

## ***Interactive comment on “Stable isotopic evidence of El Niño-like atmospheric circulation in the Pliocene Western United States” by M. J. Winnick et al.***

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We would like to thank the reviewer for their thoughtful comments and suggestions.

- 1) We will amend the figures and text with state names spelled out for a non-US audience.
- 2) We agree with the reviewer’s suggestion of providing a more detailed description of each of the sites’ seasonal climatology in terms of the relevant air masses and will expand on sections 2.1 and 4.1 accordingly.
- 3) In terms of the plots, initially we ordered Figure 2 based on the direction of isotopic

signals, but agree that the figure would be better represented with a geographically-based order and will reformat.

4) In regards to carbonate descriptions, we did not conduct any XRD analyses. The occurrence of pedogenic aragonite is relatively rare, particularly in Tertiary-age deposits (Doner and Lynn, 1989). In addition, equilibrium fractionation factors for calcite- and aragonite-water are similar (eg.:  $\delta^{18}\text{O}$  values of aragonite and calcite forming at  $15^\circ\text{C}$  would be offset by only  $\sim 0.7\text{‰}$  [Kim et al., 2007]). The sampled sections were also not iron-rich and showed no obvious signs of hydrothermal alteration, so we did not suspect the presence of ankerite, either. Assessments of calcite re-precipitation relied on avoiding clearly weathered features. We will clarify this in section 2.1 in the carbonate descriptions.

5) We agree the reviewer, and will include a few lines on the sensitivity of the region to Northern Atlantic forcing as seen in Quaternary records in our introduction/discussion as it relates to our own conclusions. Finally, we will correct the noted typographical error as suggested.

#### References:

Doner, H.E., Lynn, W. C.: Carbonate, halide, sulfate, and sulfide minerals, in: Minerals in soil environments, edited by: Dixon, J. B., Weed, S.B., Soil Science Society of America, Madison, Wisconsin, 279-330, 1989.

Kim, S. T., O'Neil, J. R., Hillaire-Marcel, C., Mucci A.: Oxygen isotope fractionation between synthetic aragonite and water: Influence of temperature and  $\text{Mg}^{2+}$  concentration, *Geochim. Cosmochim. Ac.*, 71, 4704-4715, 2007.

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