CHEMISTRY OF CR-SPINEL AND OLIVINE FROM SERRA GERAL GROUP OF SOUTHERN BRAZIL POINTS TO SIMILARITIES WITH THE CU, NI AND PGE DEPOSITS OF NORIL´SK-TALNAKH COMPLEX

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Resumo: The Morungava intrusions, SE Paraná Basin, have distinctive shapes and petrological characteristics, grading from dunitic orthocumulates into olivine websterite and olivine-free gabbros, ending in some intrusions with adcumulate anorthosites. The mafic and ultramafic rocks have high MgO (13-27 wt%), Cr (500-3500 ppm), Ni (300-950 ppm), and Co (50-110 ppm), and are the most primitive intrusive bodies in Paraná-LIP. The magma chemistry is interpreted as a combination of magma fractionation inside the crust and crustal contamination in higher-level magma chambers.

Mineral analyses are used as a proxy to solidification conditions of the intrusions and to compare Cr-spinel and olivine compositions with mineralized intrusions in the Noril'sk - Talnakh and Jinchuan deposits.

The abundance of olivine phenocrysts and their Fo_{mol} contents are variable from hortonolite to chrysolite-forsterite, strongly zoned. Fo contents display strong positive correlation with Cr_2O_3 and NiO and negative correlation with MnO. Two breaks are identified and interpreted as different steps in P-T magmatic conditions, and only olivines with Mg# higher than 60-70 have spinel inclusions.

The spinels are preferentially trapped in olivine, display strong compositional zonation and a tight and coherent *trend* from high-temperature aluminum-rich true spinel (hercynite) to Al-chromite, Mg-chromite and chromite, ending with compositions richer in FeO, Fe_2O_3 and TiO_2. A specific feature of the Morungava Cr-spinels is the high Ti content in the final phase of crystallization, taken as evidence of magma compositional modification from low Ti deep magma chamber in the beginning to a low Ti shallow chamber reflecting the ferropicritic nature of the residual magma.

Geothermometry records temperatures compatible with three steps of crystallization. A first step at 815-830°C, then one at 670-680°C, and a final at 550-530°C, probably related to the emplacement of the intrusions along conduits in long-lived, voluminous eruptions. The magmas probably remained hot for a long period of time because of flow-through of magma and as a result of insulation by the rapid accumulation of a thick overlying blanket of lava flows.

The investigations of compositions of olivine and Cr-spinel show a strong correlation between mineralized and barren intrusions, explained by crystallization from a Ni depleted magma, resulted from extraction of Ni by a sulfide liquid or from reaction and reequilibration with nickeliferous magmatic sulfide during cooling and solidification due to partitioning of Ni between spinel and sulfide. The chemical zoning of the two minerals, particularly FeO, NiO, Cr_2O_3, MnO, Al_2O_3 and TiO_2, contrasts with the more homogeneous composition of olivine and spinel from some mineralized intrusions (e.g., Noril'sk). The mineral zoning may be due to the interplay of several processes, particularly the faster cooling of the Morungava magma at shallower position in the crust.

Palavras-chave: serra geral group; cu-ni (pge); cu-ni (pge).