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Reply on RC1

Sarah J. Widlansky et al.

Author comment on "Terrestrial carbon isotope stratigraphy and mammal turnover during post-PETM hyperthermals in the Bighorn Basin, Wyoming, USA" by Sarah J. Widlansky et al., *Clim. Past Discuss.*, <https://doi.org/10.5194/cp-2021-83-AC2>, 2021

Thank you for your comment and for taking the time to review this work. We will incorporate your feedback in the final version. We appreciate the suggestions of Lehman et al. (2018) and Bataille et al. (2016) as examples of documenting the stratigraphy in more detail to make the results more reproducible. The next version will include an additional supplemental table of GPS coordinates as well as more detailed field maps showing the sampling locations and places where we traced beds between subsections. We will also be more specific about documenting specific marker beds that we used to correlate between sections. In a few places, we did not directly trace beds between different sections and the relative position of the sections was based on the previous stratigraphic framework for the area – referred to as “BCM levels” in the paper. This was expanded by using the differential GPS elevations and the isotope records. Bown et al. (1994) did not construct a chemostratigraphic section for the area, so it is not possible to show a chemostratigraphy that is entirely in that framework without incorporating some of our own stratigraphic measurements. Additionally, previous magnetostratigraphic work in the area (and for these rocks in general) is somewhat ambiguous and not possible to tie directly into our own sections so it is not possible to compare our sections with another existing “full composite section” from the same area. The different thicknesses measured between fossil localities in our sections and the Bown et al. (1994) section, however, do indicate some offset. Some of this may be the result of uncertainties in knowing which fossiliferous level was used in the Bown et al. sections to denote the level of a fossil locality, for localities with multiple fossiliferous levels.

We will also add a version of Figure 5 to the supplement in which we show the isotope results according to their section to help recognize and account for any stratigraphic mismatch in correlation. Due to the uncertainties, in the Fifteenmile Creek magnetostratigraphy described in the text, we would not feel comfortable placing it alongside our isotope results in Figure 5. This would introduce too much uncertainty as (1) the records were not measured concurrently and (2) previous work has identified a need for a revised magnetostratigraphy in the area (Clyde et al., 2007). Similarly, biostratigraphic correlation between Fifteenmile Creek and McCullough Peaks is complicated due to their significantly different fossil sample sizes and the relatively coarse biozonations relative to the resolution needed to differentiate the hyperthermals. Because

the biostratigraphy is not useful for confirming most of the chemostratigraphic interpretations, we've left it out of Figure 5. The exception to this is Biohorizon B, which is the best basis for biostratigraphic correlation between the two regions. It has been included for reference.