

Interactive comment on “Database of global glendonite and ikaite records throughout the Phanerozoic” by Mikhail Rogov et al.

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This is a very nice, complete compilation, and has been much-needed by that part of the palaeoclimate community that work on glendonites. There are only a few minor edits I would suggest:

20: “. . .mainly due to their (possible) utility for palaeoenvironmental (especially palaeoclimatic) reconstructions. . .” I think the word “possible” should be added as this is still debated among the palaeoclimate community.

70: discussion on transformation from ikaite to water and vaterite, calcite, aragonite. . .could cite Tang et al. 2009 (J. Applied Crystallography) who also show ikaite transforming to vaterite before the calcite.

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75: “Purgstaller et al. (2017) showed that the formation of anhydrous calcium carbonates is controlled mainly by the prevailing physicochemical conditions, such as the Mg/Ca ratio of the aqueous medium and water availability.” - Stockmann et al., 2018 (Applied Geochemistry) also show this, and should probably be cited here.

90 – 95: “The size of natural modern ikaite clusters. . .” Are all of these from personal observation or are there published studies you used to determine this? (in which case, cite them).

100 – 105: Petrography and Cathodoluminescence: You cite studies that have used these techniques: we have just published CL, SEM element maps, and thin section work on the Danish Fur Formation glendonites (Vickers et al., 2020, Nature Communications) that you might want to include here.

120: “Besides multiple carbonate generations, some detrital material is typically also found in glendonites” - They also tend to have a high OM content - enough that can be measured for stable isotopes by dissolving the carbonate (we did this with subsamples of the Danish Eocene glendonites, see Vickers et al., 2020 for the data).

165: “Interestingly, most glendonite occurrences have been reported from the northern Hemisphere, which is challenging to explain.” - Could it be partially due to there being fewer high latitude southern hemisphere outcrop studies? Could it be that since many of the Mesozoic and early Cenozoic S. hemisphere studies are based on cores, they may not have sampled rare glendonites in the successions?

180: “It should be noted that the giant glendonites from Denmark are mainly embedded in post- PETM rocks, but clumped isotope data from the glendonites are indicative of near-freezing temperatures” – we also present new clumped and stable isotope data for the Danish Eocene mega-glendonites in Vickers et al. (2020).

180-185: “only a single occurrence has been reported from the Barremian.” – Who reported this?

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225: However, experiments carried out during the last few years have revealed at least short-term ikaite stability at much higher temperatures, up to 30-35o C” – also Stockmann et al. (2018) could/should be cited here.

Figures: Overall very nice figures. Figure 4, however, the dots showing glendonite/ikaite locations are very small. I think you should make the dots bigger as it's hard to distinguish some of them at this scale (particularly the purple ones)

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