

## **Climate-driven desertification contributed to the decline of the Ancient Silk Road**

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The revised version of this article shows the following changes:

Dong et al. have generally responded positively to a number of suggestions for changes and corrections. They can be summarized as such:

1. Bibliographic additions. Numerous citations were added to the article in response to criticisms and as supplementary information.

2. Textual additions. Several portions of the text were added in response to issues raised by the reviewers. Among them the most notable are on lines 145-153, 325-333, 442-462, 487-492. The most substantial addition refers to two points raised by reviewers: first, the structural connection and causality between environmental stress and societal change and, second, the time lag between the date of desertification (~1450) and the decline of tribute missions. In my view the explanations offered do not resolve the criticisms raised.

3. Corrections and modifications. The authors accepted all minor modifications and corrections presented by the reviewers.

Assessment of the new version:

While the authors have made an admirable effort to react positively and constructively, there are fundamental objections of methods that remain unresolved.

The most important objections are two.

(1) There remains a disjuncture between the climatic evidence presented and the historical case built on the strength of that evidence. Even though the new version replaces “demise” with “decline” in reference to the Silk Road, the authors cannot explain the considerable amount of traffic that continued to take place between the oases to the west of XSW and the terminal points of the tribute trade in the east. The key problem is that the authors do not have sufficient data to document the degree to which the oasis system degraded, and over what time period.

(2) On the methodological front, the authors do not differentiate between primary causes with secondary causes of the events they discuss. In response to reviewers’ comments they added (lines 442-444) “Climatic perturbations and environmental degradation may not necessarily be a direct trigger of a societal crisis, but they may instead result in institutional

failure caused by the lack of a centralized response to an environmental crisis (Feng et al. 2019).”

This sentence is highly problematic because in the end all is reduced (whether “direct” societal failure or presumably indirect “institutional failure”) to an environmental crisis, without researching other possible causes. Moreover, the authors state that statistical methods can provide valid parameters to evaluate the incidence of war and conflicts. This is simply not acceptable when there is a very specific date (~1450) and location (XSW), which should make it easy to check what type of conflicts occurred, who initiated them, and whether they had some relevance in the abandonment of the region and possible desertification.

In sum, this reviewer cannot overcome basic objections to the general method of this article, because it sets out to demonstrate something that is pre-determined, namely that an environmental crisis is responsible (directly or indirectly) for a macroscopic historical event (that is, the decline of the Silk Road). Unless alternative possibilities are discussed in detail and with an appropriate methodology, it is impossible to see how the conclusions of the article can be sustained.

The authors may consider limiting their article to the scientific results obtained at XSW, without engaging in speculative historical hypotheses about the degree to which the environmental changes registered at XSW may have impacted the Silk Road.