Review of egusphere-2022-208
Anonymous Referee #2


Ou uses simple ice-sheet and climate models to propose a theory related to Dansgaard/Oeschger (D/O), Heinrich (H) and Younger Dryas variability.

The author makes hypotheses related to the origin and processes involved in this millennial-scale variability. These hypotheses guide the choice of parameters used in the simple models (heating parameters, duration of events...). The author explores 2D regime diagrams of a few physical variables (e.g. subpolar temperature, density surplus, MOC) and then concludes that all the millennial-scale variability is due to meltwater input, and distinguish the processes (geothermal heat trapping, surface melt of the ablation zone, meltback of the LIS by interglacial warmth) leading to this meltwater input for D/O, H and YD. The author further concludes that this millennial-scale variability does not involve “ocean mode change”, noting that the meaning of “ocean mode change” is unclear.

The main issue with the manuscript is that the conclusions are unsubstansiated.

The tools used for the purpose of the study are not appropriate to study the origin of D/O, Heinrich or YD variability. Similarly, the simplicity of the climatic model used does not allow conclusions related to the role of ocean and sea-ice variability associated with these abrupt climate change events.

I also note that most of the literature published over the last 20 years related to processes involved in D/O, Heinrich and YD variability has been ignored.