G7
ZONED PYROXENES IN ULTRAMAFIC ROCKS

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The pyroxenes from some lherzolites in alpine type ultramafic intrusions are compositionally zoned. The zonation is more pronounced in cpx than in opx. The cores of pyroxene porphyroblasts are richer in Al than the rims. A similar trend is observed for Na in clinopyroxenes. In some cases zonation of pyroxenes is also found in ultramafic nodules from alkali basalts. Sometimes reversed zoning occurs. Neoblasts commonly have the same composition as the rims of the porphyroblasts.

In order to study the behaviour of trace elements we have separated by handpicking porphyroblastic clinopyroxenes from a lherzolite from Lherz. The surfaces of these pyroxenes where painted with ink and then ground to less than 200 microns. With this method rims and cores of the pyroxenes could be distinguished and separated. The two separates were analysed by INAA. A lower Na content of the rim fraction may indicate loss of jadeite component. This would also explain the parallel depletion of Cr and possibly the heavy REE in that fraction (1). Because of slight differences in REE contents between the two fraction we expect differences in Sr- and Nd-isotopes. These measurements are in progress. The results will give us a tool to estimate the time of uplift of ultramafic complexes.

Lit. E. Jagoutz et al. In: The Mantle Sample: Inclusions in Kimberlites and Other Volcanics (F.R. Boyd and H.O.A. Meyer, eds.), p. 382. Amer. Geophys. Union, Washington, D.C.

G8
CHEMICAL DISEQUILIBRIUM IN SPINEL-LHERZOLITES FROM ARIEGE (FRENCH PYRENEES).

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Detailed microprobe analyses have been performed in 45 spinel-peridotite samples from the Lherz and Freychinede ultramafic bodies representative of the exceptionally-wide modal and chemical variation found in these bodies.

Regardless of this between-sample variation, in each individual sample, whereas olivine composition is invariable, spinels and pyroxenes, especially orthopyroxenes, show irregular and sometimes wide chemical variations from nearly a constant composition in the core of the porphyroclasts to their margins and to the coexisting neoblasts. In pyroxenes, Al and, to a lesser extent, Cr and Na contents decrease. Spinels display the strongest variations, due to the combination of $FeAl_2O_4$ enrichment with a later $FeCr_2O_4$ increase.

By applying various geothermometers, two groups of temperatures have been estimated at 900°-950°C and 700°-750°C respectively. The first represents the final equilibrium state reached during the main stage of deformations and recrystallizations which occurred in the uppermost mantle (13-15 Kb) in all Pyrenean lherzolitic bodies. The second is believed to represent a partial heterogeneous reequilibration which occurred during the subsequent ascent of these ultramafic slices and their emplacement in the lower crust before their solid extrusion in Cretaceous limestones.

The present disequilibrium observed in these ultramafic complexes strongly contrasts with the chemical homogeneity which seems to exist in most spinel-peridotite xenoliths whatever their textures and equilibrium temperatures (900° to 1200°C).

G9
THE ULTRAMAFIC-GRANULITIC ASSOCIATIONS: AN INDICATION OF PALEO-MOHO DISCONTINUITIES.

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The very high pressure parageneses of mafic-ultramafic associations and the common field relationships of these rocks with crustal granulite-facies rocks suggest a two stages emplacement model for such peridotitic bodies.

A- The first stage could be related to convective processes involving "diapiric" uprise and moderate partial melting of a fragment of the mantle. The mafic-ultramafic associations re-equilibrated at depth near the subcontinental Moho P.T. conditions.

B- The second stage involves the emplacement to their present environment of the ultramafic bodies together with the deep seated continental crustal rocks as a result of two different processes :

1- Emplacement along passive margins during extensional tectonic regime ; creation of oceanic crust involves a preliminary crustal thinning and occurence of the mantle at shallow depth on each bank of the oceanic area. This situation is observed along the Galicia Bank.

2- The emplacement as a result of a compressive stage after crustal thinning may lead to two different situations :

a) The previous structural relationships between ultramafic (mantle) and granulitic (crustal) rocks are more or less preserved, as shown in the Ivrea Zone and in the Beni-Bousera and Ronda area ; these concordant units are overthrust upon more superficial units pointing out mega-dislocations involving the whole upper mantle/lower crust pile.

b) The previous upper mantle/lower crust structural relationships were disrupted : ultramafic and granulitic rocks occur as scattered bodies along deep crustal transcurrent lineaments. This situation has been recognized in the northern Pyrenees and along the Southern border of the Kibo-Kabylean Belt.

G10
KIMBERLITES IN THE EASTERN UNITED STATES: LOCATION AND DEPTHS OF ORIGIN RELATED TO MID-ATLANTIC TECTONISM.

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Early Mesozoic, diatreme- and hypabyssal-facies kimberlites in the Valley and Ridge and the Appalachian Plateau Provinces of the Eastern USA record mantle perturbations associated with the early phases of Mid-Atlantic rifting.

The depth of generation of the kimberlite melts seems to correlate with the distance from the rift location. Within the Valley and Ridge Province (Tennessee and Virginia), the kimberlites are highly