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Comment on cp-2021-109

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Community comment on "Holocene climate and oceanography of the coastal Western United States and California Current System" by Hannah M. Palmer et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-109-CC1>, 2021

The article does good job of summarizing research on the Holocene evolution of the California Current and its affect on the climate of California. Graphics suggesting the driving forces behind this change, such as a plot of insolation change during the Holocene, would be beneficial.

As a researcher cited, I'd like to make some observations. Our studies (Barron et al., 2003, 2019; Addison et al., 2018) suggest the cool-water, upwelling regime of the California Current narrowed during the late Holocene (~3 ka) off northern and central California, possibly in response to intensification of the North Pacific Gyre Oscillation (NPGO). Testing of this hypothesis requires multiple core transects across the California Current, particularly south of Monterey where detailed Holocene records are lacking, as well as independent means of documenting the Holocene evolution of the NPGO.

Studies to the south needed, particularly in the region south of Monterey and north of Point Conception. The Santa Barbara Basin is shoreward of California Current and appears to feel the intensification of springtime upwelling at about 4 ka. Further south, off Baja California, warming of surface waters at ~4 ka has been tied to intensification of ENSO in MV99-GC41/PC14 by Marchitto et al. 2010; Science, 330). Increased opal MAR in that core also occurs at ~4 ka (Arellano-Torres et al., 2019, doi:10.1029/2018PA003479), seems to confirm that warmer SSTs, a likely indicator of enhanced ENSO expression, and increased upwelling are closely linked within the California Current.

At the same time, this ~4 ka step in the intensification of the California Current likely signals a major decline in the influence of the North American Monsoon (NAM) in southern California. The initiation of NAM decline at ~ 8 ka is proposed by Barron et al., 2012 (doi:10.1029/2011PA002235).

It is also important to note that seasonal bias of various proxies as well as the physical setting of a given core within the California Current can make comparison of Holocene records complicated. The seasonal biases of various surface water proxies tend to become more apparent during the late Holocene, as modern seasonal variation coupled with a narrowing California Current becomes more pronounced. For example, diatoms typically increase their flux to the sediments during the spring-summer upwelling season; however, *Fragilariopsis doliolus*, a subtropical diatom associated with the North Pacific Gyre, increases in relative abundance during September and October, during a period of reduced upwelling. Expression of this late Holocene change in diatom an assemblage off northern

California is proposed by (Barron et al., 2003), but this hypothesis needs further testing.

Alkenones are thought to record average seasonal SSTs near the California coast vs. winter SSTs in gyre settings (Herbert in Barron et al., 2003). Therefore, comparison of diatom and alkenone SST proxies in different settings likely will differ. Similarly, as planktic foraminiferal habitats extend deeper in the water column, various SST proxies (assemblages, oxygen isotopes, Mg/Ca ratios) are likely to vary in different settings and over the course of a given Holocene record.