Environmental change and morphological variability in mid-Cretaceous planktic foraminifer, *Muricohedbergella delrioensis*

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The mid-Cretaceous climate maximum (CCM) (approximately 90–98 Ma) is one of the typical examples of the green house intervals. Comparing to the modern Earth system, there must be significantly different interactions between Earth's surface environment and marine biota in this extreme condition. Oceanic Anoxic Events (OAEs), which are accompanied by extinction of surface dwelling microorganisms, e.g. planktic foraminifers, radiolarians, etc., are one of the well known perturbations in the CCM (e.g. Leckie et al., 2002). The other minor events have also been identified in the CCM. For example, mid-Cenomanian Event (MCE) is considered as a precursor event of OAE2 at the Cenomanian/Turonian boundary. However, precise interactions between oceanic surface environment and planktic foraminifers at the MCE are still poorly understood.
We here examined morphological variability, the maximum diameter and the total number of chambers, of the mid-Cretaceous planktic foraminifers, *Muricohedbergella delrioensis*, across the MCE. The specimens were obtained from ODP Site 1258 at Demerara Rise, equatorial Atlantic. Carbon and oxygen isotopic data from the same samples we utilized, published by Moriya et al. (2007), enabled us to compare our results on morphological variability with those isotopic records. The maximum diameter becomes smaller in the sequence younger than the MCE, which is accompanied by decrease in the total number of chambers within a single individual. According to the modern cultivation experiments, the maximum dimeter and the total number of chambers become greater with increase in feeding frequency (Bé et al., 1981). These results indicate that *M. delrioensis* older than the MCE might have more feeding opportunity than those younger than the MCE. Additionally, we analyzed a coiling (sinistral/dextral) ratio of *M. delrioensis*. The coiling ratio shows a significant correlation with the oxygen isotopic composition, hence temperature. The correlation between the coiling ratio of *M. delrioensis* and temperature has also been reported by Desmares et al. (2016). Our results reconfirm their implication. Considering modern examples showing genetic discrepancy between sinistral and dextral morphotypes in the species having a correlation between a coiling ratio and ambient temperature (Darling et al., 2006), the coiling direction of *M. delrioensis* might indicate existence of potential cryptic (sub)species.

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