

Interactive comment on “Sulphur-rich volcanic eruptions triggered extreme hydrological events in Europe since AD 1850” by Cristina Di Salvo and Gianluca Sottili

Anonymous Referee #1

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This paper presents an analysis of the relationship between years with elevated volcanic sulphate deposition in a Greenland ice core (GISP2), and riverflow or rain gauge data from four climate zones across Europe. The analysis is detailed, and suggests that there is evidence for a link between the volcanic forcing and the hydrological response in datasets since 1850 CE.

The major weakness of the paper is that the analysis deals almost entirely with derived datasets; and makes no attempt to show the reader the time-series of the data. There is also a lack of clarity about the precise nature of the primary datasets that are used - making it difficult for the reader to compare and contrast results across different studies (e.g. what happened in 1913? or 1982?). It is essential that, in revision, the authors at

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least provide full citations and links to all of the datasets used in the analysis; and provide a fuller explanation of how they chose the datasets that are used in this analysis, and of the limitations (time, space, resolution) of each dataset.

Specific comments.

line 17 'since the second half.'- actually your records don't start until the 1877? The analysis stops at 1985.

Line 32 how can there be 'large disagreement among models' but yet be 'widely accepted' that global precipitation decreases? More careful and critical analysis of the published literature is needed here: what do the empirical observational data suggest? What do different models suggest? See for example the recent paper by Liu et al 'Global monsoon precipitation responses.' Scientific Reports, | 6:24331 | DOI: 10.1038/srep24331

Line 67 – explain why you chose to use the GISP2 record, and give the proper citation to the timeseries that you analyse in this paper (it isn't Meese et al., 1997, which presents an age model). Why not present this record for completeness; this would help the reader understand the nature of the analysis? Is it actually annual (rather than biannual?). How does the age/identification of volcanic events compare to those in Sigl et al (2015, Nature doi:10.1038/nature14565)? How are the sulphate concentrations you quote determined? (is it the sulphate deposition record, or an atmospheric aerosol record; how did the authors determine the volcanic contribution to the sulphate?) Why would you treat Icelandic (local) and non-local eruptions in the same way in your analysis? Does the time range of your analysis stop at 1985? why not extend this to include the last 30 years of analysis (and another VEI 6 eruption)?

Line 85-86 what exactly does your method do? What is the fixed threshold, and how did you identify it?

Line 237 '12 events..' please specify. Are these all large explosive eruptions? Is there

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any dependence on hemisphere/latitude of the source eruption?

Figure 1 – caption has the wrong citation?

Interactive comment on Clim. Past Discuss., doi:10.5194/cp-2016-53, 2016.