

Deccan Volcanism and the KT Mass Extinction: A New Perspective on Global Effects of Volcanism

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Recent studies indicate that Deccan volcanic eruptions occurred in three main phases with the initial relatively small phase-1 eruptions at 67.5 m.y., the main phase-2 with ~80% eruptions over a relatively short time interval in magnetic polarity C29r, and the last phase-3 in the early Danian base C29n. Here we report the global biotic and environmental effects of each of these Deccan volcanic phases that demonstrate not only the strong cause-and-effect relationship with the Cretaceous-Tertiary (KT) mass extinction, but also the climate and environmental changes associated with the initial phase-1 and the last phase-3 in the early Danian that resulted in the long delayed biotic and environmental recovery. Data are based on ONGC wells from the Krishna-Godavari and Cauvery Basins and from KT sequences of the Tethys Ocean.

The first direct link between Deccan volcanism and the KT mass extinction was established in Rajahmundry quarries (Andhra Pradesh) and ONGC wells from the Krishna-Godavari Basin where the world's longest lava flows (known as upper and lower Rajahmundry traps) are recovered extending >1500 km across the Indian continent and out into the Bay of Bengal (Keller et al., 2008). Biostratigraphic studies of thick intertrappean sediments reveal earliest Danian (zones P0-P1a) planktic foraminifera overlying the lower traps, which places the (KT) mass extinction at the end of the main phase-2 Deccan volcanism. Corroboration of these results is found in central India (Jhilmili, Chhindwara District, Madhya Pradesh) and Meghalaya (Keller et al., 2009a,b; Gertsch et al., in prep.). ONGC wells reveal the nature of the mass extinction in intertrappean sediments between four lava flows of the lower trap basalts in C29r. Preliminary results show that after the arrival of the first lava flow, over 50% of planktic foraminiferal species disappeared, after each subsequent basalt flow more species disappeared and the mass extinction was complete by the fourth and last flow. Deccan eruptions thus strongly indicate a cause-and-effect relationship with the KT mass extinction.