**Climate
of the Past**
Discussions

Interactive comment on "Patterns of extreme weather associated with observed and proxy River Ammer flood records" *by* Norel Rimbu et al.

Anonymous Referee #1

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General comments The manuscript investigates summertime synoptic-scale composites and teleconnections related to heavy precipitation and floods in the Ammersee region, southern Germany. The first part deals with the instrumental period (discharge data and composites of meteorological data) and it is concluded that the spatial precipitation patter leading to high discharge is correlated with high local/regional cloudiness and high temperatures (low cloudiness and dry) in distant areas of NE Europe that are under anticyclonic flow due to blocking. Similar results are found for the flood layer record at Ammersee 1871-1999 (corresponding to the period covered by 20CR data). It is concluded that these results are largely similar to previous findings (Rimbu et al 2016, CP) that looked at annual data. This is expected because most of the Ammersee floods occur during the warm season (Czymzik et al. 2010,2012). The last part of the

manuscript deals with the late Holocene flood record of Ammersee (Czymzik et al. 2012). Results from spectral analyses confirm earlier findings suggesting a solar influence (Czymzik et al. 2012, 2016). Technically speaking, the methods, data and analysis are fine (mostly similar to Rimbu et al 2016, CP). Maybe I have missed the point, but being aware of the previous papers from lake Ammer and the existing literature discussing floods in the region of interest with weather types Vb (e.g. Grams et al 2014 NHESS, Messmer et al. 2015 EarthSysDyn, Hofstetter et al. 2017 IntJClim, among others) I could hardly find anything that was new to me or surprising (which would make the paper a must for reading and recommending). I am surprised that the authors do not refer to the weather type Vb (except in L 76) which explains (depending on the literature) roughly 40% of the quasi-stationary heavy precipitation events in the region of interest in summer; moreover the continental-scale synoptic situation with the teleconnections to more distant regions with the upper level cut-off low, the trough over Europe and blocking with anticyclonic flow in NE Europe and Siberia (with clear sky and high TTmax) are also well described in the literature (e.g. also Barton et al. 2016). What follows in L240 ff is well established in the Vb literature. For the instrumental period, the manuscript is very similar in the content and type of analysis in Rimbu et al 2016 (same group of authors, analysis of annual data in contrast to the analysis of summer data in this paper); the Holocene flood record and the relation with solar forcing (including the spectral analysis with the periodicities) has been discussed in Czymzik et al 2012, 2016. In several instances (e.g. Section 3.1 L145 ff; Section 3.2 L 174) a particular phenomenon is described for the summer season (Results, this paper); then it is argued that it is the same as the results from the annual analysis (Rimbu et al 2016) which is not surprising as most of the flood events in the year are observed during summer (which has previously been established Czymzik et al 2010, 2012). Other parts present rather common knowledge e.g. that cloudiness influences the radiative balance and, therefore, also TTmax. (e.g. L40), or cloudiness being correlated with precipitation (L 160) or temperature (L165). Again, technically speaking the paper is fine (except for the detailed comments), but I find the gain in knowledge

rather limited. Basically, the manuscript confirms what is known. I would not recommend this paper to colleagues or students for reading; but I would certainly recommend Rimbu et al 2016, Czymzik et al 2010 and 2012. These are important contributions. I find the organization of the paper not ideal. In many instances, Results are mixed with Interpretation and Discussion (e.g. Section 3.1 L 145 ff). The manuscript is sometimes difficult to read (wording, sentences) – a careful language editing would be beneficial (e.g. L123) and enhance clarity. In summary: technically, the manuscript is fine (from my point of view). The caveats are outlined above (limited gain of knowledge). Finally, it boils down to the Editorial policy whether or not confirming existing knowledge is enough justification for a publication. If the Editors decide to accept the manuscript (with revisions) the authors should be invited to clarify and specify what is novel and draw the reader's attention to this parts. I can live with both decisions: major revisions or rejection (not because of technical or methodological issues, but because of very limited gain of new insight; or maybe the presentation in this manuscript was not clear enough).

Detailed comments L6: new line L36 : 'Lake Ammersee' is a pleonasm (throughout manuscript) L88: periods L111: 'main' goal? What are the other goals? L113: amounts (ditto L 117) L115: was L116: check sentence L118: '.. were analyzed in connection . . .' : what does that mean? L123: redundant. Haven't you stated the same already in L 113? L125: to 1999. L138: whereas L139: where is this shown and how is this assessed? By eye? I doubt that much can be said with n=15 (if I got that right) L143: . . . correlated best with . . .. 'local precipitation': specify. Are these daily sums? L146: How many cases were used for the composite map? L154: check wording L206 ff (entire paragraph): This is not reproducible. Which days (periods) were taken here? What means 'clear' (L209); I don't think that an increase (decrease) in 0.5% of blocking days per summer is significant. What is meant by 'out-of-phase'? (ditto L230) L226: 32500 yr BC? Probably not. L228: during the LIA. This paragraph is very difficult to follow. L271 ff redundant. Has been stated several times. L283-285: I don't swallow this argument (Ogi et al. 203). I find this too speculative. I prefer a statement: . . .

is currently not known.' (Ditto L304: too speculative in my view) References: Please check very carefully formatting etc. (L 401, 414, 418, 435 Scherrer, Croci, . . . L447 Stoffel, and too many other typos). Figure captions: The units are given in the Fig (remove in caption text) Fig 1a: this Fig has been published repeated times. I don't find it very illustrative, scale too small. Fig 1b: I would add the 125 mˆ3 sˆ-1 line to make clear which events qualify. N=17? X-axis: Years AD Fig 3a: well this is the classic Vb, with the teleconnections. Fig 4. Ok, but isn't that what is expected from common knowledge (cloudiness correlated with precip, e.g. Fig 3b) Fig 5a: The flood frequency /occurrence presented here is substantially different from Fig 7a (which displays frequent floods between 1981 – 2000). The 'clear periodicity' does not seem that clear to me. Fig 7 Might be good to add significance levels. Fig 9: How was this Figure made? Which criteria? Significance levels? I don't think that sufficient information is provided here. Fig 10. The flood record is not new. Figs 10 b and c (move letter to the left) should be better connected with the text and better described. What is the purpose and what can be learnt (and what is new?)

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