

Review of paper:

Stucki et al.: Reconstruction and simulation of an extreme flood event in the Lago Maggiore catchment in 1868

General Comments:

The paper aims at the reconstruction of an extreme hydro-meteorological event causing great damages in the Lago Maggiore region and parts of the Swiss Alps, which took place in 1868. The authors combine historical information with a meteorological and hydrological modelling. Their modelling approach makes use of the 20th Century Reanalysis (20CR).

The paper is well written and covers an interesting approach. The authors manage to paint a plausible picture regarding the reconstruction of an at least centennial scale extreme event more than 100 years ago. In principle, this paper fits well in the scope of this journal.

My major concern is that it is not fully clear how specifically the 20CR data are used in their analysis or to derive their high-resolution downscaling simulations. The expected uncertainty of the 20CR data to reproduce a series of mesoscale events is not well addressed. I would guess that the 20CR ensemble is poorly constrained by the few available surface pressure information available at that period. Therefore, I would expect a large ensemble spread and a too smooth ensemble mean over 56 members. The figure they present (section 3.3) show sharp mesoscale features with respect to streamers, wave breaking or hydrological variables.

In addition, it is not clear to me, how an appropriate forcing for the downscaling is derived from an ensemble mean, since the averaging could induce imbalances in the dynamical fields or at least cause too smooth fields to allow the development of very extreme events. What are the consequences for the high-resolution quantitative results presented? Similar topics are discussed for the representation of windstorms in Welker et al. (2015) paper, which also hints at the smoothing effect of using the ensemble mean.

Both aspects should be more extensively addressed in the paper.

Specific points:

Section 1

I agree with the other reviewer that the introduction is too long and includes aspects which would better fit in the results sections.

Section 2.2 lines 9ff:

How is the initial state of the soil moisture derived? The downscaling period might be too short to derive a reasonably balanced soil.

Section 3.3:

Please state also here which data are used within the chapter – presumably the 20CR ensemble mean.

Figure 6: Not all the variables shown are explained in the caption but discussed later.

Figure 9: There seems to be a typo in the figure caption

Figure 12 right: There is a white curve, which is not explained in the caption