

Interactive comment on “The application of new distribution in determining extreme hydrologic events such as floods” by Łukasz Gruss et al.

Anonymous Referee #1

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General comments The paper analyzes hydrological time series for rivers from Poland and Tchech Republic using two sampling approaches maximum annual values and peak over threshold. They fit 4 statistical distributions (univariate) with 3 parameters (3P3, 3LN, 3W, GEV) and a new distribution (extended gamma) GGEV with 4 parameters proposed by the Nascimento et al. 2016. They personal contribution is in this application to different basins from 236 to 1400 km² using R packages. They clearly indicated which R tools are used which is worth noting for readers. The paper is rich because they see how sampling methods may impact fitting results.

In my opinion the title should be reconsidered because the pioneer work is that of Nascimento et al. 2016 and was tested using hydrological data. So this distribution is not new as indicated in the title. The introduction is too large and does not focus on the

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problem: application of the 4 parameter distribution using two sampling methods. The new in this paper is the use of mixed (extended) distributions. Unfortunately, the goal or the idea behind mixing is not outlined. For example, it is the case when the origin of maximum floods can be different from year (event) to year (event). So the physical meaning behind mixing is not noticed in the beginning of the paper (as in line 85). However this is the spirit of the work of Szulczewski and Jakubowski, 2018). Extended distributions would be a key word, because it was presented in this manner in the principal reference used (Nascimento et al. 2016). A section on model comparison is missed. Because authors compare 3 parameter distributions to 4 parameter, specific criteria should be adopted such as BIC and AIC.

some grammatical remarks in Abstract line 9 . without? line 103 various line 399 sample

Specific remarks : Abstract line 13 : it is not clear that authors discussed the parameter accuracy, later in this paper. Line 82 Pearson type III is 3 parameters. Its special case with 2 parameters is Gamma. Should be reformulated Line 129 the term genetic is not clear here. Why this word? authors may speak of flood generating processes Line 145 The 3 new distributions (The Dual Gamma Generalized Extreme Value Distribution (GGEV), the Exponentiated Generalized Extreme Value Distribution (EGEV)) were presented in a certain context (See Nascimento et al. 2016 "In recent years, several common distributions have been generalized via exponentiation. Let $G(x)$ be the cdf of any continuous baseline distribution..." and Eq. 4. This context should be recalled here. Otherwise the reader who does not know the work of Nascimento et al. and other similar works about extended distributions will not understand to general motivation of these "new" distributions lines 153 to 161 should be reformulated in order to define the objectives and the next sections of the paper line 160 why this hypothesis of the "best" ? Authors may just say that they study the adequacy of GGEV line 169 what do authors mean by profil? water level? line 172 is below meaning downstream? line 173 upstream is more adequate than below

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line 200 homogeneity tests Line 225 GEV and Pareto are linked if one considers the POT model. This should be noticed somewhere because authors selected GEV (exponentiated GEVs) while using POT. In general with POT we use Pareto. line 255 why kurtosis while 3 parameters to fit? In general the smallest orders are used for distribution moments line 259 Gamma is not listed line 246. This sentence should be removed line 271 confidence level for what? do authors study the parameters confidence intervals?

line 300 “One of the goals of this article was to propose a new GGEV distribution model in the AM and POT method” this is not fully documented. line 303 what is the reference of MARE test of adequacy? line 309 it is not clear how MARE is an index. Is it MARE or an index based on MARE? line 314 A section on model comparison is missed. Because authors compare 3 parameter distributions to 4 parameter, specific criteria should be adopted such as BIC and AIC . line 318 are they significantly different from zero? If not, it is not a trend line 330 in POME application, to what extend are finding related to the level of the selected threshold? This could be more discussed. line 383 to compare fitting results of distributions involving a different number of parameters I believe that AIC or BIC criteria are more appropriate. while this is currently found in the literature, I do not believe on can rank distributions based on K-S results. K-S result is just accepting or rejecting. The value by itself has not a real meaning. One can rank distributions based of the performance of quantile estimation or parameter estimation (variance of standard error). line 410 empirical density (Kernel) should be reported in Figure 6 and figure 7 line 414 what is the reference to say that GEV distribution has a heavy tail? It is the case of Pareto, not for GEV as I know. May authors check according to El Adlouni et al. 2008 works (On the Tails of Extreme Event Distributions in Hydrology. June 2008 Journal of Hydrology 355(1):16-33)? line 430 “This indicates that the K-S test is stronger than the χ^2 430 test.” this is not clear. Why is it stronger? Is there a physical reason for rejection? line 436 point 5 . this is known from the beginning. It cannot be a conclusion Table 1 “Water gauge location \hat{z} . what does it mean? geographic coordinates should be given source of Table 1 of what? The reference is

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not correct

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