Clim. Past Discuss., 8, C1049–C1054, 2012
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Climate of the Past Discussions

Interactive comment on "An underestimated record breaking event: why summer 1540 was very likely warmer than 2003" *by* O. Wetter and C. Pfister

Anonymous Referee #1

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General comment: This paper relies on a new Swiss series of reconstructed summer temperature. As such, it is interesting. However, I think it does not meet the standard of Climate of the Past in its present form. The description of the data is really insufficient. The methodology is very poorly explained. The authors indeed do not explain neither how they treat the data (the homogeneisation procedure which is a very important stage is not describe at all, and the description of the dataset is very mean), nor how they do transform them into temperature. The individual series should be provided in an appendix. The homogenization and the calibration should be described and commented. While the authors in the introduction remind why GHD may not be reliable data regarding climate reconstruction, they use GHD and other related data to reconstruct

temperature. After having raised so many reservations it is surprising that they apply the same method they have denigrated without discussing much the uncertainties on their reconstruction, nor the possible errors or limitations. They discuss extensively the fact that 1540 could have been the hottest summer of the last 500 years. Is it an issue? I think a more interesting approach would be to discuss the variation through time of extreme events frequency and amplitude.

Most figures are of low quality and information such as units are systematically missing (see my comment in the detailed review).

For these reason I advocate for a major revision of the paper.

Specific comment: Line 23: "He demonstrated that their model overestimated the measured temperature for 2003 by 2.4 °C, whilst at the same time severely underestimating temperatures in other warm summers such as 1947, 1952 and 1945": The formulation leads one to believe that many examples of underestimations are available whereas Keenan (2007) did not produce any other one but 1947, 1952 and 1945.

Line 24: "Beniston (2004) based on documentary evidence by Pfister (1984) and Glaser et al. (199) argued that the year 1540 was warmer than 2003" . I think the authors should read more carefully Benston (200')'s work. The only reference to 1540 in Beniston's paper is in the introduction : "Research by Pfister et al. [1999], indeed suggest that 2003 is likely to have been the warmest summer since 1540". It does not mean that 1540 is warmer than 2003. It is a statement in the introduction and not a demonstration. Glaser is not even referred to.

Line 28: "The assessment of these authors is supported with the reconstruction of monthly temperature in Central Europe since 1500 (Dobrovolny et al., 2010)". The authors should calculate the T AMJJA with Dobrovolny's data. In the Dubrovolny's paper, the year 1540 is not specifically addressed, and according to their figure 11, it is not obvious than a combination involving AMJJA will be higher in 1540 than in 2003. Line 10 page 2698: "Coherent narrative. . ." What are the references?

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Line1 page 2701: “no less than 132 divergences with their corrected version”. Labbé and Gaveau (2011) add the: “83 differences are inferior to 5 days, in which case there is no effect on meteorological conclusions”. A fair citation would mention this aspect.

Line 10 page 2701: Your series is not a GHD only series as it contains 40% of other type data (wages, phenological data). In particular, year 1540 which you concentrate on is not a GHD.

Line 17 page 2701: How do you explain that the two curves are not consistent prior to 1730-1740 (precise date unreadable on this figure).

Line 28 page 2701: How scattered are the 80 villages? Are they possibly distributed at different altitudes? Do the harvest begin in all the villages at the same time? Is the name of the village where the labourer was employed mentioned in the books of expenditures? Is the final wage series an amalgam of the 80 villages?

Line 19 page 2702: Give the relevant information about the series: How long are they? What are the oldest/youngest dates? Where are they precisely from?

Line 27 page 2702: What are these phenological data? If you have no metadata accompanying them, how do you take into account altitude effects? Describe the series please: number of data, length of the records, starting-ending date, location, variety and phenological stage..

Line 9: For a discussion on grape maturity determination you should also refer to Garcia de Cortazar et al., 2010.

Line 14 page 2703: “Instead, the time of full grape-maturity was estimated from HPD as a substitute, which is also more adequate for comparisons with the 2003 harvest date in Dijon, on which the individual vine-growers decided in place of the village community”. Your reasoning is not understandable at this stage of the paper. You must reach this conclusion after having explained why you think GHD would not correspond to maturity in this case.

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Line 12 page 2704: Besançon is not in western France

Line 4 page 2705: You could also compare these dates with those reported in Daux et al. (2012) for Jura and Northern Rhône valley.

Line 12 page 2705: “around mid-August” this is rather vague. Schweinfurt is about 400 km far from Switzerland. Do you think it is an appropriate comparison?

Line 20 page 2705: Your series is not a GHD only series: 60% percent of the data are GHD, the other 40% are not. Please correct throughout the manuscript. You cannot just refer to the homogenization procedure. It must be summarized here.

Line 26 page 2705: How did you correct for the altitude? Did you use Basel altitude (which is not the place where the harvest took place) or each village altitude?

Line 16 page 2706: “merging together different, partly short, GHD series”. You must explain in details how you merge the series.

Line 2 page 2707: Can you estimate an uncertainty on the 17 days difference?

Line 5fwd page 2707: Page 2700, you develop why GHD are not good temperature proxies. You cite Guerreau (1995) who concluded that the relation between grape harvest and temperature is not stationary. Why should Swiss series be an exception to this rule?

Line 5 page 2707: What is the estimated uncertainty on your averaged GHD? At least you should discuss the value of the standard deviation. Garcia de Cortazar et al. (2010) and Daux et al. (2012) have discussed the question of uncertainty on GHD extensively.

Line 6 page 2707: there are many ways to calibrate ... you must explain how you proceed precisely

Line 10 page 2707: your target is AMJJ while Chuine et al ‘s was AMJJA. Can it explain some differences between you and them knowing that August was very hot in 2003 (as mentioned in the introduction)?

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Line 19 page 2707: 0.52°C: this is a minimum value which takes into account only the model error.

Line 25 page 2707: Except 2003, how do your extreme years compare with those in Chuine et al.? and with HISTALP data?

Line 13 page 2708: "critically verified": this aspect cannot be appreciated in this manuscript. Line 17 fwd page 2708: provide the number of data for the correlation, please. All the correlations are decreased in the 18th century. How do you interpret this point?

Line 25 page 2709: "the relationship between temperature and grape maturity is non linear": isn't your reconstruction based on a linear calculation?

Line 24 page 2711: "The temperature is 2.4°C higher than measured temperatures in Paris". The Chuine et al.(2004) paper does not pretend reconstructing the temperature in Paris but in Burgundy. The difference of temperature between the two stations can be sizable. For instance, the August Tmax in Dijon was 32.2°C, while it was 29.9 in Paris (Meteofrance web site). The difference between Tmean (not given in the website) may not be so big. Anyway, it is clear that the comparison between reconstructed and measured temperatures should definitely be made with Dijon station and not with Paris.

Figures : x-axis are unreadable or even non-existent (fig. 7). Chose a 2, 5 or 10-year interval and begin by a 10 or 5 multiple. The figures are too small. Units must be provided.

Figure 2: Situate year 1540. In the figure caption define what mean and SD refer to.

Figure 3 and related text: the regression is strongly influenced by the two outsiders. You should choose another way of calculating it (rank correlation for instance).Remove the horizontal lines.

Figure 4: there is some kind of divergence from 1990 onwards between calibrated grape harvest and measured temperature. Do you have any idea why? When you

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calibrate on 1774-1824, the verification in the 1955-2005 shows a systematic 0.5 °C bias from 1955 to ca 1990. Can you comment on it?

Tables: Table 2: Provide the dates of start and end of the series please.

Technical comments Line 20 page 2696: Âń As such. . ., long records Âż Two sentences

Line 24 page 2702: HPD's? or HPDs?

Line 7 page 2703: define BBCH

Line 18 page 2706: "location, etc:" already said in lines 12-

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Interactive comment on Clim. Past Discuss., 8, 2695, 2012.