

BASIC EDIACARAN MAGMATISM (562 Ma) IN SOUTHEAST SUL-RIOGRANDENSE SHIELD: U-Pb SHRIMP ZIRCON DATING OF ALTO ALEGRE DIORITE

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SUMMARY: In the southeast region of the Sul-Riograndense Shield - eastern portion of Dom Feliciano Belt (DFB) - minor intrusive bodies (1-7 km) with predominantly basic character, occur in the surroundings of Pinheiro Machado and Pedro Osório-RS, among the widespread occurrence of Neoproterozoic granitoids. These basic rocks could be separated in two main associations. The Association I (AI) consists of commonly cumulated, and sometimes layered, gabbroic rocks (Passo da Fabiana, Passo da Olaria, Arroio Santa Fé and Desvio Herval occurrences). The Association II (AII) is composed mainly by isotropic dioritic to subordinate gabbroic rocks (Alto Alegre, Passo dos Machados and Campo Bonito bodies). Both associations are subalkaline, with high-alumina contents ($Al_2O_3 > 17\%$), even for the non-cumulated rocks. They present medium-K (AI) and medium to high-K (AII) calc-alkaline affinity, showing higher CaO and Mg# contents in AI, and alkalis, P_2O_5 , Zr, Nb, Y and total REE in AII, as well as distinct REE patterns, supporting the proposed division. Geochronological studies using U-Pb SHRIMP zircon isotopic dating were carried out to determine the crystallization age of the largest and most representative dioritic body of AII, named Alto Alegre Diorite. This is an equigranular medium-grained hornblende-rich diorite, mesocratic and isotropic, with locally magmatic foliation marked by the preferred orientation of plagioclase and amphibole. The accessory minerals are biotite, apatite, zircon, magnetite, pyrite and ilmenite. Aeromagnetic data of the area suggest a concordant disposition of these rocks within the regional structural setting of the eastern DFB, by lithospheric discontinuities. According to the second vertical derivative map, Alto Alegre Diorite is located between ENE-WSW lineaments, and is also marked by a pronounced dipolar magnetic anomaly (in the anomalous magnetic field), indicating a deeper body, compared to other occurrences. Regarding the geochronological data, the diorite shows typically magmatic prismatic zircons, with regular and oscillatory concentric zoning patterns. The crystallization age obtained is of 562 ± 3.7 Ma ($n=11$; 1σ ; $MSWD=0.73$), which represents a new relevant data to evaluate the geological evolution of the southeast DFB, since the occurrence of basic magmatism with this age was not reported in the area to the present date. Regionally, the basic rocks are surrounded by granites of the Dom Feliciano Granitic Suite (DFGS), in the west, and by Pinheiro Machado Complex (PMC) granitoids, to the east, where Alto Alegre Diorite is located. The DFGS has reference isochronic crystallization ages (Rb-Sr-whole-rock) between 544-572 Ma; and Pb-Pb (TIMS) of 583 ± 3 Ma (Capão do Leão Granite). Otherwise, the PMC presents U-Pb SHRIMP crystallization ages between 603-618 Ma. Consequently, we conclude that Alto Alegre Diorite is intrusive in the PMC, although granitic apophyses cutting the dioritic body are observed in the field. These should be related thus to younger granites, probably linked to DFGS, which occur as minor bodies in the region. Finally, we suggest that the lithospheric discontinuities enabled the ascent and emplacement of the basic magmas, in a post-collisional setting, as precursor magmatic pulses or by replenishment events in upper crustal silicic chambers, probably related to the younger granites.

KEYWORDS: Basic magmatism; U-Pb Geochronology; Eastern Dom Feliciano Belt.