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Climate of the Past Discussions

Interactive comment on "Millennial-scale variability of marine productivity and terrigenous matter supply in the western Bering Sea over the past 180 kyr" *by* J.-R. Riethdorf et al.

Anonymous Referee #1

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This paper presents the first high resolution multi-proxy records beyond MIS 5e from the western Bering Sea. Age models of three piston cores appear to be well established. The presented dataset itself is valuable for paleoceanographic studies in the North Pacific realm. Therefore, I think this paper will make a valuable contribution to Climate of the Past. However, there is a room for improvement in discussions and organization of the manuscript as described below.

Major points: 1. Overall impression. The manuscript has redundant descriptions particularly chapter 4. In addition, discussions are often mixed between the author's original data (western Bering Sea) and data by previous studies (Bering Sea other than west-

ern part, Okhotsk Sea, and open subarctic Pacific). As the authors mentioned in the manuscript, paleoceanographic changes in the western Bering Sea showed different features from subarctic Pacific records. I would like to request the authors to emphasize their novel findings and suggestions based on their original data by separating previous studies.

2. p. 6157, Line 7-9. The authors mentioned that riverine source is insignificant for terrigenous input in the western Bering Sea. However, VanLaningham et al. (2009) indicated that the significance of Yukon River contribution for detrital materials in the Meiji Drift, western subarctic Pacific. Considering counterclockwise ocean circulation in the Bering Sea, I think that it is not easy to rule out the riverine source (i.e. Yukon River) on the ground of distance. See also Asahara et al. (2012) and Nagashima et al. (2012) showing the Yukon River contribution to the northern Bering slopes. Uncommon findings of drop stone in Shirshov Ridge samples suggest that sea-ice is not a main agent for transportation detrital materials?

Followings are other specific comments.

3. p. 6139, line 21. Change term from "Morphological high" to "topographic high".

4. p. 6141, line 17. Definition of "deep intermediate water" is required because this watermass is not common in oceanography.

5. p. 6142, line 20: Brief explanation about oxygen isotope offset between Uvigerina peregrina and U. auberiana are useful. Also, plot δ18O values of two Uvigerina species in fig. 3 separately.

6. p. 6143. P-Mag data qualities should be mentioned because previous study indicated notable effect of sediment diagenesis on magnetic properties in the Bering Sea (Takahashi et al., 2011).

7. p.6145, line 1-5. Core stretching effect by Széréméta et al. (2004) is a case of giant piston coring. In the subarctic Pacific and its marginal seas, lack of Holocene section is

mostly found in the northern slope of the Bering Sea and the Emperor Seamounts. On the other hand, Holocene sections composed of diatomaceous ooze were recovered from the eastern and southern Bering Sea and the Okhotsk Sea. It is hard to say that core stretching effect was a main reason for the lack of Holocene section in the studied sites.

8. p. 6145, line 25. Matul et al. (2002) is a paper of radiolarian biostratigraphy and not appropriate for a reference of opal production.

9. p. 6148, line 4-6. Describe a procedure to separate >63 μm and <63 μm fractions.

10. p. 6152, line 22-24. Explanation how to estimate Pnew is needed (Nürnberg (1995) is in German). Because Pnew estimation by Nürnberg (1995) is used Atlantic samples, the authors should indicate this method is applicable for the Bering Sea samples. Ecosystem of the subarctic Pacific including Bering Sea is quietly different from the one in the Atlantic.

11. p. 6162, line 20-21. Peak of >63 μm in BA is suggested to be caused by sudden release of IRD from melting sea-ice. If so, this region was perennial sea-ice covered during H1. It appears that coastal radiolarian species R. boreale and blackish diatoms in BA section suggest a presence of low salinity surface water, which helps sea-ice formation in winter.

12. p. 6163, line 19-25. Extremely high coarse fraction during MIS5e is very interesting finding. Nürnberg et al. (2011) did not suggest perennial sea-ice during MIS5e in the Okhotsk Sea. Is this simply explained by enhanced seasonal sea-ice during MIS 5e in the western Bering Sea?

References:

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2. Matul, A., et al., Late Quaternary polycystine radiolarian datum events in the Sea of Okhotsk, Geo-Mar. Lett., 22, 25–32, 2002.

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6. Széréméta et al.Oversampling of sedimentary series collected by giant piston corer: evidence and corrections based on 3.5-kHz chirp profiles, Paleoceanography, 19, PA1005, doi:10.1029/2002PA000795, 2004.

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8. VanLaningham, S. et al., Glacial–interglacial sediment transport to the Meiji Drift, northwest Pacific Ocean: Evidence for timing of Beringian outwashing, Earth and Planetary Science Letters 277, 64-72, 2009.

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