



FORAMS 2006

Benthic foraminiferal change and sea level across the Cretaceous/Paleogene boundary at Brazos River, Texas

Robert P. Speijer¹; Peter Schulte²; Hartmut Mai³ & Christoph Meisen³

¹*Department of Geography and Geology, K.U.Leuven, 3001 Leuven, Belgium
robert.speijer@geo.kuleuven.be*

²*Institut für Geologie und Mineralogie, Universität Erlangen-Nürnberg,
D-91054 - Erlangen, Germany*

³*Department of Geosciences, Bremen University, 28334 Bremen, Germany*

It is often suggested that late Maastrichtian eustatic sea-level change caused particular sedimentary features of the K/P boundary and contributed to biotic turnover prior to or at the boundary. Benthic foraminiferal distributions provide excellent opportunities to reconstruct changes in water depth through time and thus to unravel sea-level histories. In this study, we investigate two cores drilled close to the Brazos River outcrops, together constituting an expanded succession of 15 m of the uppermost Maastrichtian (Biozones CF2 to CF1) and lower Danian (Biozone P0 to P1a). The quantitative benthic foraminiferal record shows a succession of three distinct assemblages. The Corsicana assemblage is dominated by *Clavulinoides trilatera*, *Anomalinoidea* spp. and *Planulina nacatochensis*, together consistently constituting 70-80% of the benthic assemblage (fraction >125µm). This late Maastrichtian benthic fauna is stable up to the base of the Chicxulub-ejecta-rich K/P event bed, with few first or last appearances. Planktic/benthic ratios vary between 75 and 90%, but remain high and stable up to the top of the Corsicana Fm. The stability of the fauna indicates a constant paleodepth of ~ 100m during the latest Maastrichtian. The K/P event bed marks an abrupt faunal change in the benthic foraminiferal assemblage. The post-event assemblage during Zone P0, immediately above the event bed constitutes a new fauna with a subordinate component of Corsicana taxa. The four most common Corsicana taxa compose between 1-18% of the new fauna. *Pseudouigerina naheolensis* is the first new species to appear, composing up to 42% of the assemblage. It is followed by other common species such as *Eponides elevatus*, and *Cibicides newmanae*. P/B ratios in this interval gradually drop from a peak value of 80% just above the event bed to just a few percent during Zone P0. It is remarkable that within this interval there is a one-to-one match with samples that contain a relatively large proportion (8-18%) of Corsicana benthic taxa. This relationship

strongly suggests that a significant proportion of both foraminifera groups is reworked (washed in) within this interval. At the same time the total number of foraminifera is extremely low directly above the event bed (~20 specimens per gram), but gradually increases to 100 specimens/g in the upper part of Zone P0. Paleobathymetric estimates of this interval are uncertain, because the fauna is quite unusual, reflecting variations in food and/or oxygenation rather than changes in paleodepth. However, sedimentologic and mineralogic parameters suggest neither shallowing nor deepening during the lowermost Danian. With the appearance of the benthic taxa *Alabama midwayensis* and *Anomalinoides midwayensis* during Zone P α -P1a, a typical benthic Midway-fauna was established; other common taxa are *Anomalinoides acutus* and *Gyroidina subangulata*. Only a few other species, such as *Pulsiphonina prima*, and *Cibicidoides alleni*, are observed in this interval. Only scattered single specimens of the Corsicana taxa are observed within this Midway assemblage, suggesting that there was limited – if any – erosion of upper Maastrichtian beds into this interval. The gradual formation of the Midway assemblage coincides with increasing P/B ratios, up to ~50% at the top of the Littig Member. The Midway fauna typifies deposition in a middle to outer shelf setting (50-100m), so the depositional environment at Brazos during Biozone P α -P1a appears to have shallowed somewhat relative to the latest Maastrichtian, a scenario that is also supported by sedimentological mineralogical data. In conclusion, there is no indication of sea-level change prior to the K/P boundary and the Danian record merely suggests gradual shallowing, probably reflecting a late high-stand systems tract. The Brazos data do not support eustatic sea-level change as an important controlling parameter in the global biotic turnover across the KP boundary.