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Climate of the Past Discussions

Interactive comment on "Deglacial sea-level history of the East Siberian Sea Margin" *by* Thomas M. Cronin et al.

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This interesting paper addresses an important question about the last postglacial sea-level variability in the eastern Eurasian Arctic seas in relation to the recently obtained new evidence on glacial ice influence in this part of the Arctic Ocean and its margins. It is clearly written and well-structured, the discussion and conclusions are conceivable.

However, I have several concerns about the interpretation of the data presented.

1. My first concern is the dating of sediment sequences.

- The authors refer to Bauch et al., 2001 when they explain the application of $\triangle$R=50$\pm$100 years for the oldest section in core 4-PC1 from the Herald Canyon that was not affected by Pacific waters. However, in the paper of Bauch et al., 2001 the

average $\triangle$R for the Laptev Sea based on the measurements of live molluscs collected prior to 1950 and stored in the Zoological museum was estimated as 370 yrs (see their Table 1).

- When estimating the age of the section in core 20-GC from the East Siberian Sea margin I would rather rely on the dating obtained on mixed benthic foraminifers from 56 cm. The whole sediment section is bioturbated, and infaunal molluscs like Macoma could have burrowed into older sediments, like in the case with the datings at 72, 74 and 76 cm. I would suggest for the age model to take the dating on forams at 56 cm (10725 14C), the dating at 72 cm (11050 14C), and then the old dating at 81 cm (11785 14C). Thus, the time span for sediment accumulation would be rather of 12-13 cal.ka, i.e. the YD.

2. My major concern is the interpretation of the species composition of benthic foraminifers and ostracods in terms of reconstructing past water depths.

- First of all, from the point of view of statistically correct interpretation, I wouldn't calculate percentages of species in the samples that contain less than 100 foram tests, but rather present their abundance in the form of tests/g dry weight. In fact, almost all samples from the sediment section of core 4-PC1 below 504 cm contain less than 100 tests (see Supplementary material). The same is true for several samples from the upper sediment units. Ostracods are usually rather rare in sediments from Arctic shelf seas and slope. This is also the case with the samples from the current study. Most of them from both localities contain less than 10 valves. There is a slightly more abundant interval in core 4-PC1 between 504 and 427 for which the authors calculated relative abundances of species, but actually only 4 samples from this interval contain more than 20 valves, whereas 4 samples are barren of ostracods.

- All samples from core 20-GC that contain river-proximal foraminifers and euryhaline ostracods Paracyprideis pseudopuctillata and Heterocyprideis sorbyana do also contain abundant river-intermediate species and some relatively deep-water species like

Islandiella (Cassidulina) teretis among forams which is an indicator of transformed Atlantic waters in the Arctic (Lubinski et al., 2001), or ostracods Bythocythere constricta., Cytheropteron arcuatum, C. champlainum, C. porterae, C. paralatissium, C. tumefactum, Krithe hunti (see Supplementary material). Similar assemblage occurs in unit B1 of core 4-PC1. How to explain the co-existence of these ecologically different species? I would rather assign these assemblages to the environments on a relatively steep slope of the East Siberian Sea or Herald Canyon with paleodepths of 50-60 m, but in close proximity to the paleocoast from where the shallow-water species were either transported downslope with slides or ice-rafted. A "slide event" assemblage was recorded in core PS51/154-11 from the Laptev Sea slope (Taldenkova et al., 2013) at around 15 cal.ka which contained deep-water foraminifers and ostracods along with river-proximal foraminifers, C. macchesneyi and even freshwater ostracod Iliocypris bradii. According to such an assumption, around 12-12.5 cal.ka the sea-level position in both localities was close to -60 m.

- The only "true" shallow-water assemblage dominated by river-proximal species is the one in unit B2 of core 4-PC1, but its age is determined by extrapolation and not supported by any AMS14C dating. In the Laptev Sea, similar fossil assemblages with river-proximal species and Elphidium clavatum among foraminifers, C. macchesneyi, P. pseudopunctillata, H. sorbyana among ostracods and brackishwater molluscs Portlandia aestuariorum and Cyrtodaria kurriana were found in basal sediment units of cores from the outer and middle shelf retrieved from river paleovalleys (Taldenkova et al., 2005, 2008; Stepanova et al., 2012). These assemblages likely dwelled at water depths not exceeding 10 m in former river estuaries during their initial flooding by the transgressing sea. Depending on water depth of these cores that ranges between 60 and 45 m, the ages of these assemblages vary between 12.3 and 10.2 cal.ka. Particularly, in core PS51/159-10 from the Khatanga paleovalley (water depth 60 m) the estuarine assemblage occurs below 400 cm and dates back to 12-12.3 cal.ka. This allows assuming the sea level to be positioned at about -55 m around 12 cal.ka which is consistent with the model estimations and many other lines of evidence from different

Arctic regions including the Hope Valley on the Chukchi Sea (Keigwin et al., 2006).

Some minor corrections and typos: - The title might include not only the East Siberian, but also Chukchi Sea margin, as the Herald Canyon formally belongs to the Chukchi Sea.

- In Fig. 5, the plot of E. incertum percentage should be shown against X-axis range 0-40%, otherwise the visual impression is that H. orbiculare is more abundant than E. incertum, which is not the case.

- In the abstract, 6th sentence from below – the word "during" should be shifted to the right position.

- P. 6, 6th line from top – "East Siberian Sea margin" should be changed to "Chukchi Sea margin". The same correction should be made for Fig. 7 caption.

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