

# GEOCHRONOLOGY AND CONSTRAINTS ON THE Fe-Ti OXIDE CUMULATES IN THE CANINDÉ MAFIC INTRUSION, SERGIPE BELT, BRAZIL

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Layered mafic-ultramafic intrusions are commonly associated with or hosted the formation of Cr, Fe-Ti-(V-P), Ni-Cu and platinum group elements (PGE) deposits. Worldwide magmatic Fe-Ti oxide deposits, are associated with Proterozoic anorthosite complexes (e.g. Tellnes, Norway; Lac Tio, Canada), upper parts of large layered mafic intrusions, as Bushveld and Skaergaard deposits, or lower parts of mafic intrusions associated with flood basalts, exemplified by the Panzihua Intrusion, China. The Canindé layered gabbro is intrusive in a metavolcano-sedimentary sequence and hosts Ni-Cu and Fe-Ti ores in the Canindé Domain of the Sergipe Belt, northernmost Sergipe state, NE, Brazil. The intrusion in surface comprises, as a general rule, of three main rock units of north to south composed chiefly by mafic-ultramafic cumulates; olivine gabbros and troctolites; leucogabbros, respectively. Fe-Ti gabbros and Fe-Ti cumulatic layers occurs in the last unit. The age of the Canindé intrusion has two divergent ranges: 1) ~700 Ma U-Pb SHRIMP age on pegmatitic gabbro from unit three representing the age of a single intrusive gabbroic body; 2) a composite intrusion at 870 to 670 Ma, based on Sm-Nd and Ar-Ar data. LA-ICP-MS U-Pb zircon dating of the gabbro sample from unit 2 yields an age of  $703 \pm 2$  Ma. Our data indicate that the gabbros, troctolites and pegmatitic gabbros have been crystallized almost the same time, although they might be produced by different pulse. The spinels were observed in EPMA analysis in olivine gabbro showing Cr-rich magnetite; while in third unit, the oxide ores occur as layers and lenses within the leucogabbros contain low-Cr magnetite and ilmenite with hercynite-rich close a contact aureole with calc-silicate and metatuffs rocks. Cr-rich magnetite in olivine gabbro is clearly an early crystallized phase, whereas low-Cr magnetite of the disseminated and massive ore crystallize later. Occurrence of Cr-poor titanomagnetite and granular ilmenite cumulates in the massive ores may have formed from Fe-Ti rich melts. The segregation of dense Fe-Ti rich melts behaved like a heavy mineral that settled downward in a silicate crystal mush to form disseminated and massive Fe-Ti oxide ores as part of the cumulate sequence. The oxide ores occur as layers and lenses within the leucogabbros and are concentrated close a contact aureole with calc-silicate and metatuffs rocks of the Novo Gosto unit. The ore consists mostly of euhedral cumulate magnetite and ilmenite with variable amounts of hercynite. Bulk rock data shows that the ore contains 720 to 1800 ppm in V and 8 to 11 wt% TiO<sub>2</sub> and remarkable low silica (2.7 to 4.1 wt%) indicating near absence of silicate minerals. The variable Al<sub>2</sub>O<sub>3</sub> contents (6.8 to 38 wt%) represents different pulses of cumulus corundum and spinel. EPMA analysis in oxides ore show almost pure magnetite and Mn-V-bearing ilmenite (4-6 MnO wt%) and (0.35-0.5 V<sub>2</sub>O<sub>3</sub>).

Key words: U-Pb ZIRCON AGE; Fe-Ti OXIDES; GABBROS; CANINDÉ DOMAIN; SERGIPE.