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Hydrology and Earth System Sciences Discussions

Interactive comment on "Inundation risk for embanked rivers" *by* W. G. Strupczewski et al.

Anonymous Referee #2

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General Comments:

In this work the evaluation of the risk of flooding is evaluated considering simultaneously the probability of inundation caused by the embankment breaking due to the prolonged exposure to high water on levees structure and the probability of water overtopping of the dike crest. In the paper the new two-component model of flood dynamics: "Duration of high waters–Discharge Threshold–Probability of non-exceedance" in stationary and non-stationary conditions with the methodology of its parameters estimation, was proposed in the context to a classical flood frequency analysis methods, in order to assess the inundation risk due to the levees breach and to get the cumulative probability of inundation; the method deals with the risk assessment due to prolonged exposure of levees to high water, being able to estimate the duration of flows of an assumed magnitude with a given probability of exceedance. In this context an important

factor should be taken into consideration in addition of the magnitude of the peak flows: the duration of high water levels that may weaken the levees' structure and cause dangerous leaks and breaks that threaten their destruction. The work gives an important contribution to the study of flood risk for embanked rivers; the paper is well written, its abstract is accurate and informative, the tables of data and the figures are sufficient for understanding the research conducted; the methods are fully described and the mathematical development is complete and accurate. I believe that the paper is very interesting and warrants publication with minor revisions.

Specific Comments:

-Pag. 2992, the meaning of the symbol dt should be specified; -Pag. 2989 line 22, other "methodologically innovative" flood frequency analysis models that we believe should be mentioned are: Eagleson (1972); Sivapalan et al. (1990); Gioia et al., 2008; Iacobellis et al., 2011. -Pag. 2993, lines 25-28, the sentence here reported should be explained one times in the paper; the same concept is also reported at page 2995 lines 11-13 and at page 2998 lines 1-3; -Pag. 2994, line 7, regarding the probabilistic model for flow duration curves, a huge literature is omitted we suggest "at least" mentioning Castellarin et al., 2004; Iacobellis 2008; Botter et al. 2008; -Pag. 2996 lines 1-7 the sentence should be better explained; -Pag 3001 line 23, the reason of the use of logistic function for the evaluation of ïĄć parameter by regression analysis should be explained; -Pag. Equation 27, per analogy to equation (9) should be:

The application to a case study at Vistula River in Southern Poland, is described like an exercise; in my opinion this section should reorganized, simplified and better explained.

Thecnical Comments: -Pag. 2991 line 18 the word "density" should be introduced after the word "probability"; -Pag. 2991 line 18 should be h(Fl\d) instead of p(Fl\d), as reported in equation 3 and at line 2 of page 2992. -Pag. 2994 in the equation 4 should be used the symbol ïĄęïĂăinstead of the symbol ïĄłïĂńïĂăaccording to as reported at lines 8 and 13 of the same page. -Pag. 2994 line 23 should be "the lower..." -Pag.

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3004 line 1 should be:”caused”

References Botter, G., S. Zanardo, A. Porporato, I. Rodriguez-Iturbe, and A. Rinaldo (2008), Ecohydrological model of flow duration curves and annual minima, Water Resour. Res., 44, W08418, doi:10.1029/2008WR006814. Eagleson, P.S.: Dynamics of flood frequency, Water Resour. Res., 8(4), 878-898, 1972. Sivapalan, M., E. F. Wood, and K. J. Beven, On hydrologic similarity, 3, A dimensionless flood frequency model using a generalized geomorphologic unit hydrograph and partial area runoff generation, Water Resour. Res., 26(1), 43-58, 1990. Iacobellis, V., Probabilistic model for the estimation of T-year flow duration curves, Water Resources Research, ISSN: 0043-1397, Vol. 44, doi: 10.1029/2006WR005400, 2008. Castellarin, A., R. M. Vogel, and A. Brath (2004), A stochastic index flow model of flow duration curves, Water Resour. Res., 40, W03104, doi:10.1029/2003WR002524. Gioia, A., Iacobellis, V., Manfreda, S., and Fiorentino, M. 2008. Runoff thresholds in derived flood frequency distributions. Hydrol. EarthSyst. Sci., 12, 1295–1307, doi:10.5194/nhess-12-1295-2008. Iacobellis, V., Gioia, A., Manfreda, S., Fiorentino, M. 2011. Flood quantiles estimation based on theoretically derived distributions: regional analysis in Southern Italy.”Nat. Hazards Earth Syst. Sci., 11, 673–695, doi:10.5194/nhess-11-673-2011.

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