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Interactive comment on "How sensitive are modeled contemporary subsea permafrost thaw and thickness of the methane clathrates stability zone in Eurasian Arctic to assumptions on Pleistocene glacial cycles?" *by* Valentina V. Malakhova and Alexey V. Eliseev

Anonymous Referee #2

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Problem of HSZ stability at Arctic shelf during glacial-interglacial cycles was studied in this paper with a single column model. Paper is interesting, original, appropriate for the journal and can be published after major revision.

General comments: I am agree with Referee 1 that main deficiency of the paper is that the aim of the study, as well as main goal aren't formulated accurately. Also in the introduction one can't find exact formulation of what is known and what is not known about the subject under consideration.

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Discussion paper

Specific comments: One of main conclusions in the paper is that for HB not larger than tens meters temperature change is main driver for the changes of HSZ boundaries, while pressure change is crucial for deeper HB. This conclusion seems improbable. For example, at 600 meters increase of pressure by 10 atm (100 meters of water column) should produce the same effect as decrease of temperature by approximately 2 K according to curve of methane hydrate stability. But figure 1e shows that temperature change at 600m is as large as 5 degrees and should produce larger effect. At 300 meters, increase of pressure by 10 atm produce the same effect as cooling by 4 degrees, but fig.1d show cooling by 5-10 degrees. The seeming coincidence of maximum HSZ extension and maximum sea level during interglacials shown in fig.1f can be explained by delay of cooling wave with increase in depth. So, categorical statement that increase of pressure rather than cooling is a primary source of increase of HSZ volume for deep HB should be removed from abstract, conclusion and the end of chapter 2. It would be useful if authors present figure similar to their Fig.1f (and may be 1d, i.e. for HB=50m) but for experiment with prescribed change of pressure only with surface temperature fixed at -1.8C during 400 kyrs.

Minor comments: P.2, line 25-32. Why TB =-1.8C is not the same as Tf=-1C? This point should be explained.

P.2, line 32. Coefficient for specified initial linear temperature profile in K/m should be presented in the paper.

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