

Interactive comment on “Effects of runoff thresholds on flood frequency distributions” by A. Gioia et al.

Anonymous Referee #1

Received and published: 19 May 2008

OVERALL MERIT

The Authors investigate the effects of runoff thresholds on the flood generation. They propose a new derived distribution of maximum annual flood as result of the occurrence of two different mechanisms of flood generation: L-type and H-type. The derived distribution obtained is a contagious extreme value distribution. A case study is given. My suggestion is to accept the manuscript after revision. Some technical issues, reported in the next, must be clarified before its acceptance. An improvement of the manuscript presentation is required.

MAJOR COMMENTS

Section “Two component IF Model (TCIF)”. The Authors should provide in this section the number of parameters associated to the proposed model. This issue is important

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because the Authors use an an at-site estimation for some of them.

Note that some of the parameters of the Two component IF Model (TCIF), namely Λ_L , Λ_H , r_L , r_H are estimated using flood observations at the site of interest. Two considerations come out: 1) this way of estimating the parameters reduces the applicability of this derived distribution model to river basins where you have flood observations; 2) the derived distributions are generally developed to make predictions in river basin where you do not have flood observations.

In Figure 5 the Authors compare the distributions TCEV and TCIF to the flood observations. Some comments are necessary here. Both TCEV and TCIF show a good agreement with data. However it is important to note that the TCEV has 4 parameters (Λ_1 , Λ_2 , θ_1 , θ_2) all of them estimated from at-site flood data, while the TCIF has N parameters (Λ_L , Λ_H , r_L , r_H , $f_{A,L}$, $f_{A,H}$, k , ...), 4 of them are estimated from at-site flood data.

Page 917, lines 11-14, The Authors write "In facts, at-site estimation techniques (Fiorentino et al., 1987b) in principle are not recommended for short length data series because of the very high estimator variability, with particular regard to parameters dependent on the second and third order moments". In the next (lines 20-23), They write "In other words, in order to obtain reliable estimates for parameters to be used within the derived model applied to observed annual flood series, we used at-site estimation of TCEV parameters performed by Maximum Likelyhood Estimator." In the first sentence the Authors say that at-site estimation techniques are not recommended but in the second, the Authors use an at-site estimation technique. This could generate confusion in the Reader. Please clarify this point.

Figures 2 and 3 are superfluous.

MINOR COMMENTS

Page 904, lines 24-26, change "is based on transferability of hydrological information allowing prediction in ungauged basins" in "transfers hydrologic information from

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gauged to ungauged basins making predictions in the last ones".

Page 905, line 1 delete "external".

Page 905, line 3 change "individuuate" in "identify".

Page 905, the Authors write "Such kind of analysis is required in order to test the statistical homogeneity and the spatial variability of parameters" Which kind of analyses are you referring? The sentence is not clear.

Page 905, the Authors write "Regionalization techniques allow the use of distributions with more than two parameters (e.g., GEV, TCEV), whose estimation procedures usually need extensive dataset, in particular for parameters dependent on the higher order moments. " This sentence could be misinterpreted by the Reader. In fact you can always use distributions like GEV or TCEV. Estimates of parameters are reliable only when long datasets are used. Please rephrase this sentence.

Page 906, line 9, change "are implemented combining" in "combine".

Page 906, line 28, change "in storm associated with seasonality" in "in seasonal storms".

Page 907, line 10, please give a reference for "the Matalas condition of separation".

Page 908, line 15, change "area" in "areal".

Page 908, lines 15-16, change "as a Weibull function" in "Weibull distributed".

Page 908, line 21, provide a value for the exponent ν .

Page 909, line 3, provide a value for the exponent ε .

Page 909, line 14, change "parameter values" in "parameters values".

Page 909, line 17, delete "significant".

Page 909, line 23, change "demonstrates" in "means".

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Page 910, line 6, change “indicate” in “indicates”.

Page 911, lines 2-3, change “flood annual maximum values of the flood peak” in “maximum annual flood peak”.

Page 912, line 9, insert “if” between “that” and “the saturation”.

Page 912, line 11, the Authors write “Nevertheless, apart from what is prevailing, the two mechanisms may occur in all basins”. Which mechanisms are you referring? The sentence is not clear.

Page 912, line 14, the Authors write “insisting on small portion of the basin close to the channels”. This sentence is not clear. Please clarify it.

Page 912, line 20, change “rarer” in “rare”.

Page 913, line 20, change “flood annual maximum” in “maximum annual flood”.

Page 914, line 1, Eq.(17) represents a contagious extreme value distribution. The Author should explain better than it is reported in the manuscript, how Eq.(17) comes from. For example, before Eq.(17) they could write “Assuming that L-type and H-type mechanisms are independent and each of them is associated with a Poisson-distributed occurrence process with parameters Λ_L and Λ_H then the probability distribution of maximum annual flood is” and delete the sentence after Eq.(17).

Page 914, line 6, Explain where Eq.(18) comes from. I’m not sure that Eq.(18) is correct.

Page 915, line 2, change the sentence “The investigated area includes a number of basins8221; in “The investigated area includes basins”.

Page 915, line 3, after “Puglia” add “see Fig.1”.

Page 915, lines 13-14, change the sentence “The mean annual rainfall ranges from minimum values (about 600mm) observed in Puglia and higher values (up to 1800 mm)

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in Basilicata and Calabria. " In "The mean annual rainfall ranges from about 600mm observed in Puglia up to 1800 mm observed in Basilicata and Calabria. "

Page 916, line 10, change "annual maximum flood" in "maximum annual flood".

Page 916, line 10, change "coefficient" in "coefficients".

Page 916, line 11, delete "(Ca) in the area".

Page 916, line 14, change "annual maximum flood series" in "maximum annual flood series".

Page 917, line 22 change "Likelyhood" in "Likelihood".

Page 917, lines 22-24 the sentence "Such a choice was made also to assess that differences between data series as well as their high skewness were mostly due to a physical control rather than to sample variability." is not clear. Please rephrase it.

Page 917, lines 27- the sentence "Furthermore, in this frame one should note that an effort is made to reduce uncertainty due to short data records, at the price of introducing uncertainty related to soil information which, in a way, is more prone to be knocked down by the advent of new technologies for earth observation. " is not clear. Please rephrase it.

Page 918, line 11, I think " $\Lambda_q S_{\Lambda_q}$ " should be changed in " $\Lambda_p S_{\Lambda_p}$ ". Please check it.

Page 918, line 13, change "annual maximum rainfall" in "maximum annual rainfall".

Page 918, lines 15-17, the Authors write "Assuming the hypothesis of Weibull distribution of rainfall intensity and poissonian occurrence of events, the distribution of annual maxima turns out to be a Power Extreme Value (PEV) type. " Please provide a reference for it.

Page 920, line 11, change "dynamic" in "dynamics".

Page 923, lines 29-31, The reference Gabriele and Iritano 1994 is not cited in the text.

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Page 923, lines 32-33, The reference Gioia et al. 2007 is not cited in the text.

Page 932, fig.5, the last figure on the left, the label on x axis of is cut.

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