained with a method analogous to the vector correction method. Uncertainties are assessed. The proposed method is used to measure surface flow velocities during a 1:200 year flood in Scotland.

Image based technics are now widely used to measure flow velocities. The different methods have proved to be complementary to traditional technics, in particular in dangerous conditions. Besides there are a large number of papers describing such measurements using fixed cameras on the ground or airborne cameras. The development of easy to use and low-cost UAVs offer interesting means to monitor surface flow velocities during high flow conditions and over large areas. Due to the movements of

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the camera, there are still some challenges to provide an efficient method to measure hydrodynamic variables.

This paper gives the main points of a method based on UAVs images, laser scan and GNSS system. The approach seems interesting and relevant for a publication in Hydrology and earth system Sciences Discussions. However, there are several points that need to be added in the paper, as well as several modifications are to be made.

First of all, an overview of the method is required, maybe between paragraph 2.1 and 2.2. The different steps of the calculations have to be presented, a small chart could be useful. Furthermore, more details on the algorithms should be given. For example, it is said that “a distorted camera model was generated”, could you explain how? I also wonder if the user has to locate the GCPs manually on the pictures. Could you clarify what you call “prominent features” ? The calculation of the flow velocities owing to the first steps of the method should be explained. I was also wondering if the water surface elevation is needed or not.

The method lacks a clear validation step. The obtained flow velocities should be compared with measurements performed with other devices. It could be very interesting to apply the technic on a low flow event to control the results. The proposed validation is only based on optically tracked features, more details are required about this major operation. A small map with the measurement area and the trajectory of the UAV could be helpful in the beginning of the paper.

Could you also specify how you code the different steps (matlab, fortran ?). Are the codes open-source ?

The English is good and the paper is well written. However I have some remarks and questions that must be taken into account to improve the paper:

- In the introduction, you should cite the works dealing with measurements of surface flow velocities from helicopters images. You should also cite the different technics of

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image analysis such as LSPIV, LSPTV. . .

- At the end of paragraph 2.1, the error is for all the directions x, y and z ?
- Some of the Figures (1 and 4 for example) and table 1 are not cited in the text
- The UAV acronym should be make explicit in the abstract (especially for non-english speaking people)

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