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Main Deccan volcanism phase ends at K-T mass extinction: evidence from the Krishna-Godavari Basin, SE India

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Recent studies indicate that the bulk (80%) of the Deccan trap eruptions occurred over less than 0.8 m.y. in magnetic polarity C29r spanning the Cretaceous-Tertiary (K-T) boundary. Determining where within this major eruptive phase the K-T mass extinction occurred has remained problematic. For this reason, models estimating the biotic and environmental consequences have generally underestimated the rate and quantity of Deccan gas emissions by orders of magnitude leading to conclusions that volcanism could not have been one of the major causes for the K-T mass extinction. In this study we report that the most massive Deccan trap eruption occurred near the K-T mass extinction. These results are based on sedimentologic, microfacies and biostratigraphic data of 4-9 m thick intertrappean sediments in four quarry outcrops in the Rajahmundry area of the Krishna-Godavari Basin of southeastern India. In this area two Deccan basalt flows, known as the Rajahmundry traps, mark the longest lava flows extending 1500 km across the Indian continent and into the Bay of Bengal. The sediments directly overlying the lower Rajahmundry trap contain early Danian planktic foraminiferal assemblages of zone P1a and mark the evolution in the aftermath of the K-T mass extinction. The upper Rajahmundry trap was deposited in magnetic polarity C29n, preceding full biotic recovery. These results suggest that volcanism may have

played critical roles in both the K-T mass extinction and the delayed biotic recovery. The presence of calcrete nodules at the base of the intertrappean sediments and lateritic paleosoils at the top reflect significant climatic fluctuations from semi arid seasonal to humid conditions. Subsequent weathering of huge basalt areas, mainly into smectite clay mineral, may explain the global climate and ocean chemistry perturbations observed trough the KT transition, especially in the delayed biotic recovery.