Geophysical Research Abstracts
Vol. 15, EGU2013-5791, 2013
EGU General Assembly 2013

Magnetic and mineral markers of atmospheric halogen and acid rains during the major Deccan episode

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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.