

Interactive comment on “Design flood hydrographs from the relationship between flood peak and volume” by L. Mediero et al.

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Received and published: 5 October 2010

The authors greatly appreciate the suggestions of the Anonymous Referee 1, including the corresponding changes in the paper. In the following, we respond to each comment.

Specific comments:

1. The authors use the same symbol to represent different variables. For example, V_i in equation (4) (page 6) represents the weighted standard deviation of the at site sample L-moment ratio of i th order. However, the sample symbol V_i in the equation (9) (page 7) is the i th observed volume and the hydrograph volume between t_i and t_{i+1} in

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equation (12) (page 9). The same symbol used to represent different variables may confuse readers. A list of symbols is also suggested to clarify the symbols used in the manuscript.

Symbols have been revised and changed, in order to avoid confusions. An appendix with a list of symbols used in equations has been included in the paper.

2. The authors stated that the observed hydrograph shape with the most similar ratio is selected to generate the synthetic hydrographs (last line of page 9 and first line of page 10). However, the relationship between the ratio of $Q-V$ and hydrograph for the observed events is not shown in the manuscript.

A new figure has been added to the paper, showing a set of examples of the ratio between peak and volume for different hydrograph shapes (Figure 6).

3. Uses of equations (11) and (12) (page 9) associated with the histograms shown in Figure 5 (page 25) to generate hydrographs is not clearly described in the section of Generation of Hydrographs.

Equations 11 and 12 describe two variables that measure the location of the peak and the location of the hydrograph centroid. The hydrograph shape can be quantified by these two variables. The generation of hydrographs requires the use of a set of varied hydrograph shapes. Figure 5 shows the variability of both variables, seeing that the observed hydrographs present a varied range of shapes. As conclusion, the observed hydrographs can be used in the generation of synthetic hydrographs. This explanation has been included in the paper.

4. The authors should give an illustration of the shape of design flood hydrograph with a certain return period (say, 500 years) to show that a specific set of hydrographs can yield the same maximum reservoir level.

A new figure (Figure 8) has been added to the paper, where three hydrographs with the same return period (500 years) show that different combinations of peak, volume

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and shape yield the same maximum reservoir level.

5. The legends of Figure 3 are too small to recognize the symbols.

The legends have been enlarged.

Technical corrections:

1. Page 1, line 29: Cited reference WMO (1989) is not listed in the section of References.

This reference is, in fact, Cunnane (1989), which is included in the list of references. WMO (1989) has been changed for Cunnane (1989) in the paper.

2. Page 3, line 23: "Flood Design Hydrograph" should be "Design Flood Hydrograph".

It has been corrected

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 4817, 2010.