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Palaeopedologic investigations from the intrabasaltic bole beds (palaeosols) occurring in the Bopdev ghat section of the Deccan Traps, south of Pune (India): Implications for palaeoclimates during Deccan volcanism

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Geochemical characteristics of the intrabasaltic bole beds (palaeosols) occurring in the Bopdev ghat section of the Deccan Traps, south of Pune was used in deducing the palaeoclimatic conditions prevailed during their formation. Red, orange and green coloured clayey bole beds occur as intercalations between the basaltic lava flows and show variations in their environmental conditions of formation. CIA values indicate that the red boles show higher weathering intensity and much leaching of the bases than the green & orange boles which is also substantiated by Weathering Potential Index (WPI) values. Parkers Weathering Index (PWI) values indicate an enrichment of calcium during the formation of red boles thereby indicating aridity. The MAP values point toward formation of most of the bole beds in quite rainier conditions under variable but low temperatures. Iron species ratio, gleization and Product Index values suggest strongly oxidizing and more acidic conditions for red boles than green and orange boles. More retention of original mafic components in red boles and felsic components in green boles indicate selective dissolution of mafic components from green boles in more acidic fluids. More hydrolysis and less calcification in green and orange boles point towards more arid conditions during red bole formation than green and orange boles. The values of salinization indicate that the red boles were formed under fairly leached but relatively poorly drained conditions. A-CN-K plots indicate smectite formation in red boles while green and orange boles show trend towards illite formation. SiO₂-Al₂O₃-Fe₂O₃ plot does not show any lateritization but only kaolinization stage indicating incipient weathering in bole beds. In conclusion the red boles were formed as a result of intense weathering under strongly oxidizing, acidic but arid (less hydrolysis) environment with fairly leached but relatively poorly drained conditions than the green boles, suggestive of distinct weathering regimes. Thus it can be inferred that climatic conditions during the formations of the red, green and orange boles were markedly different. Much intense weathering under stronger oxidizing, more acidic and quite arid conditions indicate harsh climates during the bole bed formations which can be related to the distresses due to Deccan volcanic activity at K/T boundary event.

