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Hydrology and Earth System Sciences Discussions

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

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We regret if the presentation of the proposed discharge monitoring technique was found tricky by the reviewer. However, for now, we want just to point out what defined in the sequel, by undertaking to address all reviewer's concerns in the revised manuscript, of course by improving the language.

- The procedures proposed by Perumal, Aricò, Dottori et al. are aimed to estimate the discharge when velocity measurements are not available at all, or the flood concentration time is too short to make very difficult velocity measurements during the rising limb of the flood (flash floods). The limit of the above proce-

dures can be found, on the one hand, in the need of an equipped river reach long enough to allow the flood wave celerity estimation and, on the other hand, without important lateral flows along the reach. This also means that the topography of the river cross-sections has be known for a large extension and, in addition, if the lateral flow is significant, the upstream discharge estimation might be unreliable.

- The benefit of using the entropy model is tied to the capability of this approach to estimate the discharge just by measuring the maximum flow velocity. It's well known that for its location in the flow area, the maximum velocity sampling can be easily carried out for whatever flow conditions by using current meters and/or radar sensors (hand-held or not). So, unlike the standard procedure of streamflow measurements, the entropy model can be conveniently exploited to instantaneously assess the discharge (by radar sensors), thus allowing a quick calibration of the hydraulic model.

Therefore, the proposed monitoring technique is aimed to combine the advantages both of the entropy theory for the discharge estimation and of the water level driven hydraulic model for flow routing. Practically, the hydraulic model computes the discharge hydrograph at the upstream section of a very short modelled reach, starting from the stage hydrograph measured in the same upstream section and using, for its calibration, sporadic measurements of the maximum flow velocity. The error in the peak discharge estimation strongly decreases along with the difference between the peak discharge and the discharge measured in the rising limb. For the previous reasons, the two approaches are suitable for different environmental conditions definitely as shortly outlined in the introduction of the paper, wherein the monitoring techniques are classified in four types, according to the environmental conditions and the instrument availability.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2699, 2011.