

## ***Interactive comment on “Flood discharge measurement of mountain rivers” by Y.-C. Chen***

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Received and published: 20 March 2013

General comments: The paper applies an interesting method of linking the average stream flow velocity to the maximum flow velocity, with remarkable validation results during adverse weather conditions. However, the author needs to be more specific in the description of previous methods (citing limitations) this would better clarify, to the reader, specifically how the methodology improves flood discharge measurement. The use of the word ‘novel’ should be carefully considered considering that the application of the ADP measurement technique is not new and the author also cites previous studies that correlate the mean and the maximum velocities. In addition, the findings of the study are case specific and can only be generalised if tested on a wide range of cross-section configurations in different rivers. Additionally, the use of the term “accurate method” is questionable given aleatory and epistemic sources of uncertainty

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affecting river flow measuring systems and observed data. The spelling and grammar throughout the document should be keenly improved prior to publication.

Ans: Thanks for your valuable comments. By analyzing the data collected from USGS, Taiwan Power Company and Water Resources Agency of Taiwan, my previous papers indicate the efficient method can be used to measure discharge in open channels. In this study, I am trying to organize the measuring system to measure flood data for calibrating all the parameters used in the efficient method. Not only the proposed method but also the measurement system is confirmed to work for measuring flood discharge. It is the first time to estimate flood discharge based on only the maximum velocity on y-axis and the gauge height. Those estimated high flows during typhoons are used to extend the rating curve. Therefore the more accurate flood discharge can be automatically and continuously observed based on the correlation of water stage and discharge. Thanks for your suggestion. “novel” is removed from this paper. In order to show the efficient method can be used successfully in Taiwan, I decide to change the title as “Flood discharge measurement of a mountain river – Nanshih River in Taiwan”. I will also rewrite the abstract, introduction, and conclusions to more carefully and precisely claim the method using for measuring discharge of mountain rivers in the Nanshih River at the Lansheng Bridge. Grammatical and writing style errors in the original version will be corrected by my colleague who is a native English speaker.

Specific comments: 1. P12660 L5 A list of limitations for use of the ADP is mentioned. However, in the methodology that was applied the author does not describe mitigation measures that would alleviate the effects of turbulent flow during typhoons (Table 1). Specifically, was any special care taken with reference to high sediment suspension and air entrainment during the measurement?

Ans: Owing to these factors affecting ADP, it will usually take more time or using another ADP with lower frequency to correct enough data.

2. P12661 L15 It would be interesting discussion for the author to comment on practical

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probable distances away from the bridge piers that would reduce the effects of the vortices at the bridge piers on the discharge measurement (considering crane arm length)

Ans: Owing to the strong turbulence, it is better to position the ADP as far as possible away from the piers. Therefore the maximum length of the crane arm, which is 15 m, is used when the ADP is applied to measure discharge during typhoons.

3. P12667 L15 and P12668 L5 By superimposing the location of the bridge piers on figure 4 and figure 5, this would probably show the effect of the pier obstruction and increased flow of water below the bridge deck.

Ans: The location of pier is added in Figures 4 and 5.

4. P12668 L15 The presentation of the observed scour and deposition would be much more easily visualised as a percentage of the cross-sectional area.

Ans: Thanks for your suggestion. The percentage of the observed scour and deposition of the cross-sectional area has been shown in Table 2.

Technical correction: 1. P12658 L20 Should be use not used, Should be gauge not 'gage'

Ans: Thanks for your suggestion. "gage" is replaced by "gauge" throughout the text.

2. P12667 L15 Should be shape not 'sharp'

Ans: It is my mistake. "sharp" is replaced by "shape".

3. P12660 L15 Reformulate the statement "Although velocity distribution data can be obtained immediately, there are still some areas of data missed." for clarity

Ans: I try to rewrite the sentence as "Although velocity distribution data can be obtained immediately, some areas were data is missing."

4. P12664 L5 Reformulate sentence "However ADP cannot sample the velocity near

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water surface and the velocity distribution is not continue.”

Ans: I rewrite the sentence as “However ADP cannot sample the velocity near water surface and channel bed.”.

5. P12667 L5 Adjust the value of the coefficient in the text or in the figure 7 (= 0.51 or 0.50?)

Ans: The coefficient is 0.50. The value in the text is corrected.

6. P12667 L15 Adjust equation coefficients to either match the figures 8 and 9, or the text.

Ans: I am sorry to show the wrong equation of G-A in the text. The correlation of water stage and cross-sectional area is . The equations in Figures 8 and 9 are correct.

7. P12670 L15 A uniform scale for figure 12 would make it easy to see the difference between the velocity distributions.

Ans: Thanks for your suggestion. All scales in Figure 12 have been the same.

8. P12671 L20 Reformulate the statement, to improve the grammar; “Concerns for personal safety, accuracy, reliability, and efficiency, new measurement method and system have to be developed for flood discharge measurement”

Ans: I rewrite the sentence as “To ensure the safety of hydrologists and accurately measure discharge, a new measurement method and system have to be developed for flood discharge measurement in Taiwan.”.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/9/C7118/2013/hessd-9-C7118-2013-supplement.pdf>

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 12655, 2012.