Ofioliti, 1999, 24 (1a), 176-177

PRELIMINARY RE-OS ISOTOPIC DATA IN PGE RICH CHROMITITE LAYERS OF LUANGA ULTRAMAFIC LAYERED INTRUSION – CARAJAS (PARÀ STATE), BRAZIL

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ABSTRACT

The Luanga layered complex intruded a greenstone belt sequence (Rio Novo Formation) at 2760 Ma (Rb-Sr radiometric dating; Suita and Nilson, 1991). This age is confirmed by relationships with the Lower Proterozoic age of the covering sequence (Salobo and Rio Fresco Units).

Lithostratigraphic data based on outcrops and three drillholes confirm the layered nature of the intrusion made up of dunite, peridotite, pyroxenite, norite and gabbro layers from the bottom to the top. Chromitite layers and seams, occur in three well defined horizons located in plagioclase pyroxenites and at the transition zone between dunite and peridotite. The massive chromitite layers show thicknesses between 2 m and a few centimetres. The massive chromitite displays an equigranular texture, with single grains ranging from 0.5 to 2 mm in size. The fresh chromitite layers show: atoll-like texture with olivine and orthopyroxene inside and outside chromite rings, pseudomyrmekitic intergrowth of silicates and chromite. Relationships of the two dominant PGMs (braggite and sperrylite) with the silicates and chromite suggest that PGM crystallization predates the almost contemporaneous precipitation of silicates and chromite. Weathering processes changed only in part the primary composition and mineralogy of the chromitite, for this reason it was possible to select well preserved primary minerals and mineral assemblages for analyses with microprobe, fire assay and neutron activation and mass spectrometry. The chemistry of the chromitite layers is typical of chromites generated by fractionation and cumulus processes, with widely ranging, but generally high Al_2O_3 and low Cr_2O_3 contents. PGE chondritic profiles display a PPGE enrichment in all the three horizons (Table 1), (Diella et al., 1995).

Table 1. PGE contents (ppb) of analyzed samples

Sample	Os	Ir	Ru	Rh	Pt	Pd
LU3	62	47	95	566	8900	1050
LU6	2	1.5	13	19	450	41

Preliminary Re–Os isotopic data were obtained on two selected massive chromitite samples from the PGE richer (Lu3) and the relatively PGE poorer (Lu 6) chromitite horizons. These two samples show respectively the highest and the lowest PGE contents of all data collected.

Isotopic analyses were performed with the Carius tube isotope dilution procedure, using the PGE standard “WPR-1” provided by the Canadian Certified Reference Materials Project.

Isotopic data (Table 2), in form of $^{187}Os/^{188}Os$, were transformed into $^{187}Os/^{186}Os$ by using a $^{188}Os/^{186}Os$ ratio of 8,302 (Luck and Allegre, 1983). Initial $^{187}Os/^{186}Os$ ratios and γOs were determined by considering an age of emplacement of Luanga complex at 2700 Ma. Reliabilty of data is confirmed by very low 2σ values for both samples.

Table 2. Re-Os isotopic data

Sample	$^{187}Os/^{186}Os$	2σ	$^{187}Re/^{186}Os$	2σ	$(^{187}Os/^{186}Os)i$	CHUR	γOs
LU3	0.7568	0.00045	0.6891	0.0027	1.4516	0.94734	53.27
LU6	0.0559	0.00082	2.80276	0.0065	1.4135	0.94734	49.25

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Our data were compared with those of other chromitites from layered complexes as Stillwater (A, B, G, I, K chromitites; Marcantonio et al., 1993) and Bushveld (UG1, UG2 chromitites; Hulbert and Gregoire, 1993) and PGE-rich Merensky Reef of Bushveld (Fig. 1).

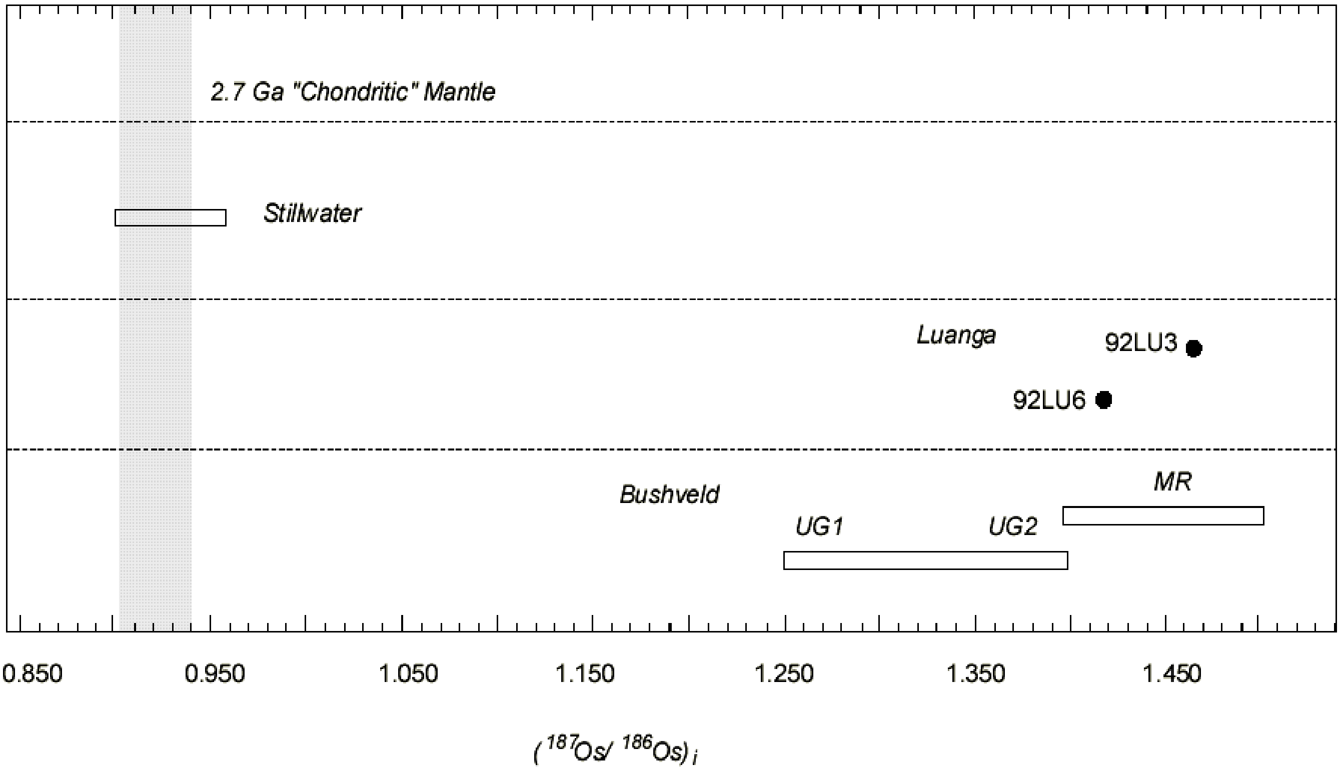

Fig. 1. ($^{187}Os/^{186}Os$)i in Luanga, Stillwater and Bushveld layered intrusions.

Luanga chromitites show high ratios, similar to those of Merensky Reef, and much higher than CHUR at 2700 Ma. It is possible to state that the mantle-melt system at Luanga underwent some modification and cannot be thought as due to a process of melting of a primary fertile undisturbed mantle. At this stage different processes able to increase ($^{187}Os/^{186}Os$)$_i$ can be envisaged: anomaly in the source due to the presence of a metasomatized mantle, strong differentiation during fractionation or crustal contamination.

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