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Interactive comment on "Enjoying the ice. Dutch Winter landscapes, weather and climate in the Golden Age, 17th century" *by* Alexis Metzger

Anonymous Referee #1

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The "winter landscapes" crafted by sixteenth- and seventeenth-century artists in the Low Countries – especially the Dutch Republic – have become the quintessential cultural expressions of the Little Ice Age. For decades, scholars in a range of disciplines have considered what they reveal about weather and climate in the period – and what they suggest about human responses to shifting environmental conditions.

This article, then, should be considered in the context of a large corpus of scholarship. The question is: does it say anything truly new? The answer: it might, if greatly refined. The paper does not have a coherent argument, but rather asks a question: do seventeenth-century winter landscapes actually reveal winter – and thus the Little Ice Age – as it was? This is not an original question, nor is the author's means of answering it – to compare weather reports in written sources with weather depictions in paintings

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– but the answer is pursued somewhat more systematically in this article than it has been in other studies. In particular, the statistical approach used in this article strikes me – as a non-statistician – as intriguing, though it is based on a small sample (more on that below).

Indeed the paper has several serious shortcomings, which I will identify by order of severity, from most to least serious.

Most importantly, its method is clearly problematic. The author analyzes a sample of 49 winter landscapes, but the only reason for choosing that sample seems to be that they were in an international exhibition. The reason for not selecting more paintings seems to be that some have been lost or are difficult to access. While it is not necessary for the author to examine more paintings, a more convincing explanation should be given for the size of the sample.

The author attempts to compare winter weather in this selection of paintings to climate and weather as they really were. Because reconstructions that use "archives natural" do not reveal seasonal or monthly weather, he has decided to use weather diaries written by weather observers, especially David Fabricius. Yet the author has not himself examined these primary sources, but rather relied on descriptions of those sources by Jan Buisman, the author of several volumes that summarize Dutch weather observations.

There are several related problems with this approach. First, it is just not true that paleoclimatic proxy reconstructions and (not considered by the author) model hindcasts can shed no light at all on cold conditions in the seventeenth-century Low Countries. The only paleoclimatologist cited in this article is, I believe, Ulf Büntgen, and the only publication cited is an overview of the Little Ice Age written for a history journal. That is insufficient. In my view, the paleoclimatic record could have enriched the author's description of winter weather and climate in the seventeenth-century Low Countries. At the very least, the author should cite paleoclimatologists – not just historians – to

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explain why he decided not to use that record.

Second, the author himself admits that consulting Buisman – rather than the primary sources Buisman summarizes – limits his analysis. The author writes that "sometimes we must therefore 'make do' and suggest reconstructions despite [Buisman's imprecise] approximations." That is not acceptable – not only because it is unnecessary (the author could have consulted the primary sources), but also because it potentially invalidates the statistics in table 1 (the statistics that ostensibly allow the author to discern whether painters depicted real weather). The author admits that "uncertainties" in these statistics "are sometimes significant, due to Buisman's approximations." In fact, it is due to the author's decision not to consult the primary sources Buisman described.

Third, it is generally advisable for scholars to avoid using weather diaries by themselves to reconstruct past trends in weather and climate. As the author (to his credit) acknowledges, a diarist such as Fabricius did not necessarily record every change in weather, and weather diaries are inevitably biased in favor of spectacular weather. A diarist might note a storm, but not a sprinkling of rain. Over time, such omissions can skew attempts at climate reconstruction. Nor should scholars assume that weather that prevailed in one part of even a small country, like the seventeenth-century Dutch Republic, necessarily affected another part. The reason that painters did not represent a weather event recorded in a diary may simply be that that weather event did not affect their locality. The way around these problems would have been for the author to consult more sources, including not only direct written reports of weather on land but also descriptions of activities that must have been affected by weather, or observations of weather at sea, or the paleoclimatic record, for example.

The lack of references in this article to paleoclimatic studies is indicative of a larger failure to engage with the scholarship not only of climate history, but also specifically of the climate history of Dutch winter landscapes. Most seriously, the author does not cite Dagomar Degroot, The Frigid Golden Age: Climate Change, the Little Ice Age, and the Dutch Republic, 1560-1720 (Cambridge University Press, 2018), although he

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does cite Degroot's dissertation. The book contains extensive passages that explore whether Dutch winter landscapes really depicted weather as it was. While this article has the potential to build on those passages, there are parts of the article that present a less detailed and less complete overview of issues already considered in The Frigid Golden Age. That book also references scholarship on winter landscapes that should be – but is presently not – cited in this article.

More broadly, the author supports claims about the Little Ice Age, the character of climate history, and the link between climatic and social histories using a small selection of publications, all at least seven years old. Given the explosion of new scholarship in climate history, far more publications should be cited, by more diverse authors. Claims about the nature of the LIA should moreover reference paleoclimatologists and historical climatologists, not historians citing scholars in these disciplines.

The article also suffers from a host of minor factual errors and omissions. For example: on page 1, the Dutch did not just experience the LIA during the seventeenth century (but for them that century was likely the coldest of the LIA), and Brueghel the Elder (not the Older) is probably the best-known painter of winter landscapes; on page 2, the Dutch Golden Age (itself an increasingly loaded term) did not necessarily "come to an end" with the 1672 rampjaar (it is a defensible argument but not one universally accepted by historians); on page 3, the "scientific knowledge" we have of the seventeenth century is not spelled out, and a reference to present-day Dutch climate is irrelevant given how much that climate has changed; on page 4, it is not clear why the painting must depict an afternoon scene because the artist has chosen to depict many people; on page 5, it is not clear why we should care that people today care about weather (as opposed to people in the early modern past, whose attitudes scholars have explored); on page 5, the significance of a 10% shift in the "percentage covered by ice in the paintings" (itself unclear) is hard to gauge given the small sample; on page 5-6, the means of classifying winter cold should be clearly explained; on page 6, the graph does not represent the two "parts" of the seventeenth century, and the caption should

cite the source (it also requires better labels); on page 8, it is simply inaccurate that frozen water posed less of a threat to the Dutch than liquid water, given for example the peril of invasions over frozen waterways (as the author acknowledges), the risks imposed by frozen waterways, and the threat of ice dams (all clearly described in The Frigid Golden Age); on the same page, descriptions of religious and political impacts seem very simplistic; on page 9, it is simply not true that it was easier to move through the Republic in "cold winters" than in other conditions, considering the centrality of waterborne transport via canals, rivers, and the Zuiderzee. In general, the "hypotheses" present by the author for the weather conditions omitted by painters from their winter landscapes consist of vague speculation that could be enriched with deeper primary source research.

Finally, a number of typos and mistranslated expressions undermine the article. There are also a couple non sequiturs (when we find out, for example, that Aert van der Neer never achieved fame and "miserably died" in 1677).

To conclude, this article is based on an interesting idea, and the method it proposes could yield interesting results. It is fascinating to consider which weather conditions seventeenth-century artists chose to depict, and which they did not. Yet for this piece to deserve publication in Climate of the Past, it needs a stronger argument, a more convincing method, a deeper engagement with existing scholarship, a stronger grounding in primary source research, and a series of minor factual corrections. I believe the author can do it, but it will take substantial work.

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