

Biostratigraphy and assemblage of middle Cretaceous planktic foraminifera in the Vocontian Basin, southeastern France

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Planktic foraminifera is useful tool for international biostratigraphic correlation, and numerous planktic foraminiferal biostratigraphy have long been studied for the Cretaceous deep-sea cores and sections. However, these deep-sea sediments contain few macrofossils, the relationship between macrofossil and microfossil biostratigraphies have not been well constrained. Vocontian Basin sequences exposed in southeastern France were accumulated in the continental slope in northern Tethys Sea, and contain abundant calcareous marine macro and microfossils. The Vocontian Basin sequence is regarded as one of the representative sequence in Tethyan realm because GSSPs of the Bathonian (Jurassic), Hauterivian, Albian and Cenomanian (Cretaceous) are placed in the sequences. Recent studies elucidate detailed stratigraphy of the calcareous nannofossils, macrofossils, carbon- and osmium-isotope stratigraphies of the Albian-Turonian interval in the Vocontian Basin (e.g., Giraud et al., 2013, Du Vivier et al., 2014, Gyawali et al., 2017). On the other hand, planktic foraminiferal biostratigraphy has not studied for the Albian-Turonian sequence except for boundaries of Albian/Cenomanian and Cenomanian/Turonian (Kennedy et al., 2000; Grosheny et al., 2006; Takashima et al., 2009). In this study, we developed Cretaceous planktic foraminiferal biostratigraphy and assemblage of the Vocontian basin and integrated it with other stratigraphic records such as carbon isotope, calcareous nannofossil and ammonites.

The studied 1030-m-thick sequence of the Vocontian Basin ranges from Middle Albian to Turonian and consists mainly of hemipelagic marl and limestone with intercalations of black shales in OAE1d and OAE2 horizons. Following twelve planktic foraminiferal zones were identified from the studied sequence; *Ticinella primula* zone, *Ticinella praeticinensis* zone, *Pseudothalmaninella ticinensis* zone, *Thalmaninella appenninica* zone, *Thalmaninella globotruncanoides* zone, *Thalmaninella reicheli* zone, *Rotalipora cushmani* zone, *Thalmaninella greenhornensis* zone, *Praeglobotruncana algeriana* zone, *Whiteinella archaeocretacea* zone, *Helvetoglobotruncana helvetica* zone, and *Marginotruncana schneegansi* zone. Most of our result are consistent with the result of Geologic Time Scale 2020, there is a significant discrepancy between integrated stratigraphy of the Vocontian Basin and GST 2020 as for the stratigraphic position of *Thalmaninella reicheli* Zone. Our integrated stratigraphy demonstrates that *Th. reicheli* zone occurs in the Mid Cenomanian Event I, while Geologic Time Scale 2020 implies that *Th. reicheli* zone is placed much lower level than MCE I.

We also reconstructed the changes in marine environment during middle Cretaceous. Based upon the planktic foraminiferal assemblage, studied period divided into six intervals. From the OAE1d to Albian/Cenomanian boundary, it would be oligotrophic or mesotrophic condition. It turned eutrophic from the Albian/Cenomanian boundary to Lower Cenomanian Event II, and from Lower Cenomanian Event III to just before OAE2, it could be oligotrophic. At OAE2, the drastic change in planktic foraminiferal assemblages suggests marked eutrophic conditions. Eutrophic or mesotrophic conditions would have remained in the Turonian interval after OAE2.

Reference

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