

Atmospheric halogen and acid rains during the major Deccan episode: magnetic and mineral evidences

Eric Font^{1*}, Sébastien Fabre², Anne Nédélec³, Thierry Adatte⁴, Gerta Keller⁵, Cristina Veiga-Pires⁶, Jorge Ponte¹, José Mirão⁷, Hassan Khozyem⁴ and Jorge Spangenberg⁴.

¹ IDL-UL, Instituto Dom Luís, Universidade de Lisboa, Portugal

² IRAP, Université de Toulouse, France

³ GET-UMR 5563, Université de Toulouse, France

⁴ ISTE, Geopolis, CH-1015 Lausanne, Switzerland

⁵ Geosciences Department, Princeton University, Princeton, NJ 08544, USA

⁶ CIMA-FCT, Universidade do Algarve, Campus de Gambelas, 8005-139 Faro, Portugal

⁷ HERCULES, Evora, Portugal

*Corresponding author: Eric Font, IDL-FCUL, Instituto Dom Luiz, Universidade de Lisboa, Edifício C8-8.3.22, Campo Grande, 1749-016, Lisboa, PORTUGAL. Phone: +351 217500811; e-mail: font_eric@hotmail.com

Abstract

Environmental and climatic changes linked to Deccan volcanism are still poorly known. A major limitation resides in the paucity of direct Deccan volcanism markers and in the geologically short interval where both impact and volcanism occurred, making it hard to evaluate their contributions to the mass extinction. We investigated the low magnetic susceptibility interval just below the Iridium-rich layer of the Bidart (France) section, which was recently hypothesized to be the result of palaeoenvironmental perturbations linked to paroxysmal Deccan phase-2. Results show a drastic decrease of detrital magnetite and presence of fine specular akaganeite, a hypothesized reaction product between FeCl₂ from the volcanic plume with water and oxygen in the high atmosphere. A weathering model of the consequences of acidic rains on a continental regolith reveals nearly complete magnetite dissolution after about 33,000 years, which is consistent with our magnetic data and the duration of the Deccan phase-2. This discovery represents an unprecedented piece of evidence of the nature and importance of the Deccan-related environmental changes.

Keywords: akaganeite, Deccan, mass extinction, acid rain, rock magnetism, weathering model.

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