

## ***Interactive comment on “Probable Maximum Precipitation Estimation in a Humid Climate” by Zahra Afzali Gorouh et al.***

**Zahra Afzali Gorouh et al.**

drbakhtiari@uk.ac.ir

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Probable Maximum Precipitation Estimation in a Humid Climate The authors wish to thank the editors and reviewers for their time in effort in reviewing our manuscript. We hope the changes listed have made the manuscript suitable for publication and we look forward to your response.

\_\_\_\_\_ Response  
to Reviewer: P1L12: At first, define the variable and then use the abbreviation (e.g.  
frequency factor; Km). Re: Required description was added to the text. \_\_\_\_\_

\_\_\_\_\_ P2L14-17:  
Too many citations..., without commenting their research Improve the syntax of the

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sentence. Re: This sentence was corrected. \_\_\_\_\_  
\_\_\_\_\_ P3L16: ... of 33 years ranging from  
... Re: It was corrected. \_\_\_\_\_  
\_\_\_\_\_ P4L4&5: Improve the syntax of the sentence. Re: It was  
corrected. \_\_\_\_\_  
\_\_\_\_\_ P5L22: Previously, you have mentioned that  $K_m$  is replaced by Kenvelope  
value. Now you use equation 5. Please clarify this point. Re: It was first thought that  
 $K_m$  was independent of rainfall magnitude, but it was later found to vary inversely with  
rainfall: the value of 15 may be too high for areas of generally heavy rainfall and too low  
for arid areas.” Because of the study area is a wet area, the value of  $K_m$  for wet areas  
is too high, and therefore revised approach was used to obtain the appropriate value  
of  $K_m$ . In order to calculate the  $K_m$ , the equation 2 was used. Then the maximum  
value of  $K_m$  was considered as  $K_m$ -envelope and was used to calculation of PMP24.  
The  $K_m$  values in standard approach were obtained from Equation 5, based on 24-h  
 $K_m$  chart (WMO, 2009; Hershfield, 1965). These curves obtained from 2700 stations  
over the USA, while in revised approach, frequency factor was obtained from observed  
rainfall over the study area and stations. The frequency factor in revised approach is  
more reasonable, for it was obtained based on real occurred rainfall over the study  
area and the result of corresponding PMP is closer to real occurred rainfall over the  
study area. Reduction of  $K_m$  in revised approach is not a reason to refuse standard  
approach; this shows that the standard approach estimates the PMP with more caution  
while estimating appropriate value of  $K_m$  is leading to decrease the cost of structures  
that affected by PMP. \_\_\_\_\_  
\_\_\_\_\_ P6L2: Discuss the differences between the two approaches.  
Re: The second approach is based on the first approach theory. The main difference  
between these approaches is  $K_m$ . in the first approach;  $K_m$  was obtained from the  
empirical chart, while in the second approach  $K_m$  is obtained from the actual rainfall  
in each station and considers the maximum value of  $K_m$  as a regional value of  $K_m$   
for all stations. \_\_\_\_\_

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————— P6Section3-2: The authors should provide the Spatial distribution of rainfall PMP24 based on physical method, as they have done regarding the other two statistical procedures. Re: The spatial distribution of PMP24 based on physical method was followed by the Spatial distribution of storm that occurred at 10/29/1993. Also, physical PMP result is an average depth for basin. Figure shows the spatial distribution of storm 10/29/1993. (Fig 1 attached.)

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— P8L1: Improve the syntax of the sentence. Re: The sentence was revised.

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— P8L1-6: This a repetition found also in section "Material and Methods" Re: The sentence was revised.

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————— P8L23: The authors should provide statistical metrics such as R2, RMSE, MAE and probability of detection (POD), false alarm ratio (FAR) and critical success index (CSI). These metrics are important to verify the results obtained by the two applied procedures. Re: Common criteria for rainfall such as (MAE, MSE, RMSE, MAPE, R(XY), and R2 was added to the text. Other criteria were not used because it was used for radar-based rainfall. Even based on performance criteria including MAD, MSE, RMSE, MAPE, R, and R2, physical method is more accurate than statistical method and revised approach is better than standard approach. Corresponding values of these performance criteria are mentioned in table 1 (attached)

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Thank you again for your time and effort and for helping us to improve the manuscript.

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-38/nhess-2018-38-AC4-supplement.zip>

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-38>, 2018.

**NHESSD**

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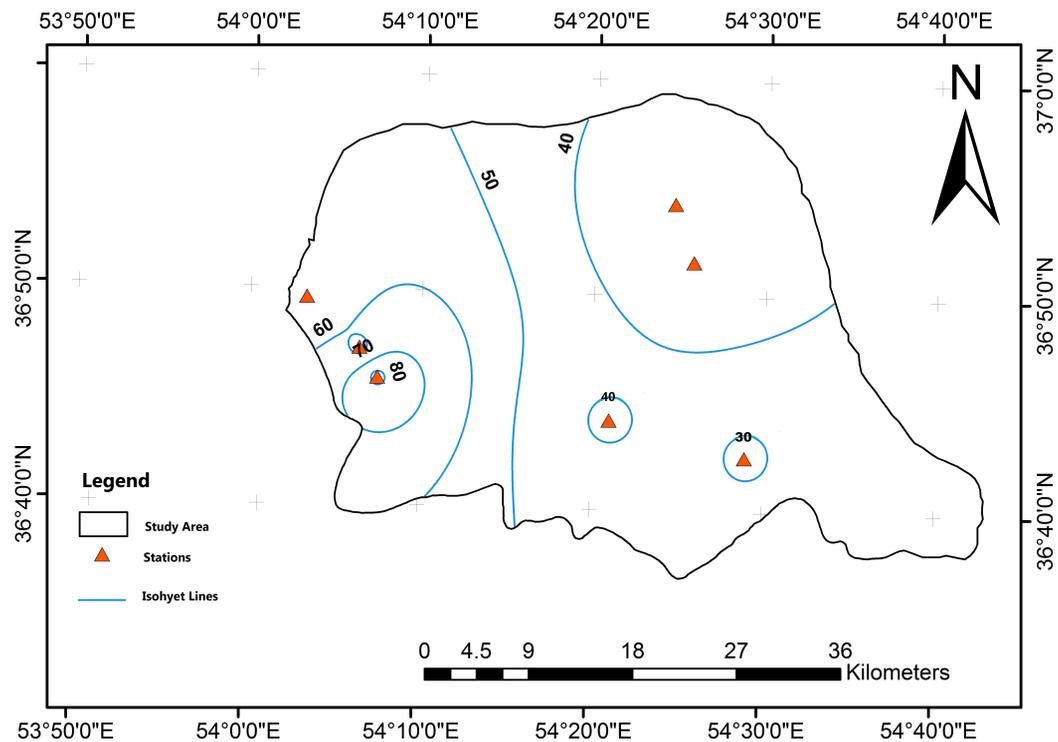


Fig. 1. Fig 1

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Statistical comparison between  $(P_{24})_{\max}$  and estimated  $PMP_{24}$  values

method	MAE	MSE	RMSE	MAPE	R(XY)	R <sup>2</sup>
Standard	258.2	69090.5	262.9	241.7	0.8	0.63
Revised	64.36	4311	65.7	61.2	0.9	0.86
Physical	7.1	50.4	7.1	4.7	-	-

Fig. 2. Table 1

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