Lithosphere mapping in the south-western margin of the São Francisco Craton

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Geophysical data from the southewesten edge of the São Francisco Craton indicate a cratonic Subcontinental Lithospheric Mantle (SCLM) of variable thickness, which may extend to the Southern Brasilia Belt. Many Cretaceous kimberlites and related rocks intruded the region (ca. 74-120 Ma), sampling the lithospheric mantle mainly in areas of lower seismic velocity reflecting a shallow SCLM. Geothermobarometry of garnet xenocrysts from these pipes defines geotherms between 40-45 mW/m^2 and the base of the depleted lithosphere (BDL) is inferred at depths of about 90-160 Km. Dominant garnet populations are lherzolitic and Ca-harzburgitic, with minor wehrlitic; the proportion of sinuous REE patterns increases from northwest to southeast pipes. The effects of heating and melt-metasomatism are pronounced in some kimberlites including Limpeza-36 and Indaiá-10 and may extend to shallower depths in some pipes (e.g., below 80 km in Catalão-1B). Some high temperatures associated with metasomatic signatures likely reflect a kinked geotherm due to hot asthenospheric melt infiltration.

Although the area includes some recognized primary diamond sources as Canastra-1 kimberlite of 120 Ma [1] and known diamond-bearing kimberlites as Três Ranchos-4, the available geochemical data so far, define an SCLM, at the time of xenolith entrainment, of variable thickness that can be considered generally thin relative to cratonic SCLM LAB depths (~180 – 220 km). This is consistent with seismic tomography and magnetotellurics images, especially in the southeast. This latter SCLM has been affected by melt-related metasomatism, as shown in previous mantle xenoliths studies [1]. Such thin and relatively hot continental lithosphere suggests that any diamonds in these pipes are relics that have survived heating and uplift of the SCLM.

[1] Chaves et al, 2008b. *Geociências*, 27, 299-317.