



Environmental magnetism of intertrapean Deccan deposits: unravelling local paleoenvironmental during Phase 1 and 2

Eric Font (1), Thierry Adatte (2), Jorge Ponte (1), Alicia Fantasia (2), José Mirão (3), Bandana Samant (4), Dhananjay Mohabey (4), and Fabio Florindo (5)

(1) Universidade de Lisboa, IDL, Lisbon, Portugal (font_eric@hotmail.com), (2) ISTE, Geopolis, CH-1015 Lausanne, Switzerland, (3) HERCULES, Evora, Portugal, (4) Department of Geology, Nagpur University, Nagpur 440 001, India, (5) Istituto Nazionale di Geofisica e Vulcanologia (INGV)

The Deccan phase 2 is a crucial period characterized by the rapid eruptions of huge volume of continental flood basalts correlated in age to the mass extinction of the Cretaceous-Paleogene boundary. However, local to global paleoenvironmental changes during the Deccan Phase 2 are still badly known. Here we provide new environmental magnetic data coupled to scanning electron microscopy of intertrapean deposits from the Deccan Volcanic Province (India) in order to unravel local paleoenvironmental conditions during periods of volcanic quiescence in the aftermath of the Deccan Phase 1 and Phase 2. Our results show that the magnetic mineralogy of these lacustrine and fluvial sediments is composed by several populations of iron oxides and sulphur, with a large range of grain size, probably resulting from different source of magnetic carriers (aeolian, detrital and bio-chemical). The number of magnetic phases identified using unmixing Isothermal Remanence Magnetic techniques is significantly higher (2 to 4) in the Podgavan section equivalent to Phase 2 than in the other studied sections, interpreted to result from higher weathering rates (acidity) by correlation with index of chemical alteration. Detailed scanning electron microscopy analysis of the Podgavan section reveal a complex mineralogy constituted by detrital magnetite, spherical and framboidal magnetite, microsphere of silicon, pyrrhotite, sylvite, manganese oxides and sporangiospores. A peculiar interval observed in the middle part of the Podgavan section, and corresponding to a thin interval of organic-rich clay capped by a thin oxidized level of reddish clays, show the presence of calcite needles and very fine hematite pigment. Hematite pigment are systematically associated to voids and form structures comparable to the blueberry hematite formed on mars. The abrupt transition from organic-rich levels (reducing conditions) to red hematitic clays (oxidation) suggests drastic and abrupt paleoenvironmental changes and acid conditions during the Deccan Phase 2.

Keywords: Deccan, lacustrine sediments, environmental magnetism, acid rain, climate, weathering, volcanism.