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PRELIMINARY GEOCHEMICAL CHARACTERIZATION OF THE VIGIA COMPLEX, SEIVAL METAGRANITE AND TUPI SILVEIRA AMPHIBOLITE UNITS, NORTHEAST PORTION OF THE BLACK COAL SHEET

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INTRODUCTION

The study of rocks helps to identify geotectonic events that occurred during crustal evolution, which are fundamental for understanding the current compartmentalization of continents. The units addressed in this study belong to the northeast portion of Folha Hulha Negra, namely the Amphibolite Tupi Silveira and its host, the Vigia Complex (CV) and the Seival Metagranite (MS). (figure 1)

The Tupi Silveira Amphibolite (ATS), composed of amphibolite garnet, outcrops near the Irapuá-Passo dos Enforcados fault system and is inserted in the Vigia Complex, studies already carried out in this area indicate that the ATS contains the age formulated through the use of U-Pb which revealed a crystallization age of 1,567 ± Ma (Camozzato et al., 2016).

The Vigia Complex is from the Paleoproterozoic era of the Riacian period formed by dioritic, tonalitic, tronhjemitic and granodiorite gneisses, with smaller amounts of amphibolites located in the southern portion of the Tijucas Terrane (Camozzato et al.2013). CV gneisses were identified to be metaluminous to slightly peraluminous with high Al content (Camozzato et al. 2017). CV tonalytic gneisses were age-dated using the zircon U-Pb age method of 2.05-2.04 Ga (Camozzato et al., 2017).

The objective of this work is to carry out the preliminary geochemical characterization of the three units based on the chemical analyzes provided by the Geological Survey of Brazil (CPRM).

METHODOLOGY

To carry out this work, initially a bibliographical study was carried out on the region studied, later chemical analyzes provided by CPRM of the Amphibolite Tupi Silveira, Complexo Vigia and Metagranite Seival were used. To create the geochemical diagrams, the GCDKit 3.6 software was updated and to finalize the details of the generated diagrams, the image editing software Corel Draw was used.

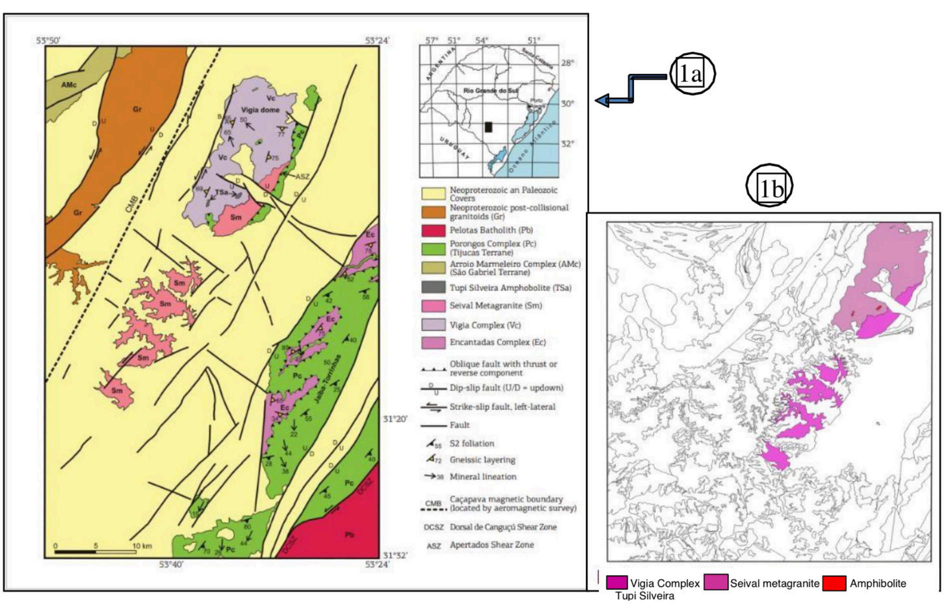

Figure 1a – Geological map of the Folha Hulha Negra map, southern portion of the Tijucas Terrain. Figure 1b – Distribution of Vigia Complex, Seival Metagranite and Tupi Silveira Amphibolite in Folha Hulha Negra. Both modified from CAMOZATTO et. al. (2017).

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RESULTS AND DISCUSSION

According to the classification diagrams (Figure 2a, b) by COX et al. (1979), the ATS consists of basalts, while the Vigia Complex gneisses range from gabbros, diorites, tonalites to granodiorites. Granitic rocks with mylonite foliation are dominant in the Seival metagranitoids. In relation to the AFM diagram (figure 2c) by IRVINE & BARAGAR (1971), the ATS samples originated in a tholeiitic magmatic series, while the gneisses of Cerro da Vigia vary between an analysis in the tholeiitic series and the others in the tholeiitic series. calci-alkaline, possibly being transitional. Finally, Seival metagranitoids are clearly rich in alkalis (Na2O+K2O), generated in calc-alkaline to alkaline environments.

As an example of geotectonic interpretation, figure 2d shows the graph by CABANIS & LECOLLE (1989). The graph demonstrates that the ATS samples plot in the field of extensional environments such as intracontinental rifts. The Seival Metagranite and the Vigia Complex are located in the orogenic field linked to a tectonically active arc environment, possibly an island arc.

To exemplify the behavior of trace elements and rare earths, we use the immovable element diagram in figure 3. The Seival Metagranite and the Vigia Complex have a negative anomaly for the elements Nb, Zr/Hf and Ti. Where the Nb element is associated with the subduction zone, Ti and Zr are correlated with crustal environments, possibly fluids associated with subduction and crystallization of titanite and zircon. Thus, both regions are linked to active environments such as island arcs and subduction zones. The ATS has a homogeneous pattern, without marked anomalies, which suggests that it was formed in passive environments such as rift zones and/or mid-ocean ridges.

CONCLUSIONS

With the preliminary results of the chemical analyses, it was possible to identify that the CV unit is composed of dioritic gneisses and amphibolitic gabbros, tonalites to granodiorites, that is, medium-grade metamorphic rocks, related to a subduction environment, possibly an island arc. The Seival Metagranite, on the other hand, is composed of deformed granites, where its formation environment is correlated with the arc environment and, possibly, post-collision events related to intense mylonitization. The Tupi Silveira Amphibolite is associated with intracontinental rift zones and possibly with an E-MORB environment.

As a future objective, it will be to carry out field visits to these units to carry out a more detailed mapping and later the production of petrographic slides and other chemical analyzes in order to better identify the events that occurred to deepen the knowledge of the geological compartmentalization of this region.

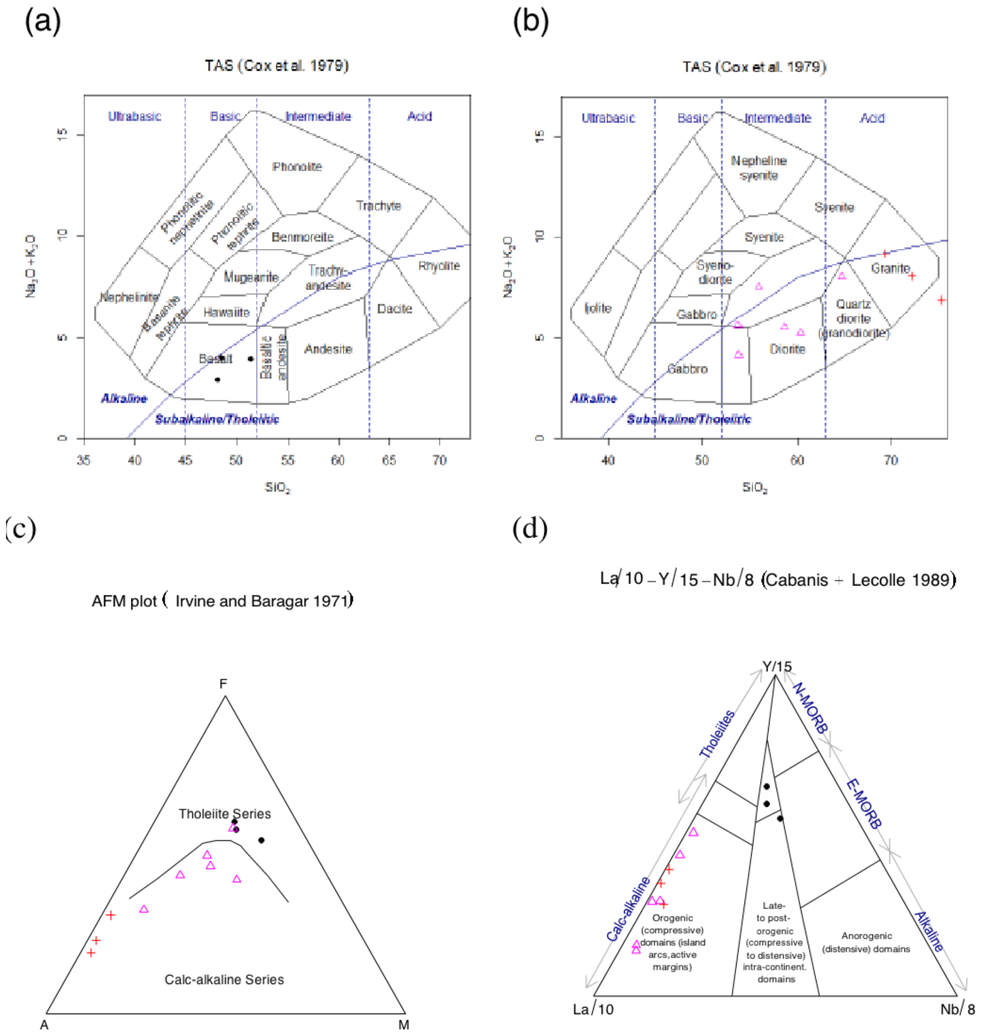

Figure 2 – Examples of treatment/geochemical diagrams of TS rocks (black circle), CV gneisses (lilac triangle) and red cross (Seival granites). a) TAS diagram for volcanic rocks; b) TAS for plutonic rocks; c) AFM diagram; d) Geotectonic environment diagram.

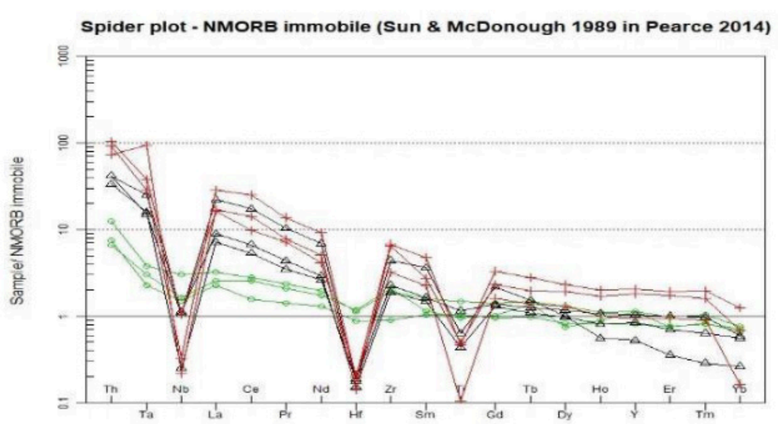

Figure 3 – Spider diagram of immovable elements from PEARCE (2014), modified from SUN & MCDONOUGH (1989), in which CV samples are in black, Seival in red and ATS samples in green.

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