



Experimental validation of Planktic Foraminifera Fragmentation Index as Proxy for the end-Cretaceous Ocean Acidification

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The final ~60 ky of the Maastrichtian leading up to the Cretaceous-Tertiary boundary mass extinction at Bidart (France) show records of poor carbonate preservation, the final ~25 ky being critical. This event has been proposed as evidence for ocean acidification immediately preceding the mass extinction. High planktic foraminifera test fragmentation index, anomalously low bulk-rock magnetic susceptibility and peak mercury content in this same interval link this crisis interval to peak Deccan volcanism in India. New results provide experimental validation for fragmentation index as an authentic proxy of end-Cretaceous ocean acidification event.

Pristine Cretaceous planktic foraminifera morphotypes were exposed to buffers of pH 8.0, 7.5, 7.0 and 6.5 for 15 days each and their preservation state was quantified as a function of time. The critical variables affecting test vulnerability and taphonomy are morphology, pH and time of exposure. Thin-walled fragile biserial species such as *Heterohelix globulosa* and *H. planata* are the most susceptible to dissolution, followed by simple coiled forms such as *Rugoglobigerina* sp. and *Hedbergella* sp. The globotruncanids appear to be least susceptible to chemical and physical damage. Tests exposed to low pH conditions clearly show a higher vulnerability to fragmentation. These results indicate a strong influence of chemical and physical taphonomy on planktic foraminifera census data with serious palaeoenvironmental implications. Results also indicate that an overestimation of the abundance of environmentally sensitive Cretaceous species (e.g. globotruncanids) due to taphonomic bias could result in underestimation of the degree/nature of faunal crisis and tempo of extinctions in the pre-extinction acidification interval.