

## **Anonymous Referee #2**

### **General comments**

Thank you for the opportunity to review this manuscript. To my knowledge, this is a first in a European (if not global) context and introduces an important new proxy for the documentary analysis of historical grain storage and hence climate variability.

The paper is beautifully written, clearly structured, contextually rich and well supported through references to previous studies. The historical context for the data is recorded clearly and succinctly, and at a level suitable for an international audience. Other than the specific point below, the methodology is clear and straightforward. The results are well presented and explained, and the statistical analysis clear and appropriate.

I really value the transparency over data availability from granaries shown in Figure 5, the corroboration of good and bad harvests from more general documentary evidence in section 4.4.1, and the comparison with wider regional studies. The discussion of the links between grain harvests and climate is strong, reflecting the multiple possible causes of a good vs. bad year. The reflections on the challenges of using grain harvest data are discussed honestly and openly. In short, aside from one relatively minor comment, I have no hesitation in recommending the manuscript for publication.

**RESPONSE:** We would like to thank the anonymous referee #2 for evaluation of our paper and raising several critical comments, which we are trying to answer below.

### **Specific comments**

Lines 168-173. I'm interested to hear more about how well this methodology deals with multi-year (as opposed to single-year) poor harvests. Did multi-year runs of crop failure occur during the study period and, if so, what happened as a result in granaries? I notice at least one instance of this mentioned in the results. There is also mention in Lines 444-446 of granaries being empty – an obvious limitation of the proxy – due to factors in addition to harvest levels.

**RESPONSE:** Multi-year poor harvests – as follows from Table 4, lasting no more than two years for a given cereal – were reflected in the second year of a bad harvest by minimal quantity of returned grain and, on the contrary, by a repeated borrowing of further grain. On the other hand, single harvest failure did not exclude the restricted return of grain, but there was no reason to borrow grain again in the subsequent year. In other words, consecutive bad harvests were primarily characterized by repeat borrowing of grain.

Line 525. Anthropogenic would be better than man-made.

**RESPONSE:** Accepted and corrected.