METAMORPHISM, ISOTOPIC AGES AND CHEMISTRY OF LOWER CRUSTAL GRANULITE XENOLITHS FROM THE CRETACEOUS SALTA RIFT, ARGENTINA.

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Abstract: Crustal and upper mantle xenoliths are hosted in basanitic dikes and necks that intruded into continental sediments of the Cretaceous Salta Rift at Quebrada Las Conchas, Provincia Salta, Argentina.

Most of the crustal xenoliths have granitoid composition (quartz - plagioclase - k-feldspar - garnet) whereas mafic compositions (plagioclase - clinopyroxene - garnet ±hornblende) are exceedingly rare.

The xenoliths show a well equilibrated granoblastic structure and the minerals are compositionally unzoned. Metamorphic conditions have been of granulite facies temperature ca. 850 - 900 °C at lower crustal depth with pressure of ca. 10 kbar from thermobarometric calculations. Sm-Nd mineral isochron ages are 94.9±8.4Ma, 91.6±13.5Ma, 89.0±4.2 Ma (granitoid composition), and 110.7±23.2Ma (mafic composition). These ages are within the errors in good aggreement with the age of basanitic volcanism. Sm-Nd isochron ages are considered as closure ages and temperature at the respective time has been still above the Sm-Nd systems' closure temperature (>600-700°C). Sm-Nd and Rb-Sr isotopic signatures ($^{147}Sm/^{144}Nd$ t0=0.1225 - 0.1608); $^{143}Nd/^{144}Ndt0$ = 0.512000 - 0.512324; $^{87}Rb/^{86}Sr$ = 0.099 - 0.172; 87Sr/86Sr = 0.708188 - 0.7143161) and common lead isotopic signatures ($^{206}Pb/^{204}Pb$= 18.43-18.48; $^{207}Pb/^{204}Pb$=15.62-15.70; $^{208}Pb/^{204}Pb$=38.22-38.97) of the granitoid xenoliths are indistinguishable from the isotopic composition of the Early Paleozoic metamorphic basement from NW Argentina apart from the lower $^{208}Pb/^{204}Pb$ ratios of the Early Paleozoic basement.

Sm-Nd depleted mantle model ages of c. 1.8 Ga from granitoid xenoliths and Early Paleozoic basement point to a Proterozoic protoliths for both with distinct ages of the last thermal overprint.

Time constraints, the well equilibrated granulite fabric, P-T conditions and lack of chemical zoning of minerals point to a high temperature gradient in a crust of nearly normal thicknes at c. 90 Ma and to a prominent thermal anomaly in the lithosphere. If this anomaly has been caused by uplift of the lithosphere/asthenosphere boundary by extensional tectonics the extension must have been restricted to the mantle lithosphere. Interpretation of the tectonic setting remains ambigous and both a 'true rift' and a rifting in a possible Cretaceous back arc have to be considered in future investigations

The crustal composition is identical with the compositionally homogeneous Early Paleozoic crust of NW Argentina and N Chile. A thick mafic lower crust seems unlikely considering low frequency of mafic xenoliths and composition of the granitoid xenoliths.