

Reply to reviewer's comments

General comments The author presents an in-depth analysis of multidecadal variations of flood frequency in Switzerland. It is based on long series of discharge and rainfall, weather type reanalysis and climate model simulation. It gives a focus on the Rhine river in Basel and the outlet of Lake Lugano.

The paper is very interesting when it related periods prone to intense or weak rainfall or flood to a flood probability index based on the frequency of weather type. It shows changes in the general meteorological circulation, which can explain the fact that the 19th century was prone to flood event. It gives an interesting contribution to past climate analysis and exemplify that a cold period may have been prone to more frequent floods. It shows clearly that better understanding relations between weather regimes and sea-surface temperature may help research on the assessment of future climate change.

Specific comments I have only minor remarks on the paper which is well written. It could be improved on the following items.

End of section 2.4 The authors could provide more information on the limits of the reconstruction.

We will add a sentence on the reconstruction uncertainty. For our analyses we chose the classification which can be reconstructed best (CAP7). After 1810, the probability of each day to be attributed to the right class is higher than 80%, after 1860 it is higher than 85%. Using a classification with more classes might capture flood events better, but could not be well reconstructed.

Section 2.5 Equation (1) is not clear. I understand that n is relative to a number (as in equation (2), f relates to a frequency). Therefore, I expect to have: $w_{tl} = (m_{tl}/n_l)/(n_t/365)$

This was not very clear; the choice of the variable names n and f was misleading. We will be more specific and state more clearly that we use absolute frequency (counts) and not relative frequencies. We will replace f with n to make this clear.

Line 207: "west-southwest cyclonic"

Thanks.

Section 3.1 Line 240: text refers to a flood event in 1882 (Rhine-Basel) which is not visible on Figure 4.

In the revised paper we will add a small arrow to the figure.

Section 3.2 Line 271: give the starting and ending years of the flood rich, flood poor periods. Instead of "(p=0.027)", write: "(p-value of the Wilcoxon test: p=0.027)"

Thanks.

Line 272: give the starting and ending years of the flood rich, flood poor periods

Thanks.

Line 278: "Bibliothèque"

Thanks.

Line 284: "over all"

Thanks.

References

Lines 143-144: reference of Franke et al. (2017) is missing

Thanks.

Line 278: reference of Bibliothèque universelle is missing

Thanks.