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Hydrology and Earth System Sciences Discussions

Interactive comment on "A multiple threshold method for fitting the generalized Pareto distribution and a simple representation of the rainfall process" *by* R. Deidda

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I would like to acknowledge Referee #1 for his positive feedback on the manuscript and for his reach comment which contributed to improving the revised version. I greatly appreciated also the detailed list of English corrections, which were all taken into account in the revised manuscript. For the sake of clarity, I will skip replying to those comments specifically dealing with English corrections. Thus, whenever I do not not provide a reply to a comment, it means that the comment was accepted and included in the revised version.

General comment 1:
The title was changed to "A multiple threshold method for fitting the generalized Pareto distribution to rainfall time series"

General comment 2:
In the abstract and in the Introduction of the revised manuscript I highlighted better the ability of the Multiple Threshold Method (MTM) to give good generalized Pareto distribution (GPD) fits on heavily quantized data.

General comment 3:
In the Introduction of the revised manuscript, the main findings of Veneziano et al. (2009) are now mentioned and discussed in relation to the MTM.

General comment 5:
The font sizes in Figures were adapted to be clearly readable in the respective single or double column final formatting of the HESS journal style.

Specific comment 4:
After Eq.(1) I added the following sentence:
"Commonly used distribution functions $F_0(x)$ of strictly positive rainfall records include the exponential, Gamma (Pearson III), log-Gamma (log-Pearson III), skewed normal (i.e. a normal distribution fitted to the Box-Cox transformed data), and lognormal (e.g., Swift and Schreuder, 1981; Kedem et al., 1990a,b, 1997; Shimizu, 1993; Katz, 1999; Cheng and Qi, 2002; Cho et al., 2004; Shoji and Kitaura, 2006; Langousis and Veneziano, 2007; Langousis et al., 2009; Suhaila and Jemain, 2007)."

Specific comment 5:

In the revised manuscript, the sentence was modified to provide references to weather generators based on Markov chains:
"E.g. this is the working mode of simple weather simulators implemented in some widely used models, such as EPIC (Erosion-Productivity Impact Calculator) and SWAT (Soil and Water Assessment Tool), in which the temporal sequence of wet/dry days is often modelled by Markov chains, while the distribution $F_0(x)$ is fitted on all strictly positive rainfall records and then used to fill in the records of rainy days in the Markov chain (e.g., Nicks, 1974; Nicks et al., 1995; Williams, 1995)."

Specific comment 14:
Referee #1 suggests to "add references to methods" (used to infer the shape and scale parameters of the GPD). I would prefer to disregard this suggestion since a long list of methods (and references) is already provided in the last part of the Introduction and I would prefer to avoid a repetition of the some information. Thus I just modified the sentence in the revised manuscript into:
"As discussed in the Introduction, in literature several methods have been proposed to infer the shape ξ and the scale α_u parameters of the GPD ..."

Specific comment 23:
I would prefer to keep Figure 3 as is, since adding more lines for the fitting obtained using a single-threshold traditional approach will compromise the readability of Figure 3 and moreover it would mask the evidence of the good performances of the MTM approach. On the other hand, examples of the bad fitting using a single-threshold traditional approach on highly discretized records were extensively provided and discussed in Deidda (2007). I provide (only with this reply) a Figure reproduced from Deidda (2007) which clearly shows what Referee #1 requested, but I prefer to refer the reader to Deidda (2007) rather than modify Figure 3 adding more lines.

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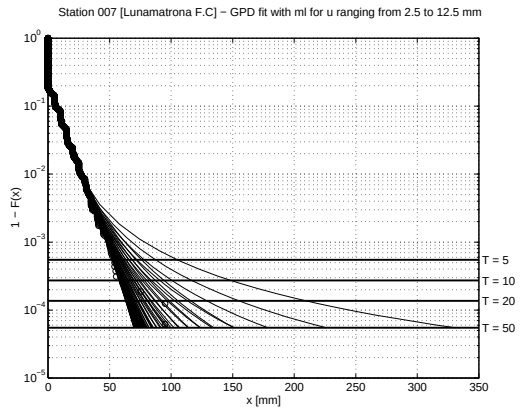

Fig. 1. [Reproduction from Deidda (2007), Figure 3 (left).] Lines represent the fitting obtained using a single-threshold traditional approach for different thresholds u (values from 2.5 to 12.5 mm)