

Page 4 Lines 9-15: Is it possible that the recorded patterns are diachronous between different ocean basins? How sure are the authors that the Northern Atlantic/Western European records are representative for the global oceans? I think this merits at least a little bit of discussion.

Figure 2:

It is unfortunate that such a large portion of the recorded patterns are forced by the Northern Atlantic/Western European records. Perhaps the authors could color-code the datapoints in A to show the regions where these datapoints are derived from?

In addition, I am a bit troubled by the atmospheric CO₂ reconstruction used in this study (based on the compilation in Hönisch et al. 2012). It is odd that the lower Jurassic values are so much higher than the mid-Cretaceous values, while we know that the mid-Cretaceous (Cenomanian-Turonian) was characterized by exceptionally high pCO₂ concentrations. I believe the authors should have a look at some other pCO₂ reconstructions, for example the one recently published by Witkowski et al (2018) in Science Advances; or the modelling work by e.g. Dana Royer. Including more compilations and reconstructions would greatly improve the manuscript.

Page 7: Is it possible that these patterns are only representative for the depicted region (the North Atlantic & Western Europe)? Can the authors argue why they believe the patterns in this rather limited (and restricted) region are representative for the global oceans?

Page 7 Line 3: I am not familiar with the term “Viking Corridor”. Can the authors explain this? Or provide a reference to a study that does?

Page 7 line 7: in the record of Aubry et al. (2005), the coccolith size actually already starts increasing in the Late Jurassic. In addition, I wonder, why would Cope-Depéret’s rule not yet be in place in the Middle Jurassic?

Page 7 Lines 10-11 *“Hence, this Invasion phase reflects a ~80 Myr-long gradual invasion of world open oceans by calcareous nannoplankton during the Jurassic-Early Cretaceous time interval.”* => It is interesting to see how the radiation/invasion over this interval directly and indirectly, led to a proliferation of various benthic groups such as burying and swimming crabs and irregular echinoids as well as nektonic groups such as ancyloceratine heteromorph ammonites. See the study of Fraaije et al (2018) for this. Perhaps worth mentioning?

Page 7 Lines 16-17: can the authors elaborate a little bit more on which type of specializations they are talking here? Which kind of ecological conditions?

Page 7 lines 22-23: How does this work? What forces this “establishment phase”? I see that the authors discuss this topic further on in the manuscript, but in its current form, this sentence triggers the big “why?” question. Why did less species, with smaller sizes, dominate? What forces this>?

Page 9 Line 28 *“within less than..”*: this “within” feels a bit superfluous. Maybe just “in less than..”?

Page 9 Line 32: Why is “Specialization” capitalized here?

Page 10 Lines 15-22 *“This phase was not related to major physical or chemical changes, climatic and environmental parameters showing steady-state dynamics”*: With major pulses of mid ocean spreading, oceanic anoxic events, soaring pCO₂ concentrations, major climate shifts, major evolutionary developments in many biological groups, the Early Cretaceous to Late Cretaceous, a period of ~60 million years (!), can hardly be called *“a relatively stable environmental setting”*. I suggest the authors rephrase this paragraph.

Page 10 Lines 22-23: => this bottom-up control of the marine ecosystem structuration also led to the emergence and dispersion in the different higher-tier trophic levels, discussed earlier (Fraaije et al. 2018).

Page 11 Lines 3-4: Perhaps the authors can elaborate a little on why the diatoms diversified over this time interval? This group appears to have shown an adaptive radiation tied to higher dissolved silica concentrations and stronger circulation and upwelling from the mid-Cenozoic onwards (Falkowski et al., 2004).

Page 11, Lines 15-16 *“The first phase, Early Jurassic to Early Cretaceous, corresponds to the nannoplankton oceans' Invasion marked by an increase in NAR and in species richness along with a quite steady coccolith mean size.”* This sentence is difficult to follow. Please rewrite.