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

Dr. Tauro (Referee)
flavia.tauro@unitus.it

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In this article, the surface velocity field of the Alyth Burn during a flash flood is re-constructed from images captured by a commercial quadrotor. Velocity estimation is based on a 5.6 second-footage captured at 25 Hz at an altitude of 50 m. Images are geo-rectified by a posteriori optimizing the UAV location. Further, virtual velocity vectors are removed by minimizing the difference in the location of actual and projected ground control points. Clearly detectable features in images are tracked using the Kande-Lucas-Tomasi algorithm.

The article is interesting and supports the potential of using UAVs for real time monitoring in complex environments. Remarkably, the Authors demonstrated the feasibility of UAVs for flash flood monitoring through rather low cost equipment, which does not
enable logging of navigation data. While future technological advancements will cer-
tainly allow for widespread diffusion of hi-tech platforms, governments and stakehold-
ers could highly benefit from the proposed approach.

The technical note is worth publication in HESS. However, the Authors should consider
the following points to improve the manuscript’s scope and presentation.

1. The Materials and Methods Section should be simplified to improve on clarity. 
Paragraph 2.2 is sometimes difficult to read (the coordinates of GCPs and of the 
UAV starting position can be easily confused). Maybe a flow chart may help in
better identifying the image processing steps.

2. Further explanation should be provided on areas presenting poor transformation 
accuracy (p.5 of Paragraph 2.2). Why were 48% of the original velocity vectors
eliminated? How do you plan to improve on that?

3. Details on the video footage should be included. Was it captured while the UAV
was remotely piloted or on autonomous navigation? Why didn’t you consider
flying in the hovering mode to reduce vibrations? How is the camera connected to
the platform? Camera gimbals sensibly reduce UAVs vibrations. Image resolution
should be included in the Materials and Methods. Also, the footage should be
added as supplementary material (I tried to access it on www.angusforbes.co.uk
but I was not successful).

4. In my opinion, limitations of the proposed approach lay in the following:
   • Numerous GCPs need to be surveyed in the aftermath of the event
   • Distinct features are necessary to geo-reference the images and apply the
     tracking algorithm

The need for GCPs tends to limit the approach to gauged or easily-accessible ar-
eas. Conversely, ungauged natural and rather extended regions would be difficult
to monitor. On-site surveying hampers the use of UAVs in wide and impervious areas. How do you plan to compensate for GCPs surveying in such areas?

What is the degree of supervision required by the feature tracking procedure? Do users need to identify the features in images to start the tracking process? I agree with the Authors that Lagrangian-based algorithms may be beneficial in case of low seeding densities. However, they typically require higher supervision by users (a priori information on shape and size of the objects to be tracked). Finally, how long did it take to process the images and extract velocities? How do you plan (if you do) on automating the approach towards real-time analysis?

The article is clearly written and the bibliography is well selected. Since few minor typos can be found, a careful revision of the manuscript is needed.