

of SiO_2 , TiO_2 , Al_2O_3 , Na_2O , K_2O , P_2O_5 and incompatible trace elements.

The geochemical evolution have been investigated by molecular ratio diagrams with Zr as the ratio element in order to eliminate deformation of the data by the closure effect.

The kimberlites and lamproites have differing trends, and one rock type cannot have evolved from the other. The geochemical variation of the lamproites modelled with congruent melting of known mantle phases give rich/phl/cpx/ap/ru = 30/45/20/3/2. This solution yields too high (Fe,Mg)O values and too low alkali content. A model is proposed where incongruent melting of phlogopite to a melt of sanidine-ilmenite composition leaves a residue of olivine. This model gives rich/phl/cpx/san/ap/ilm = 38/27/11/16/3/5. The kimberlite variation can be explained by melting of ol/phl/cc/cpx/spi/ap = 65/17/9/5/3/1.

REE distributions of both rock types indicates that the mantle source was heavily enriched in REE and especially the LREE.

C14

PETROGRAPHY, GEOCHEMISTRY AND Sr ISOTOPIC COMPOSITION OF THE MBUJI-MAYI AND KUNDULUNGU KIMBERLITES (ZAÏRE).

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At Mbuji-Mayi the diamond-rich kimberlite breccia, of late Cretaceous age, contains nodules of "primary kimberlite". Phenocryst phases are Cr-chlorite (often rimmed or replaced by phlogopite) and two generations of olivine completely pseudomorphosed to phlogopite and calcite. The very fine-grained matrix consists of Cr-chlorite, hydromica and calcite with minor amounts of apatite, magnetite and rutile. The phenocryst assemblage and mineral transformations are rather peculiar. Given the absence of phlogopite phenocrysts, one cannot rule out the possibility that these kimberlites were originally of basaltic type.

Except for a higher carbonate content, they are chemically similar to South-African kimberlites. The $^{87}\text{Sr}/^{86}\text{Sr}$ initial ratios are low (0.7040-0.7045) which point to a mantle origin without crustal contamination. The isotopic ratio in rare carbonate inclusions is equally low suggesting that they are genetically linked to the kimberlites. REE patterns are the same as those observed in South-African kimberlites: $(\text{La}/\text{Yb})_{\text{N}} \approx 100$; $\text{La}_{\text{N}} = 100-600$; no Eu anomaly. Cr-rich diopside megacryst have lower $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (ca. 0.7030) implying a xenolithic character. The pronounced HREE depletion seems to indicate that they formed in equilibrium with garnet.

The Kundulungu kimberlites are of the basaltic type (fresh olivine phenocrysts, fine-grained chloritic matrix, absence of phlogopite phenocrysts). They are much lower in carbonates but, in terms of trace element and Sr isotopic geochemistry they are very similar to the Mbuji-Mayi and other kimberlites.

C15

Nd AND Sr ISOTOPIC COMPOSITIONS AND REE GEOCHEMISTRY OF ALKALI BASALTS FROM THE MASSIF CENTRAL, FRANCE.

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Cenozoic volcanic rocks of alkali basalt family are widespread in the Massif Central. They are underlain by the Hercynian granitic basement. The compositions of basalts range from hawaiitic to basanitic, but basanites dominate the rock types. Results show that the basalts from the Cantal, the Aubrac and the Mont Dore ($T < 10$ m.y.) have $^{143}\text{Nd}/^{144}\text{Nd} = 0.51283$ to 0.51299 or $\epsilon_{\text{Nd}} = +3.7$ to $+6.7$, and $^{87}\text{Sr}/^{86}\text{Sr} = 0.70338$ to 0.70435 . Quaternary basalts from the Chaîne des Puys yield $^{87}\text{Sr}/^{86}\text{Sr} = 0.70366$ to 0.70458 . In a Nd-Sr isotopic correlation diagram, these data fall within the correlation band. The positive ϵ_{Nd} values suggest that their magma sources have had a time-integrated LREE depletion, similar to that observed for the MORB sources.

The REE data show typical LREE enrichment of alkali basalts, with $\text{La}_{\text{N}} = 80-250 \times$, $\text{Lu}_{\text{N}} = 7-13 \times$, $(\text{La}/\text{Yb})_{\text{N}} = 10-20$, and practically no Eu anomalies. Geochemical arguments do not favor any significant crustal contamination for the derivation of these basalts studied. Theoretical considerations call for a recent mantle metasomatism in which a LREE depleted source region was enriched in LREE and other LIL elements before partial melting events. Since the positive ϵ_{Nd} values and enriched LREE abundances are so common to most alkali basalts and related rocks, it appears that mantle metasomatism is precursory to the generation of alkali basalts and that the influx of metasomatic fluids have localized the melting events.

C16

Sr, Nd ISOTOPES AND TRACE ELEMENT GEOCHEMISTRY OF MELILITES FROM WESTERN EUROPE

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Melilitite bearing nephelinites (melilitites) are commonly found in provinces where evidence of melting at deep levels in the mantle (kimberlites, carbonatites) exists. They are actually among the most mafic basaltic rocks and their high content in REE and Sr together with a fairly rapid eruption mode would suggest little contribution of high level contamination in their genesis.

Twenty cenozoic melilitites from Europe (Spain, France, W. Germany and Czechoslovakia) have been analysed for Sr, Nd isotopic composition and trace element (REE + transition elements) contents. $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ ratios plot mostly within and partly below the oceanic trend with no obvious regional variation. The average $^{87}\text{Sr}/^{86}\text{Sr}$ ratio is 0.703776 (range $0.70322-0.70446$), the average $^{143}\text{Nd}/^{144}\text{Nd}$ ratio of 0.512832 ($0.51269-0.51300$). Leaching experiments show isotopic inhomogeneities and suggest the presence of a high $^{87}\text{Sr}/^{86}\text{Sr}$ component interpreted as being of crustal origin. The origin of melilitite could be found in an ordinary (oceanic type) upper mantle of which the melting products experienced contamination at high level during upward migration of the magma in the crust. The Sr/Nd ratio of the contaminant is tentatively estimated to fall in the range 3 to 15 which could fit upper crustal rocks such as shales or granites.

REE elements present the usual pattern of alkali-rocks with high concentration level, high Ce/Yb ratios (58 to 130) and no Eu anomaly.

Beside additions evidence for crustal contamination, REE and tran-