Effects on the Czech Lands of the 1815 eruption of Mount Tambora: responses, impacts and comparison with the Lakagígar eruption of 1783

The paper provides a review on the impacts in Czech Lands of two major eruptions with well-known impacts in European climate; Tambora (1815) and Lakagigar (1783). The authors use a wide variety of datasets (observations and documentary) to put into a wider and long-term perspective analysis. Although some parts of the manuscript are interesting, the overall structure is not too clear and novelty and key results are not particularly thrilling. Thus, I consider that the paper should not be accepted as it is and should be reconsidered after the authors improve it substantially.

1. Major comments

1.1. (Novelty of datasets used and results obtained) It is not entirely clear to readers the level of novelty of the various datasets presented in section 2.2. If I understood correctly all datasets have been described/used in the past, with the exceptions of the documents related to Reverend Simon Hausner and the teacher Noviny pod Ralskem. This is important to understand if the authors have simply used datasets compiled previously (even if often by themselves) or if new datasets where explored within the scope of this particular work. **Please clarify.**

Moreover, to ensure reproducibility and homogenization of derived datasets it is common for authors to provide all methodological steps on the information and time series derived from documentary sources. Here no such information is provided in section 3 (Methods), underlining perhaps that these are not new datasets (?). **Please clarify.**

It is clear that the authors have a large experience in past-climate analysis, particularly over Czech Republic. Thus, it is expected that all relevant literature for the main topic of this work (i.e. impacts of major eruptions in Czech lands) is provided at the introduction, allowing to stress the novelties that will be investigated here. Thus it is rather strange that the first time a key reference evaluating the impact of major eruptions in the mean Czech temperature region is mentioned only at the end (Page 11), and not in the introduction (Mikšovský et al, 2014). **Please clarify.**

1.2. (Lack of statistical significance inference of several results). There are a number of interesting results describing weather/climate extremes that may be associated to the effects of both eruptions in the climate of the Czech Lands. However, many times the descriptions are not accompanied by a more robust statement on the statistical significance (or uniqueness) of the so called-extreme event. A few examples of that are highlighted here:

a) (Page 4, lines 33-36): "A message from Litoměřice dated 9 August reports a flood lasting eight days on the River Elbe after five weeks of rainy periods. The water rose to a level of two feet [c. 65 cm] under the bridge, so the structure survived, but grain, vegetable and other field crops were damaged (Katzerowsky, 1895)." **How exceptional is this situation? How many time has it occurred in the last 300 years?**

b) (Page 5, lines 8-10): "The ice was definitely gone by 8–9 March (S2). Lehmann reports a 3/4-ell [c. 58-cm]-thick crust of ice on some fields in Noviny pod Ralskem (S6). Frosty weather prevailed in March with blizzards from 26 to 31 March. April was cold and dry, with no heavy rain (S4).." **Again, to what extent are these descriptions unique in the longer term context?**

c) (Page 6, lines 5-8): Kreybich, the Žitenice cleric, reports four landslides in spring, the result of extremely wet conditions in north-western Bohemia: the first on Křížová hora Mt. north of Žitenice, the second on Trojhora Hill between Chudoslavice and Třebušín, the third at Vitín near Malé Březno (community now defunct) and the fourth east of Jílové (S3). **Are landslides very rare in the area? How often do these occur?**

1.3. (The choice of Tambora vs Lakagigar is not clear). It is not clear to readers the choice of these two eruptions that are so different in their characteristics, location, impacts, etc. A more straightforward approach would be to consider several major tropical explosive eruptions (as those listed in Fischer et al. 2007) or, alternatively, major eruptions in high latitudes (particularly in Iceland). Besides taking place roughly with 30 years apart, it is not entirely clear the rationale for the combined assessment. **Please clarify.**

Please notice that the differences between the two types of eruptions are so large that they have implications in the literature cited (that can be quite different) and even way their impact is evaluated. In particular the definition of month 0 (and in fact year

0, 1 and 2) is quite unclear to me in the case of the eruption of Lakagigar that took place between (1783 and early 1784). **Please clarify**

2. Minor suggestions/comments

2.1. (Page 3, sections methods) Please provide 1 or 2 references to support the various options explained, particularly the 5+5 years used before and after the eruption.

2.2. (Page 3, end of section 4.1) I think that this section would gain with a sentence explaining that major tropical eruptions (e.g. Tambora-1815, Krakatoa-1883, Pinatubo 1991) have the capacity to alter the radiative balance for the entire world, impinging widespread cooling at the surface level of the globe, but often inducing large-scale changes in the atmospheric circulation that can warm the continental areas in winter (see carefully Robock 2002, Science).

2.3. (Page 3, sections 4.1) The term VEI has not been described before. Please provide its meaning here when it appears for the first time (Volcanic Explosivity Index, VEI). It would be also useful to give a range of its scale between 1 and 8 (and a glimpse of the logarithmic nature of its scale, thus emphasizing the much larger volume of lava associated to a VEI-7 when compared to a VEI-6).

2.4. (Page 4, lines 1-2, Fig. 2) The 5 lines used in Fig.2 are very similar and it is not clear the exception mentioned for Brno as being particularly milder than the others for the winter 1816/1817 (?)

2.5. (Page 4, Section "The year 1815") Are the author implying that the "cold May 1815 with more frequent rain and frosts on 29–30 May" are related to the Tambora eruption? And the same doubt applies to the reference to the fruit trees eaten by caterpillar.

2.6. (Page 4, Section "The year 1815") Are the authors implying that the "cold May 1815 with more frequent rain and frosts on 29–30 May" are related to the Tambora eruption?

2.7. (Page 6, line 17) Please provide a reference to Fig.6 earlier at the end of the sentence: "…driving prices up from 1813 onwards, culminating in 1817 (Fig. 6)".

2.8. (Page 7, lines 33-38) Several specific extreme weather events are mentioned here (e.g. March 1784; April 1785). A number of works for other sectors of Europe have

been developed for the years post-Lakagigar, please provide some links to these works in terms of compatibility (or not) of the atmospheric circulation anomalies.

2.9. (Page 8, section 5.2) The contents of this section are not particularly well incorporated into the overall flow of the text. First, this discussion is not structured with Tambora being analysed after Lakagigar (that should be probably the most natural order, but the authors have preferred the reverse from the beginning). Secondly the temporal and spatial link between these various theories (earthquake in Messina 1783, Comet in 1811, Number of sunspots in 1814, etc) is not provided in a meaningful way.

Figures

Fig1 Please provide different symbols for stations with different information. For example Prague and Brno should have a distinct symbol. The same apply for those locations with just documentary sources.

Fig3. I believe the figure caption should read: "Difference between mean summer and winter…"

Fig. 6 It seems that the contents of this figure is repeated in Fig 10 (?)

Fig. 7I believe that the time delimitation of Lakagigar eruption should extend until February 1784.

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