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On Planktic Foraminifera Calcification Crisis in the Deccan Benchmark Interval of Bidart, France

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The Late Maastrichtian Deccan volcanic pulses contributed to a cumulative biotic stress that set the stage for the Cretaceous-Palaeogene boundary (KPB) mass extinction. The high-flux emissions of volcanogenic CO₂ and SO₂ into the atmosphere likely led to ocean acidification. The resultant carbonate crisis has been hypothesized as a key stressor for marine calcifying biota such as planktic foraminifera. The final ~50 ky of the Cretaceous at Bidart (France) record a unique concurrence of anomalous bulk-rock low magnetic susceptibility, high Hg/TOC, and high planktic foraminifera fragmentation index. This study documents new evidence of a biological (calcification) crisis in the geochemical and taphonomic Deccan benchmark interval.

The onset of the hypothesized acidification interval (~0.5 m below KPB) coincides with abrupt changes in the relative abundances of the heavily calcified globotruncanid (~30 to ~17%) and larger biserial tests (~38 to ~55%). The absolute abundances of target groups/species however show a marked decline in both the biserials and globotruncanids. The counts per gram within the benchmark fluctuate considerably. At the KPB, the relative abundances of robust tests are high, partly due to taphonomic overestimation. However, absolute abundances unequivocally show a decline in all analyzed groups e.g., globotruncanids, biserials, racemiguembelinids and *Planomalina brazoensis*. The benchmark interval also records smaller-than-average test sizes of *Globotruncana arca*, *Globotruncana mariei*, *Heterohelix globulosa*, *Pseudoguembelina hariaensis*, *Pseudotextularia elegans*, *Pseudoguembelina carsayae*, *Pseudoguembelina palpebra*, *Rugoglobigerina rugosa* and *P. brazoensis*, indicating intraspecific dwarfing. This same interval also records a measurable decrease in the test-wall thickness amongst adult (>150 µm) specimens of *H. globulosa*, *R. rugosa*, *P. elegans*, *P. brazoensis*, further substantiating a carbonate crisis. The interpolation of geochemical, taphonomic and the new biological evidences strongly validate an ocean acidification event spanning ~50 ky preceding the KPB, a duration more consistent with Deccan volcanism as the cause.