

We would like to thank Martha Bell for her archaeological point of view very much. Her suggestions gave us good hints to improve to original manuscript!

1. *However, I find the linkages made to archaeological studies and cultural history to be very weak. I think that the authors have presented an overly simplistic explanation of the relationship between climate and culture change. For instance, the reference to Binford et al 1997 on page 1710 is one of the few statements of how the authors view this relationship – the authors go on to mention vaguely that the “success of pre-Columbian civilizations was closely coupled to areas of geo-ecological favorability.”*
In general these paragraphs are overly brief, not clearly written, and present only weak linkages/connections between the study’s results and Nasca and Paracas cultural history.

We re-worked the archaeological discussion completely concerning your (as well as Dr. Morales’) comments.

And of course, there is always the question of chronologic resolution in both the culture and climate records which makes analysis of the relationship(s) between these two so difficult.

We agree with your general scepticism on comparing different chronologies. However, we want to point out that we used the best available archaeological and paleoclimate chronology for this area. With that, we hope to minimize insecurities in comparing both records for this stage of research.

Then instead of stating such direct relationships to population, settlement and culture, they might propose a series of more interesting questions for future research. For example: How did the Nasca and Paracas cultures use and management water? What kinds of irrigation were practiced and how were these practices adapted to periods of greater or lesser water availability? Were water storage or drought adaptation activities used?

Thank you very much for these suggestions. We were taking care about your suggested questions and tried to answer them in the re-written chapter as far it was possible according to the current state of archaeological research.

Specific Comments:

p. 1712, line 5 – What feeds the mentioned springs? Seepage/filtration? Is this related to rainfall and ITCZ shifts?

The peatlands form below spring outlets, below groundwater seepages and in shallow valley-bottoms, threaded with streams fed from springs along the valley margin. Spring water analyses confirmed that the springs are not fed by thermal waters of volcanic origin. The knowledge about the hydrology of high-Andean cushion peatlands is still very sparse. We suggest that the groundwater reservoirs indirectly respond to precipitation changes by refilling during rainy episodes. A second important factor for the hydrology is the overall vegetation density and the presence and formation of soils in the catchment, which is controlled by climate (and land-use).

p. 1724, line 18 – Unclear reference to “now” arid conditions

This comment concerns p. 1723 (not p. 1724). We refer to Mächtle & Eitel (2012), who investigated loess accumulations in the western Andean foothills, an area which is characterized by (hyper)arid conditions today. The authors explain that these loess and paleosoil accumulations must have formed during more humid conditions than today. Further details concerning the loess topic can only be answered by the mentioned authors.

p. 1728, line 13 – What is “enforced moisture availability”?

This comment concerns p. 1727 (not p. 1728). This chapter was completely rewritten. The expression was to point to a higher occurrence of rainfall events in the Palpa-Nasca area, driven by enhanced monsoonal activity.