

## ***Interactive comment on “Rapid attribution of the May/June 2016 flood-inducing precipitation in France and Germany to climate change” by Geert Jan van Oldenborgh et al.***

### **Anonymous Referee #2**

Received and published: 3 November 2016

This MS addresses heavy rainfall associated with the may/june 2016 flooding in France and Germany. The paper relies on a method that is available to deploy on short notice to address extreme events in a relatively short turnaround time, in order to have a scientific study supporting media work on the extreme events in question. I have a number of general points and some specific recommendations

1) while the ms is impressive in the breadth and knowledge background it brings to the event, it reads unfinished. There are many questions left hanging in the text, the structure is not great (why have a subsection on a model that isn't even used eg? Wouldn't a sentence do in that case?) and the rushed writing is too visible in the ms to be acceptable in its present form. The figures have strange headings, and not all are

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well readable.

2) I am unconvinced about the value of the analysis for Germany given the scale (time and space) of the events. The Germany flooding is due to shortterm highly convective events. Such events are not well resolved in climate models, there are no data to support the hourly extreme resolution involved, raising the question if it really was likely that such an event would have been reasonably well addressed in the models attempted. I wonder if a focus on the France floods wouldnt have made the paper a bit more coherent and readable. Also, summer rainfall may change differently in convection permitting models than parameterized models used here, so there should be quite a bit of caution about that event class a priori.

3) For France, there are interesting differences in results between Seine and Loire between analysis methods and tools, and the reader remains confused about which ones might be statistical flukes and which ones can be explained physically. Also, while the wide array of tools deployed to analyse extreme precipitation in Francis is impressive, there is little scientific explanation of the results. Also, there is little discussion of the synoptic background state and the extent to which the models simulate the key contributors dynamically to those events. This is due to the time constraints. It would be much more satisfying if in addition to a statistical model evaluation an evaluation of the dynamical causes and model ability to resolve it had been possible. I don't understand the Seine results. There is no convincing trend in events with global temperature, yet you find a strong signal. So where might the trend come from? Wouldn't this make you more concerned about reliability? I may well miss the result here because the writing is confusing (see point 1) – but the observational analysis result appears not to be integrated with the model results.

4) It would be very helpful if the model sections were much more integrated among models as well. Models that aren't used can be just mentioned in a sentence rather than have a section. It is also not clear how the models differ in their ability to resolve the events, and a bit of an introduction to that in a more integrated way would be useful,

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and what modelling frameworks are particularly suitable and why. The models seem to be selected ad hoc (unsurprisingly based on the timeline but this needs to be resolved in a revised cleaned up ms)

5) It would have been nice to have data for flooding rather than the rainfall per se, as that would have captured also the preconditions of the wet soils as well. On the other hand, I see value in a rainfall analysis as well.

6) I see the questions raised about rapid attribution from the other reviewer and the comment. I am unsure what to recommend here - there is a benefit in being able to address event attribution on a short timescale, although I agree about the limitations by available data and the inability to scrape below the surface of the event is a problem. Some of these issues could be addressed in the review, but with additional data later or additional analysis this also brings the risk of results changing through the review. It does put a burden on the reviewing community as the paper really doesn't read like a polished, finished product. On the other hand, there are several reasons why the results might be reasonably robust: the combination of an observational and model analysis, using multiple models, improves robustness, although the results are not pulled together sufficiently to judge this with confidence (the figures appear to generally show similar results). The author team is fairly cautious about caveats and not over-interpreting results. Being able to have some scientific support for rapid results beats being able to offer only speculation. Also, the relatively large community involved in this specific study helps to make this result more robust, as the approaches used by different researchers and their diverse experience will bring a multitude of perspectives to the event and ensure that key features or problems aren't overlooked. So on balance, I agree with submitting reasonably well researched ms rapidly. However, I think the turnaround time here is too ambitious and an additional few days to week to polish the ms would really have benefitted here. Maybe a format like the BAMS supplement suits the problem better, where a short result could be published quickly followed by detail papers in the scientific literature. In conclusion, I think this study can

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be improved to publishable quality, but will require quite much better integration in the revision and clearer addition of caveats, many of which are already implicitly there not well integrated.

Detail comments:

Abstract: L 13 it needs to be added what this estimated return time is based on, so there has to be a bit of the abstract that goes over methods, models and data used.

L 16: why is the precipitation return time more rare for Seine than Loire? Also, this isn't the case in all the models if I interpret the text correctly. What are the return times given here based on – is it the overall summary assessment from all approaches combined?

p. 2 | 18: how do you estimate those return periods? There are a few numbers in the introduction that aren't well supported. On the other hand the breadth of material here is quite impressive and reads interesting.

L 31: low water flows? Or just water flows?

P 3 | 12: in what sense is 3 days the response time of the rivers and how is this determined? (based on basin sizes but how?)

P 3 | 24 Niederbayern is not in the southeastern corner of Bavaria (close though).

Figure 2: what is becaprcp?

p. 5, discussion of findings in literature seem to contradict each other, which isn't discussed well or resolved.

Methods section: why is the my parameter exponential in T – this needs an explanation in the text. Also, given you have 4 parameters to fit, do you have enough data to fit robustly? Lastly, do you include the event in question in your analysis (I suspect not but that should be said, unless I missed it its not there)

L 31 p 6: what is a multiplicative bias correction? It sounds very dangerous here but

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later it becomes somewhat more clear what it means and sounds more acceptable but this should be explained here. Also it is not clear in the section above here how the uncertainties are estimated and how and if autocorrelation is accounted for.

p. 7 | 28: I cant see that this is seen in Fig 4bd

Fig. 3 the axis labels are not great! (can be figured out yet. . .). Also wouldn't a longer timeseries in addition be useful? Particularly given that figure 4 shows it only against temperature (and really there is no trend for the Seine!)

The tables are very useful, but should be edited to highlight where results are inconsistent with the data – eg table 1 why are there no results from the observational analysis to compare against? The caption is way too terse to understand it. Which results are significant (highlight bold eg)? Table 2 ceta is really hard to read and many results are just zero compared to observations.

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