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Hydrology and Earth System Sciences Discussions

Interactive comment on "Extracting statistical parameters of extreme precipitation from a NWP model" *by* J. Eliasson et al.

J. Eliasson et al.

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In this paper the Authors present results concerning spatial distribution of the M5 and Ci as derived from the MM5 model at an 8-km grid resolution. I generally agree with the review comments by Dr. T. Johannesson and I find this paper potentially interesting. I find particularly interesting the use of MM5 for a rainfall study at high resolution over such a long temporal horizon. However, I have some comments that should be addressed before considering this manuscript for publication. The Authors can find my comments below. - One general issue concerns the language. I actually found this paper difficult to read and I would suggest sending it to a professional editor. Response We hope this is better now. - From the beginning of the paper and in the

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Interactive Discussion

Discussion Paper

abstract, the Authors talk about M5 and Ci without describing them right away. Please include a description of these two parameters earlier in the text. Response Eliasson (2000) is given as reference. Complete description of these statistical parameters is complicated and goes a long way back. The M5, who has both a parametric and a nonparametric definition, it is originally suggested by Jenkins and presented in the British Flood Studies Report of 1975, cited in Eliasson (2000). If the editor demands an explanation will be included first time M5 is mentioned, but we would rather not. - Can the Authors provide some information about initial and boundary conditions used by the model? - Response The boundary is shown on fig. 1. The time dependant boundary conditions are the ERA40 initial and boundary data from the European Centre for Medium-range Weather Forecasts for the period in question. (Sec. 2) On pg. 4865 (line 18), by "annual extreme 24h rainfall", do the Authors mean "annual maximum daily rainfall"? Response Not annual maximum daily rainfall. That is the precipitation from 0.00 hours to 24h each day. The basic data here is the 24h running averages of the 6h series and annual maxima of that series (Table 1, Table 2 output time step). - At what scale are the M5 and Ci maps generally useful in Iceland? Also, an 8-km pixel map is probably not very useful for small basins. Could the Authors please comment on this? Response There is only an M5 map with Ci information connected to it. The map shown in Fig. 6 is not very useful in urban hydrology but more detailed maps exist. How useful an 8-km pixel map would be is in this stage completely unknown. It may be much better than what we have in some places, then again much worse in other parts of the country. We authors prefer to remain quiet on this point in spite of the matters importance. - I was surprise that the paper by Crochet et al. (2007) was not referenced. Why did the Authors not consider the model proposed in that study? Response We assume Gumbel distribution a priori. Later we plan to investigate the distribution of the annual maxima to prove this assumption a postori. Then it is planned to investigate M5-AAR (annual average rainfall) relations. In both these tasks the paper by Crochet and al will be very useful. - The Authors may want to include some of the papers by Prof. Brian Colle regarding the impact

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of orography and micro-physical schemes on model simulation. Response It has been done in Rögnvaldsson et al cited in this paper. That was considered sufficient. - I think that the issue of stationarity for these series over the past 43 years should be addressed more in depth, particularly in light of the changes in cyclonic activity over the North Atlantic. Response Meteorological series are neither stationary nor ergodic in the statistical sense. This imposes a huge problem in hydraulic engineering and safety of structures. The cyclonic activity over the North Atlantic is especially problematic as it does not show any significant correlation to changes in precipitation in the region as a whole. We think that if we try to address this in more depth we will just be drowned. See also the differences in Figure 4 between 1990 and 2006. Can the Authors discuss the changes of the M5 maps over time? Response These differences are discussed and it is concluded that stationarity is good enough so observed M5 can be compared to simulated even though the time period of the observation and the simulation is not quiet the same. We have added clarifications and changed various sentences to improve the understandability of this point. We hope it is OK now. - At the bottom of pg. 4866, the Authors present some results regarding the WRF model. Why WRF and not MM5? Response We found it necessary to point out the influence of the grid size. This simulation was made available and consequently it was considered unnecessary to do a MM5 simulation in a finer grid as it is not possible to repeat the MM5 simulation in a 1-km grid as of yet. It could be done in a 5 km grid, perhaps in 3, but that is not enough. - Rather than presenting the results in absolute values, can the Authors present them as percentages of the mean value? For instance, on pg. 4868 (line 7) and Figure 4, I am not sure whether the differences are with respect to an average value of 100 mm or 10 mm. Response Relative differences add practically no information. Length of observation period (horizontal axis on Fig. 4) does more. Additional information (if needed) should be how many common years there are in the two periods. The maximum is number of station years minus 16. C2075 In Figure 6, where does the top figure come from? Response Website information added How was it derived? What was its original resolution? I could not read the numbers on it

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so I can not really say much about how it compares with the bottom one. Response Information on zooming the pictures added. - On p. 4870 (line 16), can the Authors please add a reference or specify who recommends a value of Ci=0.19? Response Information added, this was originally proposed for Reykjanes but later extend ended to the whole country. Eliasson 2000 only accessible reference in English. Out of the four schemes in Figure 8, which one have the Authors selected? Response The other referee found this Figure unnecessary so it has been deleted. But they are all used. Does the interpolation scheme significantly affect the results? Response Most of the time no. When the 5-point scheme shows great variation the 8 point scheme is brought in. A few times the result is unclear as in Fig. 10. On pg. 4871 (lines 4-5), I am not really sure of what correction the Authors refer to. Please clarify. Response Clarification added Where are the three "outlier" stations located? Response Far East, far West and intermediate southwest. This is not a cluster. Are they at high elevation? Response No, kind of an average station elevation. Also, I am not really sure I understand why these points should be outliers. Response Neither do we. No common reason can be found. In Figure 9, the Authors consider those three points as outliers, even though there is a difference on the order of 40% to 60% with respect to the M5 based on the model. Response A difference that cannot be explained by spatial variation in neighboring points. However, there are two points for which the model has a value around 40 and the observation around 70-80. In this case there is a difference of about 100% with respect to the M5 from the model. Should they be outliers as well? Response Good question. In Figure 9, I am not sure what the blue and black lines refer to (as well as the equation). Can the Authors please add this piece of information in the caption? Editorial comments: Response Information added in discussion of the Fig. 9 in the txt. Hopefully satisfactory. p. 4864, line 10: "with standard deviation of 17 mm" p. 4867, line 20: "Eliasson (2000)" p. 4868, line 26: "Gumbel's parameter" p. 4869, line 17: "Zangl et al. (2008)" Response So corrected What is the journal for Hanna et al. (2008)? Response Information added All the figures need to be improved. In many figures, the x- and y-labels should be

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parallel to the axis and below the numbers. Also, few figures have text in Icelandic (e.g., the x-axis in Figure 5; Figure 6). Response Figures hopefully OK now. Figure 7: can the Author make it look like Figure 1, rather than showing the mesh? Response ??? Figure 1 shows the mesh. Its the only figure showing the total model area with the calculation grid. In Figure 9: please change the comma in the equation to a point. Response Done Please expand the figure captions, including a more detailed discussion of the content of the figures. Response Hopefully OK now.

Please also note the Supplement to this comment.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 4863, 2009.