

Is Deccan Volcanism the real cause for the KT Mass Extinction?

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Could Deccan volcanic eruptions in India be the real cause for the KT mass extinction? Several recent discoveries strongly suggest this possibility: (1) The main phase (80%) of Deccan Trap eruptions likely occurred over as little as 10,000 to 100,000 years (Chenet et al., 2007, 2008). (2) The KT mass extinction coincides with the end of this main phase of volcanism (Keller et al., 2008, 2009a,b). (3) The longest lava flows in Earth's history, spanning 1000 km across India and out to the Gulf of Bengal, mark this phase of Deccan volcanism and the mass extinction. (4) SO₂ emissions associated with just one of these major volcanic pulses, or megafloes, are on the order of SO₂ emissions estimated from the Chicxulub impact; the total SO₂ emissions during the main phase of Deccan volcanism are estimated at 30 to 100 times that of the Chicxulub impact (Chenet et al., 2007, 2008). Thus, the short duration of volcanic eruptions and repeated massive SO₂ injections may have caused a deadly runaway effect that lead to the K-T mass extinction.

Critical new data on the KT mass extinction comes from investigations of Deccan Trap outcrops in central India, quarry outcrops in SE India (Rajahmundry) and subsurface cores from the Krishna-Godavari Basin, SE India, by the Oil and Natural Gas Corporation of India (ONGC). In eight subsurface cores examined, a total of 9 volcanic megafloes have been identified as occurring in very rapid succession. The biotic effects of these megafloes can be evaluated based on planktic foraminifera, which suffered the most severe mass extinction of all organisms. After the first megafloe more than 50% of the species disappeared and with each new megafloe more species died out culminating in near total mass extinction coincident with the last megafloe at the KT boundary. After the mass extinction, no megafloes reached the Krishna-Godavari Basin for about 250-280 ky during which a low diversity early Danian assemblage of small new species evolved. The last major Deccan volcanic pulses began at the C29R/C29N boundary and appear to have been the cause for the long delay in the full biotic recovery. Deccan volcanism can thus explain both the KT mass extinction and the long delayed biotic recovery that has been an enigma for so long.

Chenet et al. (2007): EPSL 263, 1-15.

Chenet et al.(2008): JGR J. Geophys. Res. 113, B04101.

Keller, G. et al. (2008): EPSL 268, 293-311.

Keller et al.(2009a): JFR 39(1), 40-55.

Keller et al. (2009b): EPSL, 2009 (in press).

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