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Hydrology and Earth System Sciences Discussions

Interactive comment on "A dynamic rating curve approach to indirect discharge measurement" *by* F. Dottori et al.

F. Dottori et al.

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We would like to thank Prof. Geoff Pegram for his extremely positive comments, and also for providing an in-depth review, which will allow us to improve the quality of the paper.

Specific comments

Reviewer: *Eqs (1) and (2): the use of 'y' and 'z' is not clear in the context of their definitions; in Appendix A, y and z are given as 'water stage' and 'water surface level' respectively. I believe y should be water depth and z (in this context) water surface*

level relative to some datum, which by definition (in Section 25.1 of the Handbook of Hydrology edited by David Maidment), is how 'stage' is defined.
Authors: We fully agree with the reviewer. Unfortunately we followed the definition given by several authors (see for example Fenton, 1999, and Perumal et al., 2004) where "water stage" is used to indicate water depth. However, we think the reviewer definitions are the correct ones, and we will use them in the revised manuscript.

Reviewer: *to add to confusion, in Figure 2, 'H' is defined as hydraulic head and 'h' as stage. Because all the formulae have different geneses, it would help if a definition sketch were included in the Figures, defining the relevant variables and the formulae interpreted consistently with them.*
Authors: we acknowledge the mistake and will correct it in the revised manuscript. As the reviewer suggests, we will also add a definition sketch

Reviewer: *865: 13. I have a problem here. Either m is the ratio of c/U for the Manning equation in the case of a wide rectangular channel, or the exponent of the hydraulic radius [A/P] in the Chezy equation is 1/2, not 5/3.*
Authors: we agree, m is the exponent of the hydraulic radius and should be 1/2.

Reviewer: *881: 1. The following paragraph is too long and not clear - I can make no suggestions to repair it. Please separate the ideas into shorter sentences: 'As opposed to the case of the steady-flow rating curve, a parameter of which controls the curvature of the rating curve, the parameter of DyRaC is the roughness coefficient, which more or less allows to move up and down the rating curve, while the curvature, which is fundamental when extrapolating beyond the range of measurements, is only driven by the cross section geometry, which is known.'*
Authors: the paragraph will be rewritten in a clearer way.

Reviewer: *881: 9 what does the following phrase mean? '...which influence is practically eliminated in the calibration phase.' It seems this idea has not been discussed before its appearance in the Conclusion.*
Authors: the phrase should be referred to the previous sentence:"Finally, as found in previous works (Dottori et al., 2008), the DyRaC methodology allows for an accurate discharge estimation also in sections affected by backwater effects, which influence is practically eliminated in the calibration phase". The backwater effect is taken into account during the experimental stage-discharge measurements, which are used for roughness calibration. In the cited paper by Dottori et al., the authors describe the application of Dyrac methodology to the Arno River, in Italy; since there were sections influenced by backwater effects, the authors calibrated the roughness coefficient as a function of water depth, which allowed for a good reproduction of experimental rating curve under all flow conditions. The use of the proposed methodology in such cases has not been discussed in order not to increase the complexity of the paper. Nonetheless, we will briefly describe this application in the revised version.

Reviewer: *Fig 3. The case numbers and the shading do not coincide, which is difficult to decipher. Please re-order - also in Figure 4. It would help the reader if the equation numbers were included on the caption: e.g. "Henderson (3)" to prevent confusion - it's not too clumsy...*
Authors: we will re-order the cases using the number, adding the equation number in the caption.

Reviewer: *Fig 5. I cannot 'see' 'Chow and DyRaC' in this and the next few figures (presumably they coincide almost exactly with the 'true' curves. Only when we get to the irregular channel are the points distinguished by circles. Otherwise make the comment that they are indistinguishable.*
Authors: We point out in the text that Chow and DyRaC formulae coincide almost ex-

actly with the 'true' curves in most of the figures; we will specify this in figures captions.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 859, 2009.