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Using Calcareous Nannofossil Biostratigraphy to Improve the Identification of the Albian-Cenomanian Boundary

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Identifying the Albian-Cenomanian boundary has proven to be difficult due to taxonomic discrepancies associated with the foraminifera used to mark this boundary. *Thalmaninella globotruncanoides* and foraminifera that co-exist at this stratigraphic level are difficult to distinguish due to the presence of transitional forms. As a result, it is important to find other microfossil markers to aid in identifying this boundary.

The first appearance datum (FAD) of *Calculites anfractus* is the secondary calcareous nannofossil marker for the basal Cenomanian; however, *C. anfractus* is not a reliable marker as it is rare. In addition, holococcoliths do not occur in all oceanic settings because they are more susceptible to dissolution than heterococcoliths. Currently, the last appearance datum (LAD) of *Hayesites albiensis* and the FAD of *Corollithion kennedyi* are used to estimate the Albian-Cenomanian boundary. Although these markers are reliable, it is necessary to refine the nannofossil biostratigraphic resolution in this part of the column to improve the accuracy of placing the boundary.

Seventy-three smear slides were analyzed from DSDP Sites 137 and 547. Approximately 500 specimens were counted and two additional traverses were scanned for rare species. The data were then analyzed using a probabilistic biostratigraphic method known as RAnking and SCaling (RASC).

Lithraphidites eccentricum was previously believed to have an FAD in the middle Cenomanian because it was assigned an age based on its co-occurrence with planktonic foraminifera from the *Rotalipora cushmani* Zone and *Rotalipora appenninica* Subzone; however, a taxonomic review later showed that the FAD of *L. eccentricum* co-occurs with foraminifer *Hedbergella libyca,* which went extinct shortly after the Albian-Cenomanian boundary. This study corroborates this finding as the FAD of *L. eccentricum* is observed below the FAD of *C. kennedyi* (100.45 Ma). The LAD of *Gartnerago stenostaurion* is another event that was placed in the upper Albian; however, this study shows that *G. stenostaurion* has its LAD in the lower Cenomanian. The LAD of *G. stenostaurion* almost coincides with the LAD of *Gartnerago chiasta*, which is dated at 99.94 Ma. Furthermore,a transitional morphotype between *Corollithion signum* and *C. kennedyi* was observed at Site 547 close to the Albian-Cenomanian boundary. These transitional morphotypes exhibit a thick central crossbar and a more hexagonal shape, similar to that of *C. kennedyi*; however, the morphotype lacks optically split crossbars. This indicates that this is not *C. kennedyi*. These transitional morphotypes have an LAD before the FAD of *C. kennedyi* and potentially have biostratigraphic significance. It is important to note that this is a preliminary finding and more localities need to be assessed to determine the extent of its distribution.

In addition to the LAD of *H. albiensis* and the FAD of *C. kennedyi,* this study proposes using other lower Cenomanian bioevents to improve the resolution in this part of the stratigraphic column. The revised stratigraphic positions of the FAD of *L. eccentricum* and the LAD of *G. stenostaurion* as well as the newly identified LAD of the *C. kennedyi* morphotype should be used in conjunction with other bioevents to better constrain the Albian-Cenomanian boundary.