

We thank the editor's constructive advices through the manuscript. And we've revised the manuscript in accordance with the editor's and reviewers' suggestions point by point.

Detailed response to reviewer's comments:

The responses are in blue. The revisions are marked in red in the revised manuscript.

The comments were separated into several parts and responded to point by point.

Reviewer #4:

This is an interesting work. Based on the new record and previous paleoclimatic records, as well as historical archives in Dunhuang area, the authors found a decades-scale drought/desertification event in the region during the late 15th century and early 16th century, and they associated the event with the decline of the ancient Silk Road. The work provided a novel view on the fall of trade between western and eastern Eurasia during this period, which provide a better understand of the development of the ancient Silk Road. The manuscript has been improved according to the previous comments. I recommended a minor revision before its acceptance.

1. While climatic change played an important role on the trade exchange between the Ming dynasty and the West as the manuscript suggested, the influence of social-economic and international political situation cannot be ignored. It may be even equal to the climate role. The authors have discussed the effects of warfare on the tributary trade, but it seems the information about the international political situation was absent in the manuscript. The Ottoman Empire eliminated the Byzantine Empire in 1453 AD and underwent a rapid growth across Asia, Africa, and Europe thereafter, which may block the Silk Road trade between the European and the Chinese Ming government. Meanwhile, the Ming dynasty also experienced a prosperity-to-decline convert around 1450 AD due to the Tumubao war. This was also likely to contribute to the decline of trade along the Silk road. In addition, the economic recoveries of the Ming government in the post 1450 AD, like Resurgence of Hong Zhi (1487-1505 AD), and Resurgence of Jiajing (1521-1566), may promote the trade. The authors should give some discussion on this side.

Response: Thanks for the reviewer's constructive suggestion. We agree that the influence of socioeconomic and geopolitical factors is also important. We accept the reviewer's suggestions and have added related content about the Ottoman expansion and the

Tumubao war. **Please see Line 72-74, Line 78-83.** On the other hand, the socioeconomic situation was very complicated and difficult to quantify, and it is not a major part of this research. Therefore, we did not discuss social factors in detail. We believe that there further research and debate are needed in the future to elucidate the assess the role of socioeconomic and geopolitical factors.

We thank the reviewer for the detailed suggestions regarding “the economic recoveries of the Ming government in the post 1450 AD, like Resurgence of Hong Zhi (1487-1505 AD), and Resurgence of Jiajing (1521-1566), may promote the trade”. However, after an extensive literature survey we found that many sociohistorical records focused on the gradual isolation of the governance as well as on a contraction of tribute trade during Resurgence of Hong Zhi and Jiajing; e.g.: “In 1493 AD, the Ming government rejected the tribute of Turpan and closed the tribute trade road”. “In 1524 AD, the Jiayuguan pass was closed for defensive purposes”. “In 1529 AD, the Ming reduced the number of Hami Ambassadors by 20%”. “In 1522 AD and 1532 AD, the Ming government specified that the tribute trade from Hami, Turpan, etc., was permitted every 5 years.” (Research Institute of History and Language of the Central Academy, 1962; Zhang, 1974; Tian,1999). Therefore, we did not discuss the Resurgence of Hong Zhi and Jia Jing.

References:

- Research Institute of History and Language of the Central Academy. Ming Shilu, Ming Xiaozong Shilu, Taiwan, 1962.*
- Tian, S. Tributary trade between Gansu town and in western regions in Ming Dynasty. China's borderland history and geographic studies, 1999 (01):15-24.*
- Zhang, T.Y.: History of Ming dynasty. China Publishing House, Beijing, 1974 (in Chinese).*

2. There were also some spelling mistakes should be revised. For example, Line 399 (Fig ? g, h), 409 (Fig ? b, a). Fig. 1, Tulufan should be Turfan. Alun Mountains should be Altyn-Tagh.

Response: Thanks for the reviewer's kind reminder. We have corrected the related content. Please see **Line 409 and 418, Fig.1.**

Editor's comments:

1. The new reviewer has given the manuscript a positive evaluation and has requested minor revisions. Some of these concern spelling mistakes (e.g., Turfan), which were corrected

in some parts of the manuscript but not others. The most important revisions concern the political and social causes of the decline of the Silk Road. The authors should expand this section of the manuscript to include the additional factors identified by the reviewer.

Response: Thanks for the editor's kind reminder. We have corrected the related content as the reviewer suggested. Please see **Line 409 and 418, Fig.1.**

2. In light of the reviewer's comment on social and political causes for the decline of the Silk Road, I would also ask for the following minor changes. In line 80: "for the decline of" should be changed to "for the timing of the decline of". In other words, the political, social, and economic factors already discussed – as well as those that the reviewer has indicated – seem to account for the vulnerability of the Silk Road to disruption by the late 15th century. The timing of the drought appears to account for why that vulnerable institution declined during particular decades of the 16th century and not sooner or later. Therefore, by specifying the causal claim, the authors make a stronger case for the role of climate and the relevance of their finding. As explained later in the paragraph, climatic changes, particularly drought in arid regions, have been identified as "triggers" for societal change. "Trigger" here also carries the meaning of the cause for the timing of a historical outcome rather than a complete explanation for that outcome. Although it would be possible for a drought to be so severe as to constitute a complete explanation for a historical outcome, that does not appear to be the case in this study or in the others referenced in this paragraph.

Response: Thanks for the editor's helpful suggestion. We have modified the expression as the editor suggested. Please see **Line 87**. Also, we accepted the editor's advice and replaced "trigger" with "factor" .

3. Lines 247-249: I would recommend revising this sentence for clarity. In lines 270 and 278: The phrase "warfare" should be changed to "an increase in warfare" or "an increase in the frequency of warfare". A quantitative analysis like this one can only establish whether the frequency of warfare was correlated with migration or the decline of the Silk Road. It cannot establish whether some particular war was a necessary or sufficient condition for the decline of the Silk Road.

Response: Thanks for the editor's kind suggestion. We couldn't agree more with "It cannot establish whether some particular war was a necessary or sufficient condition for the decline of the Silk Road." It is more logical and convincing and we have modified the related content. Please see **Line 253-256, 276-277, 285.**

4. Finally, I would encourage the authors to undertake a review for correct English language usage in those sections that have been revised or added since the first draft. For example: In line 23 in the abstract, "natural factors have not been adequately discussed as social aspects" should be "natural factors have not been as adequately discussed as social aspects" or better "unlike social factors, natural factors have not been adequately addressed".

Response: Thanks for the editor's kind advice. We will find an expert to polish the manuscript.