

Interactive comment on “Flow velocity and discharge measurement in rivers using terrestrial and UAV imagery” by A. Eltner et al.

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The main contribution of the present manuscript is oriented in exploring surface flow velocities and discharge estimations using fixed cameras and UASs devices. A full and automatic workflow is introduced for the estimation of the variables mentioned above. Two case studies are considered for validation purposes, namely the Wisenitz (paved) and Freiburger Mulde (natural). ADCP data were collected for benchmarking purposes. The manuscript is almost well written and easily understandable. Its length is also appropriate.

Major comments:

• Section 2.2.1 Reference data: The authors stated that surface flow velocities were

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extrapolated using ADCP measurements. However, they do not say anything about the process. Please, add information on the extrapolating process. Additionally, at Wesenitz case study, only one cross-section was measured. Why such a decision? (consider that for a rigorous comparison between image-velocimetry results and reference velocities is better not to use only local reference velocities).

• Section 2.2.2 Image-based data: The authors used a low-resolution camera for video acquisitions at the Freiburger Mulde case study. Justify such a decision considering that low-cost smartphones can reach a better resolution.

• Section 2.4.3 Feature tracking: The authors stated, ‘In this study, features are tracked for 20 frames and new features are detected every 15th frame’. Is there any reason for these numbers? Why did the authors decide a new detection every 15 frames?

• Section 2.4.4 Track filtering: This subsection is relevant and deserves a better explanation of the filtering criteria. For example, it would be positive to add a figure showing an example of application of the different filtering criteria (e.g. what is the reference for the angles?).

• Section 2.4.5 Velocity retrieval: The authors stated: ‘The threshold is defined as the sum of the average velocity with a multiple of its standard deviation’. Please, add information about the ‘multiplying factor’ of the standard deviation.

• Section 2.4.5 Velocity retrieval: The authors stated: ‘For a better visualisation, final flow velocity tracks are rasterized’. Please, add information about the block assumed for the rasterizing process. If the comparison of estimated velocities is made with the rasterized velocities, please mention it and discuss implications.

• Section 3.2 Flow velocity measurements at the Wesenitz: The authors stated ‘However, it is difficult to perform exact comparison to the ADCP measurements because the precise location of the ADCP cross-section in the local coordinate system of

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the river reach is not known as the ADCP boat was not equipped with any positioning tool and its movement across the water surface was neither tracked nor synchronised. Therefore, the accuracy assessment of the spatial velocity pattern is limited'. This is a critical issue that may limit the validation of the procedure. Do you have any alternative strategy to quantify ADCP positions in order to allow a realistic comparison?

Minor comments:

â€” Page 2, Line 2: '...observe flash floods. And Le Coz et al. ...'. Please, remove the point before 'and'. â€” Page 2, Line 22: Please, consider starting a new paragraph after '...then searched for in the subsequent images.'. â€” Page 3, Line 4: '...flow conditions. And Costa et al. (2000)...'. Extra point into the sentence. â€” Page 4, Line 12: 'Here, average water level and discharge are 48 cm and 2.2 m²/s, respectively'. Mean annual variables? â€” Page 4, Line 19: 'During this day discharge and water level were 5.7 m³/s and 68 cm.'. Considering the information provided before (Average discharge and water levels are 6.9 m³/s and 66 cm, respectively), why a decrease from 6.9 m³/s to 5.7 m³/s (17% of difference) is creating an increment from 66 cm to 68 cm in terms of water levels? â€” Page 5, Line 19: '...the performance of different cameras (fig. 1b). Two...'. Fig. 1a? â€” Page 6, Line 31: '...to matching failure. And if moving...'. Extra point into the sentence. â€” Page 9, Line 10: '...suitable at the Wesenitz. But at the Freiburger...'. Extra point into the sentence. â€” Table 2: What is s₀? â€” Page 11, Line 29: '...2.7 m³/s, which corresponds to the velocity measured by the ADCP...'. Discharge.

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