Abstract

We analysed the geochemical and mineralogical aspects of sedimentary beds associated with Deccan volcanism exposed in the eastern part of the volcanic sequence in the Jabalpur–Mandla–Chhindwara (JMC) sector (Madyha Pradesh) and in the Nand–Dongargaon (ND) basin in Central India. These sediments were deposited in terrestrial environments before the onset of the volcanic activity or during periods of quiescence in mainly alluvial-limnic to lacustrine facies. Deposited at different stratigraphic levels within the Deccan lava pile, they provide crucial evidence to evaluate environmental changes on land induced by the onset of the volcanism in the central part of India. Our results indicate that sediments (intertrappeans) deposited during Deccan volcanism do not reflect the same depositional characteristics as sediments (Lameta Formation) preceding volcanic eruptions. The sedimentological and mineralogical observations indicate alluvial-limnic environments under semi-arid climate during deposition of the Lameta sediments. This could explain the low concentration of organic matter, which probably underwent excessive desiccation/oxidation processes under semi-arid conditions. The eruption of Deccan volcanic flows severely affected environmental conditions. Intertrappean sediments associated with Deccan phase-1 and phase-2 were deposited in terrestrial to lacustrine environments under semi-arid climates with dry and humid seasons, which are highlighted by the predominance of smectites resulting from basalt alter-ation. Organic matter is well preserved in the sediments deposited in phase-1 and indicates a mixed source with well-preserved lacustrine organic matter and terrestrial inputs. The subsequent intertrappean sediments within phase-2 are strongly influenced by Deccan volcanism characterized by high volcanic content associated elements (Ti and Fe) and high chemical alteration (CIA-K) that likely reflects increasing acid rains rather than climatic change. In addition, a sharp decrease in pollen and spores coupled with the appearance of fungi mark increasing stress conditions, which is likely a direct result of volcanic activity. Bulk organic geochemistry points to a strong degradation of the autochthonous organic matter, suggesting that the biomass was oxidized in acidic conditions triggered by intense volcanic activity.