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DIAMONDIFEROUS KIMBERLITES AT ORRoroo, SOUTH AUSTRALIA

R.V. DANCHIN, J.W. HARRIS, B.H. SCOTT SMITH AND K.J. STRACKE

Stockdale Prospecting Ltd., 60 Wilson Street, South Yarra, 3141, Australia

A suite of Jurassic dykes and associated blows ranging in thickness from a few millimetres to 30 metres occur near Orroroo, South Australia. All the intrusions at surface are extensively altered but most of them are apparently petrographically similar and can be identified as altered phlogopite-rich kimberlites. Fresh material was obtained from one of the dykes at 60 metres depth. This borehole core can be classified as a hypabyssal, calcite, phlogopite kimberlite. Mineral chemistry of olivine and groundmass phlogopite, tetraferriphlogopite rims, serpentine, perovskite, spinel and clinopyroxene are characteristic of kimberlites. Whole-rock geochemistry of this dyke is also typical of such mineralogical varieties of kimberlite.

The kimberlite dykes can be divided into three main geographic groups each falling on a different, but sub-parallel, strike line. Variations in the nature of the heavy mineral concentrate and diamond content correlates with this grouping. Together with the petrography, this suggests that the dykes were intruded as three separate, but related pulses. Although no ultramafic xenoliths were found, the chemistry of garnets, ilmenites, diopsides and spinels is discussed.

Details of the shape and colour of the diamonds recovered from the kimberlites are given. Enstatite and magnesio-wustite occur as inclusions in the diamonds.

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mineralogically similar and classification as macroporphyritic and aphanitic-hypabyssal facies, ilmenite-rich phlogopite kimberlites would be appropriate. The mineralogical similarities of the two textural types of kimberlite are reflected in similar bulk rock compositions, although minor trace element differences are noted. In addition to a geochemical examination of the major xenocrysts, the relationships between the dominant matrix minerals have also been investigated. Of particular interest is the presence of chromian-rich ilmenite inclusions in olivine and occasionally phlogopite phenocrysts. Mantle xenoliths comprising phlogopite-ilmenite assemblages and clinopyroxene-ilmenite intergrowths are observed, though rarely. The mineral chemistry of these xenoliths has been documented and will be compared with examples from other kimberlites. From the petrographic and geochemical investigations the two textural varieties of kimberlite are apparently related, possibly through filter pressing processes and/or multiple intrusion.

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THE PETROLOGY OF OLIVINE MELILITITES FROM NATAL, SOUTH AFRICA

E.A. COLGAN

De Beers Consolidated Mines Limited, Kimberley, South Africa

Six new occurrences of olivine melilitites have been discovered on the East Coast of South Africa. These occur as small pipes and dykes in north central Natal. They are important as they are the first recorded occurrences of alkaline ultrabasic magmatism in this area. The rocks intrude sediments of the Karoo and Cape Supergroups. The occurrences are mineralogically similar to those found on the West Coast (Moore 1979).

Petrographically both diatreme facies and hypabyssal facies textures are recognized. The diatreme facies rocks consists of varying proportions of country rock fragments, rounded 'pellets' and earlier generation fragments of olivine melilitite and phlogopite phenocrysts set in an extremely fine-grained matrix of rare clinopyroxene microlites, secondary clay minerals and cryptocrystalline carbonate. The earlier generation fragments are extensively altered but relicts of olivine, melilite, perovskite, phlogopite and small spinels can be recognized. These are set in a base of secondary clay minerals and lesser cryptocrystalline carbonate.

The hypabyssal olivine melilitites are porphyritic rocks. They consist of phenocrysts of altered olivine and minor augite, phlogopite and ilmenite in a finer grained groundmass. This consists of altered melilite, phlogopite, diopside, apatite, spinels and perovskite set in a base of serpentine and minor calcite.

These rocks are similar to kimberlites in several respect i.e. their mode of emplacement, textures and to a limited extent their mineralogy.

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THE 1977 EXPLOSIVE ERUPTIONS OF THE UKINREK MAARS, ALASKA

V. LORENZ

Inst. f. Geow., Johannes-Gutenberg-Universität D-6500 Mainz, Germany

In March/April 1977 the two small Ukinrek maars formed on the Aleutian Range when weakly undersaturated alkali olivin basalt magma rose 13 km behind the Andesite volcanic chain. During the volcanic activity eruption clouds rose to heights of up to 6500 m.

The West Maar formed within 3 days and reached a diameter of 170 m and a depth of 35 m. Its activity started with near-surface explosions leading to ejection of large partially frozen (permafrost) moraines and conglomerates and intermittant lava fountaining. After a maar forming collapse the level of explosions retreated to deeper levels which caused ejection of blocks of the dike feeding the initial eruptions.

The East Maar formed during the following 6 days. The maar reached a diameter of 300 m and a depth of 70 m. During the eruptions frequently two styles of activity could be observed simultaneously within the maar: phreatomagmatic eruptions next to lava fountaining. Whereas the phreatomagmatic produced juvenile lapilli and bombs of relatively low vesicularity of round to cauliflower shape, as well as large amounts of wall rock fragments, the lava fountains caused formation of scoriaceous fragments.