

KIMBERLITE EMPLACEMENT MECHANISMS PART 2 : THE SASKATCHEWAN PERSPECTIVE

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The Cretaceous crater-facies kimberlites of central Saskatchewan differ from the classic southern African diatremes (cf. Part 1). The Saskatchewan kimberlites were emplaced in poorly consolidated Upper Cretaceous sediments that overlie Palaeozoic indurated carbonates below which is the Precambrian basement. The shallow bodies (100m deep) flare rapidly towards surface and have diameters up to ~1300m. No root or diatreme zones were developed (cf. Parts 1, 4). The bodies formed by two distinct processes : (1) explosive crater excavation and (2) subsequent crater infilling. Little or none of the explosively disrupted country rock material was deposited back within the craters but no extra-crater deposits are preserved. The bodies flare out from a well known aquifer at the base of the Cretaceous. It is proposed that the craters were formed by phreatomagmatic processes.

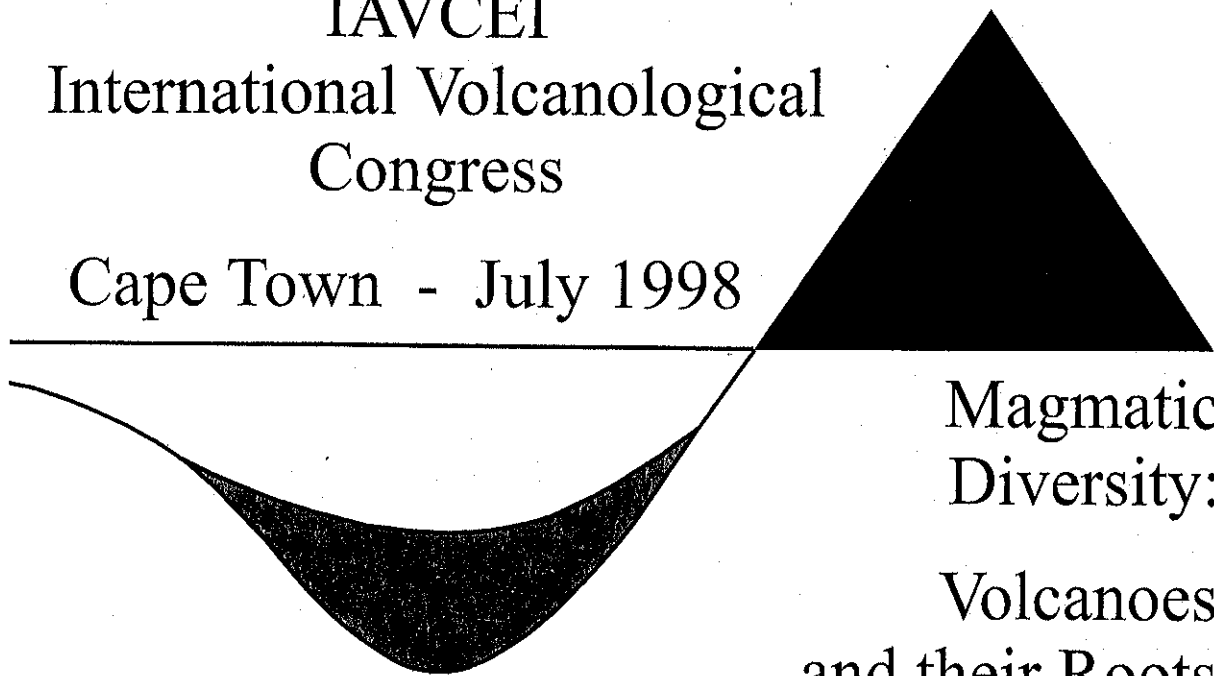
The craters were rapidly infilled predominantly by subaerial primary pyroclastic processes. Hawaiian-Strombolian style eruptions formed tuffs containing common amoeboid shaped juvenile lapilli which can be vesicular as well as unusual olivine crystal tuffs. Much more explosive kimberlite-specific eruption styles result in the formation, within the craters, of unique mega-graded beds (up to 90m thick) containing pelletal lapilli. These deposits and other textural features reflect the unusual properties of kimberlite magmas, their low viscosities and high CO₂ contents.

It is suggested that this Saskatchewan maar-like model is a second emplacement process for kimberlites. The differences primarily reflect the near surface country rock geology. The interpretation of the Saskatchewan kimberlites validate, rather than negate, the classic diatreme emplacement model.



IAVCEI
International Volcanological
Congress

Cape Town - July 1998



Magmatic
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11-16 July, 1998
Cape Town - South Africa

Abstracts
