

Interactive comment on “Combining flow routing modelling and direct velocity measurement for optimal discharge estimation” by G. Corato et al.

Anonymous Referee #2

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The paper's aim is the derivation of a novel technique for the estimation of river discharge hydrographs during flood events using water level measurement data, 1-D flow routing model and a few measurements of surface flow velocity at a site. Due to well known problems related to rating curve estimation, the method would be very useful in a number of hydrological and hydraulic applications, not only at sites where the rating curves are not established but also for evaluating the correctness of existing rating curves and its uncertainty. The authors combine two techniques, entropy theory and hydraulic routing modelling. However it is not clearly explained what advantages the new method offers in comparison with the other methods, and in particular, entropy measure and hydraulic routing modelling approaches. The latter methods allow for the derivation of discharge hydrographs, based on different types of available measure-

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ments when certain assumptions are met. The authors are asked to give a discussion on the assumptions required, the generality of the proposed approach and to give an estimate of errors.

I have to agree with the first reviewer that this paper is difficult to follow. It seems that the information is there, but in a wrong order. In particular, the authors are advised to clarify the introduction. The authors introduce four main configurations of the monitoring available in practice and specify that their approach is suited for one of the configurations. The authors should discuss the advantages and disadvantages of each configuration. This should be followed by an explanation of disadvantages of the methods used so far and the advantages of the newly developed approach. A list of assumptions required for the application of the proposed method should be also given. In the introduction the authors should state precisely what they are going to present in the following part of the paper, giving a clear picture of what follows. They should describe in simple terms how the two methods are combined and what advantages from this combination are envisaged.

In section 2 the authors present flow routing model. There are too many details given which should be put into the appendix, if they are necessary for the explanation of the approach. This would simplify the presentation and make it clearer. At the moment the reader is lost in too detailed information that cannot be followed without referring to the papers where it comes from and the aim of the presentation is thus lost.

Section 3 gives a presentation of the entropy approach to model flow velocity. It is a difficult concept and the authors do not make it any easier by copying the equations from the work of Chiu without a proper introduction to the approach. Moreover, some variables (D and h) are not defined. There are no assumptions/conditions of model validity given.

Section 4 presents the domain extension criterion. The authors discuss here the length of the river reach required to avoid the influence of downstream boundary conditions.

This section is also difficult to follow and it seems a bit removed from the main aim of the paper. As the authors refer to this section in the next section (5), it would be better to combine both sections and simplify the presentation with the formulae derivations moved into the appendix and only the main, important results left.

If the reader wanted to apply the proposed approach, he/she would need some algorithm – a scheme describing what to do, what assumptions should be met and what errors could be expected. It should be given in a “methodology” section.

Technical comments: 1. Page 2712, line 13: there are some problems with equation 2, that the authors refer to and in the next section 5. The authors (presumably) made a mistake in the first line of the section 5, referring to eq. 2. Further on (page 2714, line 7), the authors wrongly mention section one, where the numerical model is supposed to be described. The authors are advised to check all their references to equations and sections (see above and also page 2715 – line 6); 2. What do the authors mean by “solid of velocity” (e.g. page 2700, line 20), and later through the text?

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