

Interactive comment on “Sedimentary record from the Canada Basin, Arctic Ocean: implications for late to middle Pleistocene glacial history” by Linsen Dong et al.

Anonymous Referee #2

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General Comments.

The manuscript by Linsen Dong with co-authors is devoted to solving the critical issues of the glacial history of the Canada Basin covering the last 15 MIS. The MS is characterized by a deep analysis of the obtained data, interesting and important findings. The set of methods used in this work allows obtain reliable results. The largest number of questions addressed to the authors of this MS refers to the size, timing and mechanisms of the East-Siberian Ice Sheet formation. I believe that this work makes an important contribution to the understanding of the evolution of the climate of the Northern Hemisphere in the middle-late Pleistocene and can be published after minor revision.

C1

Specific comments.

L 62-62: Existence of considerable ice masses on the onshore East Siberian margin is in serious reservations. A short article by Basilyan about glaciation on the New Siberian Islands is not convincing enough and raises many doubts, especially regarding the formation of interbedded ice, which the authors unreasonably considered to be relicts of glaciation (Basilyan et al., 2010). For example, geochemical studies of massive ground ices from the New Siberian Island showed their non-glacial origin (Ivanova, 2012, Earth's Cryosphere).

L 212-214: Have you tried to identify the Clark units (except PW) in your Core? Why do you mentioned the PW layers, but nothing has been written about the other Clark units?

L249-250: When characterizing the polymodal grain-size distribution of bottom sediments, it is meaningless to use the skewness and kurtosis (although these parameters can be technically calculated)! Using the skewness and kurtosis makes sense for unimodal curves only!

L 255-256: For a correct analysis of the modes in the plot of bottom sediments grain-size distribution, it is necessary to use a fixed distance between adjacent boundaries, which should correspond to a same module of geometric progression: ratio between neighboring fractions should have a constant value. Therefore, it is desirable to specify the number of fractions used during plotting the grain-size graphs.

L 285-289: I wonder why a maximum of dolomite in the B 11 sediment does not coincide with the Pw1 layer?

L 340: Did you study the benthic foraminifera? If benthic forams were checked in sediments, then why you didn't put the information on their content? Probably, they are absent in section? Clarify please.

L 353-355: Could you describe foraminifera in the layers "B14-16" in more details?

C2

What is their size (are they juvenile?), species? Is it possible to compare them with the foraminifera *Globigerina quinqueloba* from the Clark's unit "G" (Clark et al., 1990)?

L 405: Mode 2 "around 7-7.5 mkm is too coarse for suspension plumes. ...". It depends entirely on the water current velocities. Even at low currents speeds of 0.1 cm/s (or even less!) the particle of this size can be transported by currents in suspension without problems. You can check it on the "Hjulstrom curve".

L 540-542: The statement that the smectite, kaolinite and chlorite correspond to the East-Siberian Ice Sheet is questionable. The content of kaolinite and smectite in the sediments of the East Siberian Sea is not high (e.g. Stein, 2008; Wahsner et al., 1999). The high content of smectite and chlorite comes to the Chukchi Sea mainly through the Bering Strait and therefore occupy western part of the Chukchi Sea in a greater degree. In general, the content of chlorite is more or less close to the Siberian Arctic seas Can you confirm the link between clay minerals and fine sand statistically (by calculating the correlation coefficient)?

L 648-649: "..., with Siberian sources predominating early and late glacial stages (MIS 12-14 and MIS 4-6, respectively)..." Siberian sources really quite probable for MIS 4-6, however, are doubtful for the MIS 12, as it contains high amounts of dolomite (fig. 5).

L 1122-128 – FIG 1: In Figure 1, there is no difference between the Banks and Victoria islands. However, Victoria Island is composed primarily with platformal dolomites, whereas Banks consists mainly of clastic rocks.

L 1158-1161 – Figure 5: For the convenience of sedimentary environments analysis, the distribution of the sand fraction should be added to the Figure 5.

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