

Interactive comment on “A paleoenvironmental reconstruction of the last 15 000 cal yr BP via Yellow Sea sediments using biomarkers and isotopic composition of organic matter” by A. O. Badejo et al.

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We thank Referee 2 for his/her review. The comments help us to improve or manuscript
Reply to the comments made by Referee 2

General comments: The authors reported biomarker (long chain n-alkane and alkenone) and carbon isotope (bulk organic and n-alkane-specific) records in the Yellow Sea from the Last Glacial Period (15000 years ago) to the mid-Holocene (7000 yr ago), and this paper contains valuable data for evaluation of millennial-scale climatic

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fluctuation and identification of climatic event(s) for paleoclimatology and paleoceanography in the northwestern Pacific / eastern Asian regions including marginal seas. In addition, I think that there is potential for clarifying long time scale climatic systems such as land - ocean climatic linkage associated with East Asian monsoon (EAM) in their data obtained from marginal sea area. However, explanation and discussion in the present manuscript are superficial to implicate the millennial-scale variations in paleoceanographic and paleoclimatic conditions in the study region.

Reply: We add the following discussion about the millennial-scale variations in paleoceanographic and paleoclimatic conditions in the study region. The Pr/Ph ratios and the series of laminated thin, dark layers observed in the sediment lithology corresponding to the glacial period indicated an anoxic environment that likely resulted from a lowered global sea level, which limited surface water exchange between the neighboring seas. Tada et al. (1995,1999) stated that the formation of the dark layers during late Quaternary sequences in the Japan Sea was synchronized with Dansgaard-Oeschger (D–O) cycles, thereby attributing these layers to millennial-scale variations in the northern portion of the East China Sea during cold/dry climate periods. Paleoclimatic reports from different areas have been documented showing D-O event is associated with global climatic effects. Similar millennial scale climatic variation is reported in marine records from the South China Sea (Wang et al., 1999), middle East China Sea (Li et al., 2001), Atlantic region (Hughen et al., 1996) and in European and North American pollen records (Thouveny et al., 1994; Benson et al., 1998). Wang et al., 199; Li et al., 2001 all discussed the mechanisms controlling climatic tele-connections between the East Asian millennial scale and Greenland. However true mechanism of tele-connections in the global climate system is unclear, atmospheric dynamic and oceanic circulation are two important possible mechanism (Li et al., 2001). The linkage of climates of the North Atlantic and China by the effect of the westerly winds (Porter and An, 1995) must have affected the climatic and oceanographic environment of the East Asia as a result of the changes in the intensity of East Asian monsoon circulation during the D-O cycles. As a marginal sea of the NW Pacific, the Yellow Sea is said to

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be controlled by the East Asian monsoon system. The changes in the EAM mechanism could be responsible for the paleoclimatic and paleoceanographic variation observed.

Specific comment: In particular, I entirely disagree with discussion for data of pristane/phytane (Pr/Ph) and pristane/C17 n-alkane (Pr/n-C17) ratios demonstrated by the authors. The Pr/Ph and Pr/n-C17 are generally applicable as redox or maturity proxies to significantly mature sediment samples deposited during periods other than the Pliocene. Such isoprenoid compounds are commonly identified as functionalized isoprenoid (e.g. phytol) and unsaturated isoprenoid alkene (e.g. pristene and phytene) from late Quaternary sediment. We can recognize that the pristane and phytane are very minor compounds in a chromatogram of hydrocarbon from the Yellow Sea sediment as Figure 4. It is possible that these compounds are derived from more mature organic source(s) such as fossil fuel delivered from China continent. Higher values of Pr/n-C17 ratios in sediment layers deposited during the Younger Dryas event (Fig. 6) imply that more mature organic matter such as coal might be transported more efficiently from China to the Yellow Sea, although it is only speculative.

Reply: We agree and partially disagree with the comment made. The Pr/Ph and Pr/nC17 ratio are normally applicable as redox or maturity proxies to signify mature sediment samples. We have not heard of the fact that these ratios are basically used for mature sediment samples deposited during periods older than the Pliocene. There have been various reports about the application of these ratios in younger sediments (Pliocene and Pleistocene); Kvenvolden et al 1990 (Proceeding of the ocean drilling program scientific results vol 113), Philip A. Meyers, 1993 (Marine Geology), González-vila et al, 2003 (Organic Geochemistry) and Xie, et al 2003 (Organic Geochemistry). It is true that such isoprenoid compounds are commonly identify as functionalized isoprenoid and unsaturated isoprenoid alkene because they are derived from the geological and microbial alteration of the phytol side chain of chlorophyll-a from algae, and cyanobacteria. The minor component of these compound could basically be as a result of the rate of alteration of of the phytol side chain of chlorophyll-a from algae, cyanobacte-

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ria and bacteria. Sediments older than Pliocene and Pleistocene would have a higher concentration of these isoprenoid hydrocarbon. We totally agree with the comment made that it is possible that these compounds are derived from more mature organic source(s) such as fossil fuel delivered from China continent. Higher values of Pr/n-C17 ratios in sediment layers deposited during the Younger Dryas event (Fig. 6) imply that more mature organic matter such as coal might be transported more efficiently from China to the Yellow Sea, although it is only speculative. This is because PAHs data from surface sediments from Yellow Sea and East China Sea indicates supply of coal from China to Yellow Sea (In preparation for submission). This could be a speculation for the Younger Drays event. Further studies on PAHs profile distribution should be carried out to support this hypothesis.

Other comment: Also, the English language needs major revision. The authors should be advised to seek the help of a native English-speaking colleague. The present text in the ms requires many grammatical and style corrections (it therefore, is very difficult to understand discussion/demonstration in this ms). Thus, I do not recommend publication of this manuscript until a major revision is undertaken.

Reply: All sentence in the manuscript have been checked by a native English-speaking colleague .

Interactive comment on Clim. Past Discuss., 10, 1527, 2014.

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