GLIMERITIC AND PERIDOTITIC XENOLITHS FROM THE MATA DO LENÇO MICACEOUS KIBERLITE - ALTO PARANAIBA IGNEOUS PROVINCE, BRAZIL: EVIDENCES OF METASOMATIC PROCESSES IN LOCAL MANTLE SOURCES.

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Upper mantle metassomatism has been world wide documented in several cratonic and pericratonic areas, usually by xenoliths which are present in kimberlite or lamproite. Metasomatic processes in the mantle sources of the Alto Paranaiba Magmatic Province where documented by Tallarico et al. (1993) and Tallarico (1993) in the glimeritic and peridotitic xenolith of the Mata do Lenço Intrusion (MLI), being recently ratified through the overall geochemical investigation of various host rocks of the Province (Gibson et al., 1995). The present study, is focused on detailed petrography and mineral chemistry of selected mantle xenolith from the Mata do Lenço intrusion.

Host magmas is a Cretaceous (83.5 ± 0.8 Ma - phlogopite megacrystal K/Ar age, Gibson et al., 1995), alkaline, ultrapotassic (K_2O 5.21%; $K_2O/Na_2O>2$; MgO 19.07%), micaceous kimberlite (Tallarico et al., 1993) with chemical and petrographic characteristics similar to madupitic lamproites (Gibson et al., 1995). The IML exhibit strong porphiritic fabric defined by abundant megacystals of phlogopite, less frequent olivine, and rare enstatite set on a fine grained inequigranular matrix. Matrix mineralogy includes microphenocrystic phlogopite and olivine set on fine grained fabric of spinel, diopside, perovskite and poikilitic phlogopite. Rare chalcopyrite, pyrite and apatite also occur. Rare earth and highly incompatible elements' geochemistry of the host magma (La/Yb = 92.77; Ba/Lu = 70.92), as well as its isotopic systematic ($^{143}Nd/^{144}Nd = 0.51225$; $^{87}Sr/^{86}Sr = 0.70463$), point towards a metassomatized mantle source (Tallarico, 1993; Gibson et al., 1995).

Upper mantle xenoliths in the MLI are basically of two types: peridotitic and glimeritic. Peridotitic xenoliths are dunites, harzburgites and lherzolites, and rarely hercinite-spinel peridotites. Garnet-bearing xenoliths where not recognized.

Dunites, harzburgites and lherzolites are composed of olivine ($Fo_{82.25-86.29}$; NiO 0.17-0.33%), enstatite ($En_{91.02-92.37}$; $Fs_{7.13-8.28}$; $Wo_{0.49-0.80}$) and Cr-diopside ($Wo_{44.76-50.46}$; $Fs_{3.79-5.40}$; $En_{44.82-50.21}$; # Cr 0,01-0.06), depending on its specific variety. Accessory phases include phlogopite (*mg* 92.76-94.03; TiO_2 0.15-0.30%; NiO 0.14-0.29%; FeO_t 2.89-3.51%), ilmenite (MgO 11.52-12.46%; Cr_2O_3 0.43-1.00%), spinels (Cr_2O_3 54.59-62.59%; MgO 8.57-11.31%), perovskite and richterite. Peridotitic ilmenites exhibit distinguishing features of spinel exsolution and intergrowth with perovskite and spinel. Dunites, harzburgites and lherzolites occur in two fabrics: coarse and porphyroclastic. In both textural types the hydrated paragenesis occurs in typical textures of modal (Harte, 1987) or patent (Dawson, 1982) metasomatism.

Hercinite-spinel peridotites show porphyroclastic textures and differ from common porphyroclastic peridotites by the presence of hercinite-spinel (4D-spinels; #Mg 0.53-0.61; $\#Fe^{2+}$ 0.34-0.46) associated to the hydrated paragenesis. Phlogopite and hercinite-spinel crystals are xenomorfic, occurring in corrosion textures with anhydrous peridotite minerals. These spinels are chemically identical to rare matrix hercinite-spinel recognized as xenocrysts.

Glimeritic xenoliths are composed basically of flogopite (*mg* 82.36-84.69; TiO_2 3.90-9.16%; NiO 0.00-0.12%; FeO_t 6.48-7.47%), with acessory ilmenite (MgO 8.36-9.15%; Cr_2O_3 0.05-0.32%), and rare perovskite, spinel, pyrite and chalcopyrite. Glimeritic ilmenites lack exsolutions and intergrowths and occur interstitial to phlogopite. Occasionally extremely corroded relicts of anhydrous peridotitic mineral (e.g. olivine) are recognized in these xenolith.

The presence of richterite, the composition of the phlogopite (high *mg* and NiO, and low TiO_2 and FeO_t), as well as the texture and composition of the ilmenite (with exsolutions of Cr-rich spinels, and high contents of MgO and Cr_2O_3) characterizes the metasomatic paragenesis of the peridotitic xenoliths. The glimeritic paragenesis can be distinguished by the phlogopite's chemistry (lower *mg* and NiO, and higher TiO_2 and FeO_t), and the ilmenite texture and composition (lack of exsolution, and relatively depleted in MgO and Cr_2O_3). The evidences for two distinct hydrated metasomatic paragenesis suggests a complex (possibly two-stage) history of incompatible element enrichment in the local mantle sources (see fig. 1 and fig 2).

Extreme compositional similarities between glimeritic and cognate macro and microfenocrystic phlogopites (*mg* 86.03-88.77; TiO_2 4.92-7.74%; NiO 0.05-0.23%; FeO_t 4.83-6.00%), suggest that glimeritic xenoliths originate from high pressure crystallization of the ultrapotassic magma. In addition, glimeritic phlogopites and ilmenites exhibit great compositional identity with equivalent phases of the MARID suite (Dawson & Smith, 1977; Waters, 1987). Thus, glimeritic xenoliths (probable MARID rocks) are interpreted as testifying consequent metasomatic processes in the mantle sources.

Besides the mentioned mineralogical and compositional distinctions between the glimerite and peridotite metasomatic paragenesis; it was recognized, in the latter, that the infiltration of the hydrated metasomatic paragenesis in anhydrous peridotites is strongly related to neoblast zones of the porphyroclastic varieties, probably due to mantle plume. A plume-associated magmagenesis was previously demonstrated by Gibson et al. (1995). The origin of the metasomatic paragenesis recognized in the peridotitic xenoliths is still unknown, however association with upwelling asthenospheric fluids or silicate melts is possible (e.g. Bailey, 1970).

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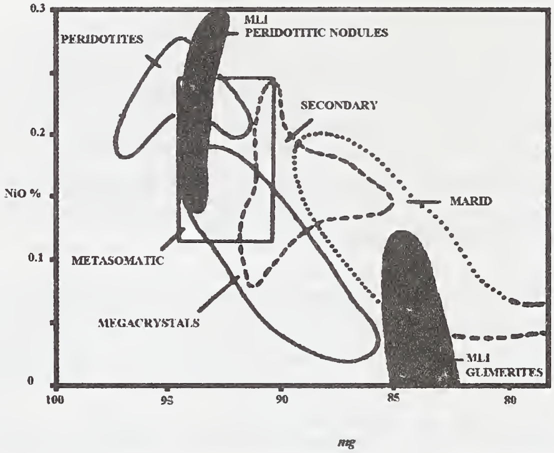

Fig. 1 - NiO *vs. mg* diagram for mantle derived phlogopites (after Dawson & Smith, 1977).

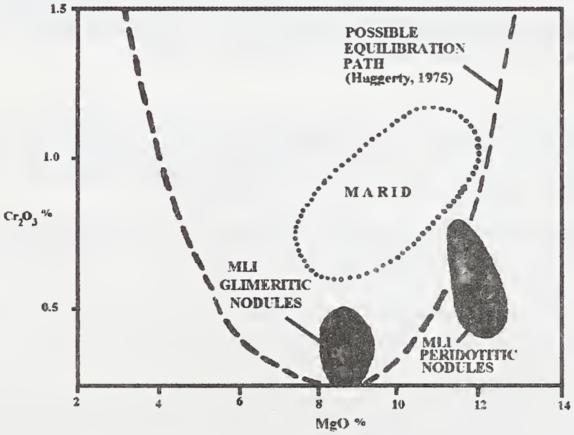

Fig. 2 - Cr2O3 vs. MgO diagram for mantle derived ilmenites (after Haggerty, 1977; and Dawson & Smith, 1977).