Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-227-AC1, 2017

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Future extreme precipitation intensities based on historic events" *by* Iris Manola et al.

Iris Manola et al.

iris.manola@wur.nl

Received and published: 24 November 2017

We would like to thank the reviewer for her/his time and constructive comments. We have revised the document accordingly and addressed each of the comments and suggestions in their response.

The article will be acceptable, although some revision is desired to make it easier to understand. [Specific comments] The authors describe a number of approaches and methods to estimate future extreme events in Chapters 1 and 2. It is desired to make their relations clearer for readers who do not know much about techniques in this field.

@ Please make clear how the three methods mentioned in the upper part of Page 3 (future-weather method, first scaling method, and second scaling method) are related

to the "current approaches" described in the middle part of Page 2. In the introduction section of the manuscript it is mentioned that in order to provide accurate information on how extreme weather events may look like in the future, sufficiently long and precise model simulations would be necessary. Since those are not yet existent, alternatives are being employed. Some of those are being listed as broad categories: Method A) the delta change technique (or elsewhere named 'delta transformation'), which is a statistical approach that transforms observed data based on changes found in simulated data, Method B) downscaling techniques, Method C) bias-correction techniques, and Method D) the future weather method, in which an observed event is simulated in a high resolution model to show how the same event would occur in a future, warmer climate.

In this study three techniques are further explained and implemented. The two of them belong to Method A and the third to Method D. The first is a scaling method, based on the non-linear delta transformation Pi-Td (Method A), and the second is a simplistic linear delta-change technique (also Method A). These methods will be referred to as 'delta transformation' and the 'simple linear delta transformation', respectively. The model method belongs to the Method D, the 'future weather method'. This explanation is now explicitly mentioned in the introduction of the revised paper. In order to further avoid confusion.

@ Also, please make clear how these three methods correspond to the three methods that appear in the first paragraph of Chapter 2 (Pi-Td scaling method, future method, and linear delta-change method).

It will be clearly mentioned in the text of chapter 2 that 1) the Pi-Td scaling method refers to the first scaling method in the introduction that follows a non-linear delta transformation (Method A), 2) the linear delta-change (or delta transformation) refers to the simplistic linear delta change in the introduction (also Method A) and 3) the future weather method (Method D).

@ It is better to write the method name in each box in Fig.1.

To further clarify the names and uses of the 3 different methods the names, as suggested by the reviewer, will be mentioned in the flowchart as seen in the Figure 1, attached below.

It will be better to change the phrase "historic events" in the Title to "a historic event", because the study was made for a single case. We agree and will change the title to ‘a historic event’.

[Technical comments]

@ Line 30 on Page 2 "Selection of events that have triggered concerns by for instance flood-risk managers using leads to âĂŤ": I cannot understand the sentence. Possibly the word "using" is unnecessary.

The sentence is corrected to: “By basing a future situation on past events that are known to flood-risk managers, it is much easier for them to interpret the impact of such hypothetical future conditions. “

@ It is better to show the location of Amsterdam on a map.

Amsterdam is now shown using a black box in figure 2.

@ Line 9 on Page 6 "0.28deg x 0.28deg grid size (32x32 km2)": 0.28 deg in longitude will be about 20 km at the latitude of 50 deg.

This is true, thank you for the notification. The size should indeed be 32x20km2.

@ Line 7 on Page 8 "Fig.2": Fig.3

This is now corrected.

@ Line 20 on Page 10 "Td is expected to rise by 2 deg by 2050. âĂŤ the entire range of the historic precipitation is increased by

25% (or, assuming a linear increase with temperature, an increase of 11.8% per degree

of Td warming)." 11.8% x 2deg is 23.6%, which is different from 25%. Please check. Thank you for the notification, the text should be corrected to “steady increase with temperature” (instead of linear). That is 11.8% increase per degree, therefore for 2 degrees would be 11.8%*11.8% = 25% increase.

@ It is better to write the number of members for Fig.5 (seven?).

In the caption of figure 5 we now mention that there are seven ensemble members.

@ Line 11 on Page 12 "9am (top) and 2pm (bottom).": left and right.

Indeed, is now corrected.

@ Line 4 on Page 12 "the Pi-Td method increases the total precipitable water for the entire event by 36%, which is about 17%/deg of warming.": If the increase of Td is 2 deg, then the increase of 36% means 18%/deg of warming. Please check.

The situation is similar for the phrase "27%, which is about 13%/deg" in Line 19 on Page 13. By a total 36% of warming with a steady increase for 2C we mean that x%*x% = 36%, so x=16.62%, or rounded for simplicity to a 17%. Similarly, the 27% increase for 2 degrees would result from a 12.7% per degree steady increase, which is rounded in the text of the manuscript to a 13% per degree. We will clarify this in the text of the manuscript in line 23 of page 10, where this example of calculation is made for the first time in the text.

@ Line 9 on Page 13 "the rapid drying of the soil": Why does the soil dry after precipitation?

Treatment of the land surface in Harmonie model is a compromise between physical accuracy and availability of local information. Previous (non-documented) experience with the land surface module in Harmonie has shown that the representation of both vegetation (controlling evaporation) and soil hydraulics (controlling drainage to deeper layers) is not very well adjusted to local conditions in many locations of the simulation domain. Particularly under extreme conditions - such as the case explored in this study - this may lead to imperfect representation of the relevant processes such as the dynamics of soil water in the land surface module.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-227, 2017.

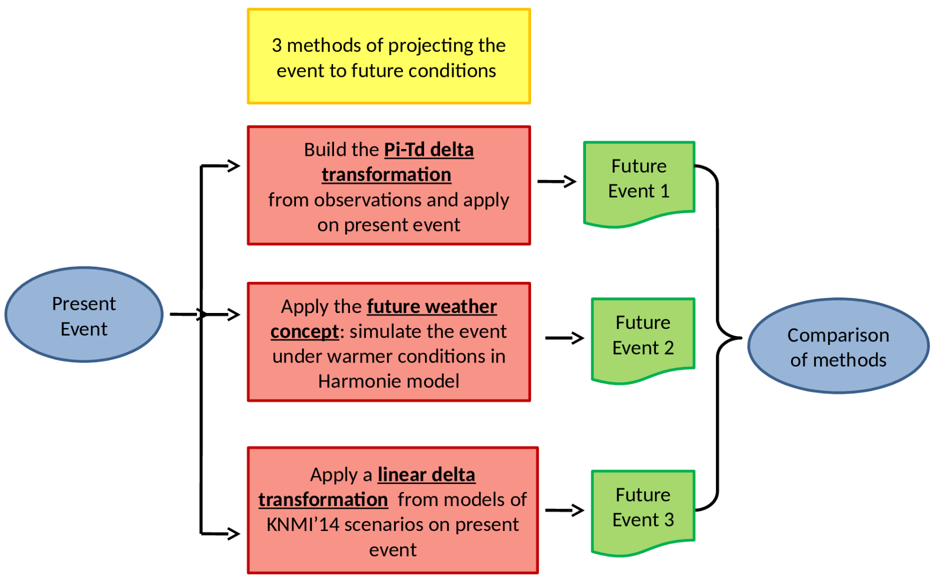

Fig. 1.