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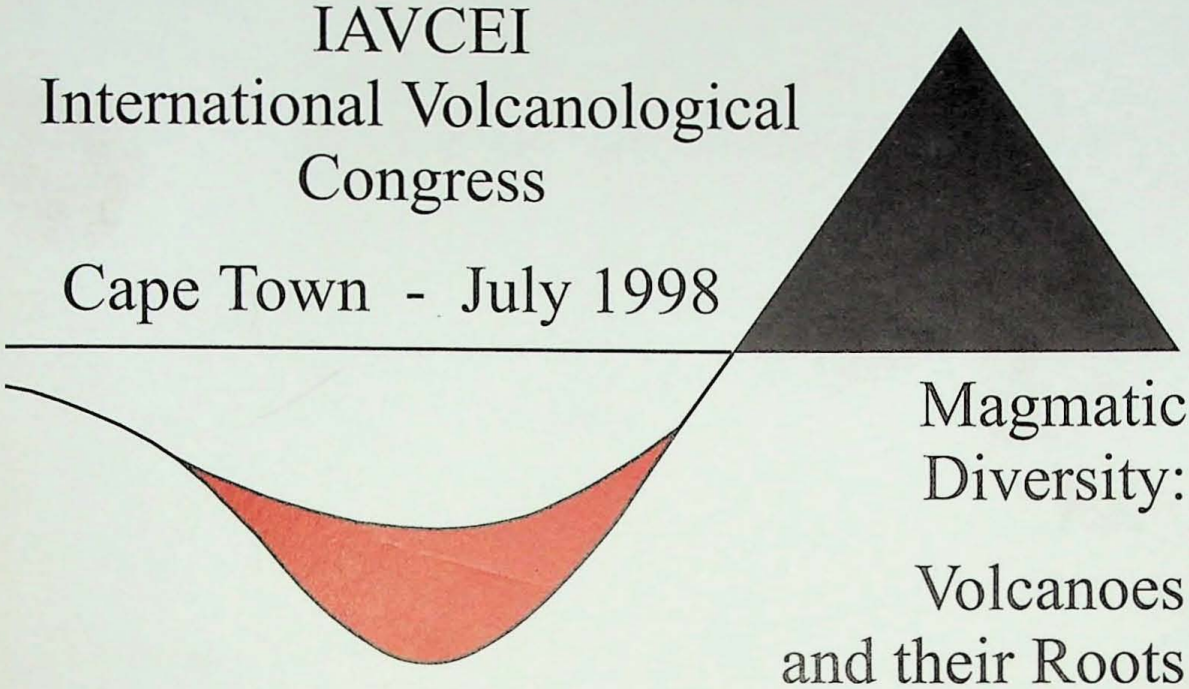

Magmatic Diversity:

Volcanoes and their Roots

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Abstracts

THE KERGUELEN PLATEAU, SOUTHERN INDIAN OCEAN: RECENT GEOPHYSICAL RESULTS

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The Kerguelen Plateau is a Cretaceous and Cenozoic giant mafic igneous province in the southern Indian Ocean. It is mainly submarine, covers an area of 1.54×10^6 km^2, and rises 1000-3500 m above adjacent seafloor. We recently acquired the first deep multichannel seismic reflection data over Kerguelen, including a 16 s profile across the entire plateau from the presumed Cretaceous oceanic Enderby Basin on the west to the Tertiary oceanic Australia-Antarctic Basin on the east. The plateau's western flank, as well as Elan Bank, a western spur of the plateau, are characterized by numerous intrabasement reflections dipping basinward, suggesting subaerial basalt flows. In general, igneous basement of the western plateau is relatively smooth and undeformed, and it too is characterized by many intrabasement reflections of variable dip. Normal fault scarps of the 77° Graben disrupt the central plateau, and likely result from transtension. The eastern plateau contains two major sedimentary basins and shows many small basement faults and possible intrusions; intrabasement reflections are observed in places. At the base of the plateau's steep eastern flank in the abyssal Labuan Basin lie the East Kerguelen (sediment) Ridge and channel, presumably created by vigorous, north-flowing Antarctic Bottom Water. The Labuan Basin, conjugate to the enigmatic Diamantina Zone south of Broken Ridge and the Naturaliste Plateau, contains the thickest (~3 s two way travel time in places) sediment in the entire Kerguelen region. Significant erosion of Labuan Basin sediment is probably related to uplift associated with the Eocene breakup of Kerguelen and Broken Ridge. Adjacent to the Labuan Basin, basement of the relatively young, thinly sedimented Australia-Antarctic Basin shallows 1 s two way travel time relatively abruptly, indicating a major discontinuity in crustal age.

INTERACTION BETWEEN CRYSTAL-RICH SILICEOUS MAGMA-WET SEDIMENTS AT DIFFERENT LEVEL OF EMPLACEMENT

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In Puna Argentina outcrops synsedimentary intrusions like crystals-rich dacitic sills, lacoliths and cryptodomes emplaced in early Ordovician submarine silt-sandstone turbidites. Detailed analysis allowed to identify different interaction features among them.

Megapeperites (6 to 10m thick) with dacitic angular fragments (0.2-1m) enclosed in abundant (15-20%) massive siltstone matrix were recognized at the tops of cryptodomes, in the interface with sediments. They show towards the cryptodome increasing packing and gradation to a jig-saw autobreccia breccia (10-15m). Also were found megapeperites with ragged lensoid-shaped dacitic blocks (0.1-2m long) on top and laterally of lacoliths composed mainly by hyaloclastites. Globular peperites with blob-like and irregular dacitic fragments of reduce size (2-5cm) immersed in silicified structureless siltstone are developed on top and base of sills (15-30m thick). Mean while in some others sills no clear interaction contacts was recognized. In the peperites described is common observed in the interface sediment/dacitic fragments quenching textures with granulation and shattering of the lava, grading outward to microbreccia with angular crystals and original glassy fragments dispersed in a massive and silicified sediment.

The interactions magma/wet sediments of the examples go from development of large peperites result of steam explosive expansion as cryptodome reach the sediment-water interface or produced by expansion of intensely heated pore fluid of wet sediments in contact with magma, to formation of microglobulares peperites or negligible reaction contacts. This spectrum of textures, among the same magmatic and sedimentary host members, points out different levels of emplacement for the synsedimentary intrusions.

MAGMA CHAMBERS BENEATH CALDERAS IN TAUPO VOLCANIC ZONE, NEW ZEALAND

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Taupo Volcanic Zone (TVZ), New Zealand, is a region of exceptionally high heat flow and high eruption rate, with at least 34 ignimbrites erupted from at least 8 calderas or caldera complexes in the last 1.6Ma. A combination of detailed pumice geochemistry of TVZ ignimbrites, studies of rare plutonic lithic fragments within the units and an assessment of subcaldera structure have provided important constraints on magma chambers from which the ignimbrites were erupted. Compositional variation of pumices within the ignimbrites is controlled largely by open system processes such as magma mixing and syn-eruptive mingling from separate magma batches, rather than by a progressive eruption from a single large zoned magma chamber. Evidence for these processes is given in posters within this symposium. In extreme cases high-Ti andesitic ignimbrites indicate mixing and syn-eruptive mingling of large quantities of andesitic and rhyolitic magma. Rare plutonic lithic fragments (granitoid, leucogabbro, dolerite and microdiorite) found in many ignimbrites are subvolcanic equivalents of TVZ eruptives. Most granitoids are considered on geochemical grounds to be co-magmatic with the host ignimbrite, but those from the Rotoiti ignimbrite represent an incompletely solidified intrusion related to an earlier ignimbrite. This is the subject of another paper in the symposium.

CARBONATITIC MAGMATISM IN THE PARANÁ-ANGOLA-ETENDEKA SYSTEM

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In the Paraná-Angola-Etendeka system, the variation of incompatible elements for Early Cretaceous tholeiitic rocks, both high- and low-Ti, and for coeval potassic rocks, displays a systematic negative anomaly for both Ta and Nb. By contrast, in the Late Cretaceous potassic and sodic rocks we observe for Ta and Nb a tendency to a form positive anomaly and strong positive spike, respectively. Tertiary to present day sodic rocks have positive Ta-Nb anomalies both in oceanic and continental occurrences. The rocks with potassic affinity, as Tristan da Cunha and Gough, show a tendency to a reversed relationship.

The Sr-Nd isotope system for coexisting silicate rocks and coeval carbonatites from Early to Late Cretaceous occurrences, clearly shows a tendency to vary from the enriched quadrant to BE.The silicate rocks of post-Cretaceous times consistently show a shift from bulk earth to the depleted mantle. These rocks are essentially sodic, Tristan and Gough excepted. We note in conclusion a shift towards DM with the decreasing time and from potassic to sodic compositions. Model ages (DM) illustrate a progressive younging of possible mantle sources with the changing geochemical character from potassic-carbonatitic to sodic rocks. This may reflect the evolution of a lithospheric mantle, where mantle small volume melts prevailed in the generation of the Early Cretaceous and Late Cretaceous potassic magmatism in well defined regions.