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Discussions

Interactive comment on "Technical Note: Surface water velocity observations from a camera: a case study on the Tiber River" *by* F. Tauro et al.

Anonymous Referee #2

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General Comments This Technical Note presents the results of a study which applied Large Scale Particle Image Velocimetry (LSPIV) to flood conditions on the Tiber River. A novel LSPIV system which utilizes a laser calibration system is employed to rapidly register the images in space without the use of fixed control points or survey, though this system has been first presented in a recent Water Resources Research article (Tauro et al. 2014). Velocity measurements are made near the center of the river during various states of a 10-year flood event. However, the velocity measurements are not of sufficient quality to provide confidence that these measurements are reliable. Given the lack of tracers available in these conditions, perhaps particle tracking a more appropriate approach than LSPIV. Overall, while the presentation is good and the concept is promising, the manuscript content is not worthy of publication as a HESS Technical

Note.

Specific Comments Page 11885, Line 4-6: The authors imply that only remote sensing approaches are capable of providing continuous data acquisition. This is not true, as many stream gauges rely on ADCP or HADCP for continuous velocity measurements.

Page 11886 Line 13-14: The authors claim the abundance of natural materials during flood events should provide enough tracers for LSPIV. First, this statement should be attributed to the multiple studies which use these natural tracers. Second, this statement is clearly not supported by the data presented in this study, as the lack of tracers in the Tiber River severly limited the velocity measurements.

Page 11887 Line 21-22: The maximum velocity may not necessarily occur near the center of the cross section, as the study site is located on a bend in the river. Are there rating curve measurements that can be used to verify the maximum velocity location?

Page 11887 Line 24-25: How does the single velocity value given in Figure 2 represent an average of both surface and cross-areal velocity? This quantity is not clear

Page 11888 Line 10-12: When using the telescoping bar, how are the cameras ensured to be oriented orthogonally to the river surface. I would imagine the cameras may be tilted slightly by perturbations in the telescoping bar. The authors should provide an estimate for the expected error or velocity bias that a violation of the orthogonality assumption may introduce.

Page 11890 Line 19-21: How was the river or tracers illuminated in the evening Test 1? This is not a trivial task.

Page 11890 Line 23-25: The author suggests that as the transit does not have homogeneous tracer distribution the velocity maps are expected to underestimate the flow. This is certainly true and is a reason why LSPIV may not be an appropriate approach for this problem. This is a fundamental flaw in the manuscript and the likely reason why the results do not agree well with the comparison data. Perhaps the authors should try

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a particle tracking algorithm which may be better suited for the sparse tracer distribution experienced in this study.

Figure 5: As the authors note, illumination issues can be the reason for the poor velocity results in Test 1. However, the velocity pattern in Test 2 does not seem realistic either, as the velocity vectors indicate that flow is directed from the center of the channel towards the bridge pier. Is there an explaination for this?

Table 1: These velocities do not provide sufficient support to suggest that the measurements are of good quality. Quite large deviations exist between the benchmark velocities Vm and the numerous LSPIV velocities. Many inconsistencies are also apparent; for instance, while the rating curve estimate, vrt, suggests a decreasing velocity progressing from Test 1 to Test 3, Test 3 has the highest LSPIV velocities for all measures. These issues are not sufficiently addressed in the manuscript and must be resolved to provide confidence in the LSPIV method presented.

Page 11891 Line 18-20: While low coefficients of variation are encouraging, these results are not up to the standard of other LSPIV results, which can provide highly accurate velocities in comparison with independent, direct velocity measurements.

Page 11892 Line 2-4: The authors claim that the main novelty is the laser calibration system. As this was the main novelty of their WRR paper (Tuaro et al. 2014), this manuscript must have a “main novelty” that goes beyond another implementation of the same method.

Page 11892 Line 13-15: While focusing on smaller fields of view may lead one to the more reliable sections of the image for velocity measurement, acquiring velocity measurement at inconsistent locations in the cross section is not very useful. How can these measurements be related to a needed quantity such as discharge? Can these velocities provide an estimate of the maximum river velocity?

Technical Corrections Page 11886 Line 17: “During the flood occurred in” should read

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“During the flood which occurred in”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 11883, 2014.