

Paper Number: 443

Palaeoclimatic imprints revealed from the Deccan intrabasaltic palaeosols from the Lonand area (Satara district) of Maharashtra (India)

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Intrabasaltic palaeosols (bole beds), from Salpe ghat section and Kharadewadi village, preserved between the basaltic lava flows of Deccan Volcanic province were studied for their palaeoenvironmental conditions in comparison with the associated basalts and modern basaltic soil. The bole beds show variegated colours between deep red, chocolate brown, buff and violet. In general bole beds show Chemical Index of Alteration (CIA) values between 64.65 and 68.76 indicating considerable weathering intensity than their parent basalts which is also reflected in the Bases/R₂O₃ ratios. The values of hydrolysis, calcification, salinization, product index etc. show some distinctions, in these two widely separated areas, pointing towards the variations in the conditions of their formation. While the Mean Annual Precipitation (MAP) values (755 to 816 mm/yr) indicate quite wetter conditions for the bole beds than for the modern soil of Holocene (approx. 404 mm/yr) the Mean Annual Temperature (MAT) values, however, do not show any significant variations. The ratios between original mafic to felsic minerals show more preferential leaching of mafic minerals from the bole beds indicating more acidic conditions for the dissolution of augite from the parent basalts which is also supported by the values of Product Index. Although rare earth element (REE) concentrations indicate their depletion in bole beds from the Salpe ghat section and an enrichment from Kharadewadi area; in both the areas LREE enrichment is seen. (Gd/Yb_N) versus (Eu/Eu*) plot indicates no recycling during bole bed formation and are products of *in-situ* basaltic weathering although they were affected by intracrustal differentiation. SiO₂-Al₂O₃-Fe₂O₃ plots indicate that the bole beds were the products of incipient basaltic weathering and not the results of lateritic condition. As compared to the climatic conditions prevailing during the formation of modern soil (Holocene) the bole beds could have been formed under high rainfall resulting into higher hydrolysis and less calcification. However, salinization values suggest that the conditions might have been considerably variable with regards to the drainage i.e. between well-drained to poorly-drained conditions, which is also supported by A-CN-K plots.

