

Interactive comment on “Upwellings mitigated Plio–Pleistocene heat stress for reef corals on the Florida platform (USA)” by T. C. Brachert et al.

T. C. Brachert et al.

brachert@uni-leipzig.de

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Dear editors, we thank the anonymous referee for his very competent and constructive review! The points risen in the review will clearly assist us in making the discussion and conclusions of our manuscript more concise. All aspects will be considered and used for the revision. First, the reviewer claims us not taking into account a number of papers (listed in the review) dealing directly with the data/interpretations made in the manuscript. These papers are indeed relevant to the subject and have been used in the discussion of a companion paper submitted previously to BG (Brachert, T.C., Reuter, M., Krüger, S., Klaus, J.S., Helmle, K., Lough, J.M. (2015): Low Florida coral calcification rates in the Plio-Pleistocene.- Biogeosciences Discussions, 12, 20525-20555; doi:105194/bgd-12-20515-2015). Nonetheless, we agree to refer to these studies in

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this submission as well. We will include them at relevant sections of the discussion. Second, and more severely, the anonymous referee sticks to our simplified (geologist's) approach on "upwelling" and a lack of more in depth considerations on the nature of decadal near-surface temperature fluctuations. During the study and during the preparation of the manuscript, both aspects became a more and more obvious problem when more and more datasets were prepared. In the end, we were happy to document a typical geological signature of "upwelling" in the combined data of $^{13}\text{C}/^{12}\text{C}$ and $^{18}\text{O}/^{16}\text{O}$ ratios which seem to be consistent with the signatures of skeletal calcification in z-corals. To our knowledge, there are two principal types of upwelling occurring along the peninsula today: (1) winter upwelling along the east coast associated with fluctuating wind systems, and (2) summer upwelling along the west Florida shelf driven by an enhanced loop current and/or southward winds. With regard to the Pliocene and Pleistocene interglacials, the loop current is known to have been enhanced and has been suggested to reflect a southward displacement of the ITCZ and ongoing closure of the Central American Seaway. The latter, however, seems to have been closed substantially earlier than assumed by those oceanographic studies and is, therefore, likely not critical for controlling long-term changes of the upwelling. We also do not know, how upwelling at the eastern side of the peninsula during may have affected corals living at our sampling sites in southwest during interglacial highstands of sea level. Did the complex paleogeography of the southern Florida peninsula have a significant effect in blocking currents or letting them pass? For the reason of all these unknowns, we consider the identification of the driver (and true type) of upwelling a mission impossible and suggest better leaving this question unanswered until more and better suitable data are available. In order to conform with the review, we propose to insert a short but open discussion on the types of modern upwelling around the peninsula. In case you have any question, please feel free to contact us again.

Sincerely, yours Thomas Brachert and co-authors

Interactive comment on Biogeosciences Discuss., 12, 16553, 2015.

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