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Hydrology and Earth System Sciences Discussions

Interactive comment on "Discharge estimation in a backwater affected meandering river" *by* H. Hidayat et al.

Anonymous Referee #1

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General comments

The paper addresses the issue of discharge measurement in a river reach where flow is heavily influenced by multiple backwater effects. By means of an fixed acoustic Doppler current profiler (H-ADCP), continuous measurements were carried out, using two different methodologies to convert point velocity data to discharge data, and measurements from a boat mounted ADCP for calibration and validation.
A conventional stage-discharge relationship based on the Jones formula was also applied but it was not able to capture the complex flow dynamics of the study area, thus confirming the validity of the alternative approach proposed by the authors.
Overall I think this is a good paper, and just a few minor issues should be addressed by the authors prior to pubblication.

Specific comments

Page 2670, line 4: please add the citation of the original work by Jones (1915), see in the Reference section.

Page 2670 lines 21-22: please note that the formulae presented by Dottori et al. (2009) do not rely on the steady state assumption.

Page 2674, Eq. 2: The term η is represented in Fig. 2 but is not explained here.

Page 2678, lines 5-6: please correct as: "...*c* is the wave celerity, S_0 is the bed slope, and *dh/dt* is the rate of..."

Page 2678, Eq. 10: according to the original version of the Jones formula, the discharge taken from the steady flow rating curve should be used in place of Q_{kin}. Eq (11) is the expression of the uniform flow discharge, therefore it should be used in Eq (10) only for prismatic channels, where steady flow coincides with uniform flow. The authors should state clearly whether or not the river reach can be considered as a prismatic channel. See section 2.1.1 of the paper by Dottori et al (2009) for a more detailed review of the Jones equation.

Page 2680, lines 24-27: I do not agree with the sentence *"The Froude number takes a value around 0.01, which legitimizes neglecting the spatial and temporal acceleration terms in the momentum equation, validating the non-inertial wave approximation"*. A low value of Fr does not necessarily imply a non-inertial wave condition, which depends instead on the relative magnitude of terms in the momentum equation. See

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secton 2.4 of the paper by Dottori et al. (2009) for a discussion about this issue.

Page 2680, line 29: The sentence " there is no theoretical justification for this" related to the kinematic wave assumption is too strict. The kinematic wave approximation can be used in certain conditions of flow and bed slope as stated by Perumal et al. (2004) and Dottori et al. (2009).

Pge 2690, Figure 4: these plots are not very clear, please replace them with either standard line plots or histograms.

References

Dottori, F., Martina, M. L. V., and Todini, E.: A dynamic rating curve approach to indirect discharge measurement, Hydrol. Earth Syst. Sci., 13, 847–863, doi:10.5194/hess-13-847-2009.

Jones, B. E.: A method of correcting river discharge for a changing stage, U.S. Geological Survey Water Supply Paper, 375-E, 117–130, 1915.

Perumal, M., Shrestha, K. B., and Chaube, U. C.: Reproduction of Hysteresis in Rating Curves, J. Hydrol. Eng.-ASCE, 130, 870– 878, 2004.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2667, 2011.