

## ***Interactive comment on “Re-examining the 4.2 ka BP event in foraminifer isotope records from the Indus River delta in the Arabian Sea” by Alena Giesche et al.***

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Staubwasser et al back in 2003 published an influential paper entitled ‘Climate change at the 4.2 ka BP termination of the Indus valley civilization and Holocene south Asian monsoon variability’. The paper generated a lot of interest and if I am not mistaken, was the first attempt of its kind, to reconstruct variations in Indus river discharge, and thereby, the hydroclimatic history of the region, where the Indus valley civilization emerged, prospered and declined. Fast forward 15 years, Giesche et al manuscript “Re-examining the 4.2 ka BP event in foraminifer isotope records from the Indus River delta in the Arabian Sea” seeks to confirm and improve upon the results from the orig-

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inal study. A salient and an important aspect of this manuscript is that the authors have attempted to reconstruct changes in both summer and winter Indian monsoon by adding new data through the stable oxygen and carbon isotopes analyses of two additional foraminiferal species over a targeted interval from 3.4 to 5.0 ka. They have presented their findings in the context of societal changes that occurred in this region. Additionally, their new data is a step towards a better dynamical understanding of the 4.2 ka event in the Indian subcontinent. Both are critical and important objectives. The paper is well written but its presentation could be further improved (see below). Authors are suitably careful in interpreting the proxy data. The conclusions are reasonably well supported by data and the necessary caveats are clearly noted. I, therefore, highly recommend this manuscript to be published in *Climate of the Past* with some modest revisions.

I have outlined my suggestions below that I hope authors will find useful in further improving the 'scientific and presentation qualities' of their manuscript.

**Manuscript Length:** First, I encourage authors to substantially reduce the length of this manuscript. A shortened/concise manuscript will greatly improve its readability. While the authors can decide how to best approach this, I would suggest that figures # 4, 6, and perhaps 7 (and associated discussions) can be easily moved into the supplementary section. Also, aren't Figures # 3 and 5 somewhat redundant? Can they be merged as a single figure?

**Figures Presentation:** Figure 1: Fonts are too small particularly on panels b and c. Figure 2c has multiple shades for each species. Are different shades representing sediment trap data for different depths? It is not clear from the figure caption. Figures # 3, 5, 7, 9, and 10: Loess smoothed curves are shown along with the raw data (is that correct?). The latter is shown as scatter plots, which is fine if the goal is to show the effectiveness of Loess smoothing but not very intuitive if one wishes to see the evolution of higher frequency variability in time series. I suggest perhaps one figure with scatter plot can be shown to demonstrate the idea of Loess smoothing and the rest of the

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figures can be more conventional (i.e., line plots) superimposed by smoothed curves.

Statistical Treatment I would also recommend that authors present foraminifera isotope data as z-scores or anomalies from the mean (that is of course, after initially presenting raw data). This is particularly useful as comparisons are made across the different species and proxy records.

Authors have reported the results of several statistical tests in this manuscript. It is not clear whether the statistics were performed on interpolated or raw data. This needs some clarification. What is the average temporal resolution of non-interpolated isotope data? A critical information that I could not find in the manuscript.

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