Planktonic foraminiferal and geochemical record across the Cretaceous-Paleogene boundary (K-Pg): evidence from the Neo-Tethys, Turkey

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The end-Cretaceous mass extinction is a unique event such that it potentially coincides with both the Chicxulub bolide impact and the Deccan volcanism. Among these two drivers, the role of the Deccan volcanism is crucial to decipher if there is a causal relationship between volcanism and environmental stress, and if so, how stressed the environment was during the latest Maastrichtian. To assess the cause-and-effect relationship between Deccan volcanism and climate change and mass extinctions, high-resolution biostratigraphy, quantitative species analysis coupled with geochemical measurements have been performed on complete sections of Mudurnu-Göynük and Haymana basins (Turkey).

Detailed quantitative study on planktonic foraminifera of the Haymana Basin revealed that planktonic foraminiferal community in the latest Maastrichtian is dominated by ecological generalists with small, simple morphologies (e.g., *Heterohelix, Globigerinelloides, Guembelitria*). Among them low oxygen tolerant *Heterohelix globulosa* is the most dominant taxa and their abundance changing with the presence of stress marker *Guembelitria cretacea*. In all sections, the K/Pg boundary itself is characterized by 2-3 mm thick reddish oxidized layer which corresponds to sudden annihilation of large, ornamented ecological specialists (e.g., *Globotruncana*, *Rugoglobigerina*, *Racemiguembelina*). Right after the boundary, there is an acme of calcareous dinoflagellate cysts (*Thoracosphaera*) and a surge of *Guembelitria cretacea* indicate ecosystem collapse in post-K/Pg environment.

On the other hand, detailed quantitative analysis shows a systematic reduction in the species richness throughout the *Plummerita hantkeninoides* Zone corresponding to the final 150 kyr of the Cretaceous. Proliferations of the *Guembelitria cretacea* through late Maastrichtian is known as an indicator of high terrigenous influx; therefore, enhanced food resources. The high sedimentation rates observed in all the studied sections might be linked to increased greenhouse conditions due to Deccan volcanism leading to enhanced weathering. Overall, our multiproxy approach including quantitative biostratigraphy and geochemical analyses highlights the influence of the Deccan volcanism by releasing high amounts of atmospheric CO_2 and SO_2, leading to the climatic changes and associated biotic stress, which predisposed faunas to eventual extinction at the K/Pg boundary.

Keywords: Mass Extinction, K-Pg boundary, Planktonic Foraminifera, Paleoecology, Deccan Volcanism, Turkey