esd-2016-73-RC2
Schade, N.H.
"Evaluating the atmospheric drivers leading to the December Flood 2014 in Schleswig-Holstein, Germany"

Content:
In this article, atmospheric conditions were studied, which caused the severe flooding in Schleswig-Holstein in December 2014. The topic is interesting and important having a direct value for human activity. Two classifications of large-scale atmospheric circulation and two indices of precipitation and moisture conditions were used.

General comments:
The main disadvantage of the paper is its descriptive nature. A number of characteristics and maps have been presented but their analysis, synthesis and discussion is lacking. The objectives, tasks and hypotheses of the study are not clearly formulated. I'll answer to the general questions of the journal and then I'll make my more detail comments and suggestions. 1. Does the paper address relevant scientific questions within the scope of ESD? Partly. 2. Does the paper present novel concepts, ideas, tools, or data? Some. 3. Are substantial conclusions reached? Partly. 4. Are the scientific methods and assumptions valid and clearly outlined? Yes. 5. Are the results sufficient to support the interpretations and conclusions? Yes. 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes. 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes. 8. Does the title clearly reflect the contents of the paper? Yes. 9. Does the abstract provide a concise and complete summary? Yes. 10. Is the overall presentation well structured and clear? Yes. 11. Is the language fluent and precise? Revision of the language is needed. 12.Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes. 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No. 14. Are the number and quality of references appropriate? More or less, yes. 15. Is the amount and quality of supplementary material appropriate? Yes.

Response to general comments: At first, I would like to thank the anonymous referee #2 for the helpful criticism to improve this manuscript.

The revised manuscript will be rewritten with more emphasize on analyses, synthesis and discussion to state the objectives, tasks and hypotheses of the study more clearly (as also pointed out in the response to RC1).

Further, I would like the revised manuscript to be proofread by the editorial office to improve the language since both referees are pointing out language revision.

Remarks and suggestions

1.) The term "westerly situation" widely used in this paper seems a bit strange for me. I think that "westerly circulation" is meant here. Classifications of general weather situations are more like circulation classifications (page 3 line 13).

Response: The term "westerly situation" will be changed in the revised manuscript to "westerly circulation"

2.) Page 1 line 18. I prefer to use "precipitation event" instead of "event precipitation".

Response: The term "event precipitation" was defined by Schröter et al. (2015) as the highest 3-day precipitation sum at the onset of the flood. For consistency reasons I would prefer to keep it.

3.) Page 1 line 27. There should be December, not Dezember.

Response: Indeed!

4.) Page 2 line 13-14. The sentence should be revised. Which physical conditions of the North Sea are the dominant factors?

Response: The sentence will be rewritten.

5.) Page 3 line 14. What does mean the abbreviation BSH?

Response: "Federal Maritime and Hydrographic Agency" will be included in the revised manuscript.

6.) I have a question how much the used circulation classifications were objective or subjective. It is written that the second classification was objective. But is the Jenkinson-Collison classification subjective?

Response: The Lamb Weather Types (LWT) in the original form are indeed subjective. Jenkinson and Collison developed an automated system to "objectify" LWT, allowing classification based on sea level pressure data solely. Therefore, the Jenkinson-Collison classification is objective as well. It will be stated in the revised manuscript.

7.) Page 3 line 21. I am not sure which term is used in English: "cyclonality" of "cyclonicity". Please, make clear it.

Response: "Cyclonality" is the correct term.

8.) In the section 2.2 many data sources were listed. Which variables were used in this study, it was not indicated.

Response: The REGNIE dataset includes only daily precipitation sums (on a 1 km by 1 km grid) which were used in this study to calculate the precipitation indices. The chapter will be rewritten in the revised manuscript to clarify.

9.) Trend analysis was not mentioned in the introduction. Why it was included into this study? Trends are not related to the 2014 flooding event. The significance of the trends is not estimated at all. Without it we cannot talk about trends.

Response: "trend analysis of the indices investigated" was mentioned on page 3 line 9, but I admit, it can easily be overlooked. The introduction will be rewritten to clarify that trends for the precipitation indices were included to point at potential future problems that may come with increased antecedent precipitation (-> higher soil moisture -> higher chance of flooding due to persistent precipitation) and increased event precipitation (-> higher chance of flooding due to higher precipitation sum). Concerning significance, I only present significant trends (Mann-Kendall Test) in the analyses, see chapter 2.3, page 5. However, supplementary information including figures showing maps of the p_value ≤ 0.05 could be added to the revised manuscript.

10.) It is not correct to express wind speed using the Beaufort scale. It will be better to do it using m/s.

Response: Well, I would not say it is incorrect to use the Beaufort scale, since wind speed observations over sea have been estimated in Beaufort for a long time and, in fact, when comparing those observations with today's measurements, it is always recommended to use the Beaufort scale. But I admit that it will be better to use m/s in this context.

11.) I think that there are too many subchapters in the chapter 3. I recommend to use two hierarchic levels, not three.

Response: I would change the hierarchic levels in the revised manuscript, if the editor decides that it is necessary.

12.) Page 5, line 24. There is written that the LWT seems more appropriate. How much is this statement justified? On which facts is it based?

Response: Actually, it is due to the fact that LWT is centred close to the area of interest and offers the slightly better suited general weather situation for this specific case. Further, OWTC misses wet days during the first precipitation event. The passage will be rewritten in the revised manuscript.

13.) A misunderstanding is related to the title 3.1.4 Gauge data. Are the data from rain gauges? In fact, there is information about water level measurements. Gauge data were not described in the section of data and methods.

Response: No, these are not rain gauges. As pointed out in the response to RC1, there will be additional passages in the revised manuscript including information about gauge data from the report of the LKN-SH and LLUR-SH (2015).

14.) Page 8 lines 3-4. This sentence was not understandable for me.

Response: The passage will be rewritten in the revised manuscript.

15.) It was difficult to understand the use of severity indices. What they show and how they could be compared?

Response: The severity indices are measures to compare flood events in their extent and extremeness. I admit chapter 3.2.3 does not really improve the manuscript in this regard. Thinking about that, I might remove the chapter in the revised manuscript, together with passages in the "Data and Methodology" chapter.

16.) The main results of the study are not clearly and shortly concluded

Response: As pointed out in the response to RC1, the concluding remarks will be extensively rewritten according to the focus of the paper.