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Geochemistry, Petrography and Mineralogy of Intrusive Metamorphic Dykes and Their Relation with Gold Occurrences in the South of Minas Gerais, Brazil

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The Tiradentes Formation, located in the south of the São Francisco Craton, Minas Gerais, Brazil, consists of a succession of quartzites and metapelites deposited in a Mesoproterozoic basin of an aulacogenic rift type, the São João Del Rei Basin. This is overlain by a succession of metacarbonates and metapelites which form the base of the Carandaí Basin. The group was deformed and metamorphized under greenschist facies conditions during the Brazilian orogeny in the Neoproterozoic. The Fm. Tiradentes is cut by mafic dykes associated with the rifting that originated the Carandaí Basin. The importance of the study is due to the history of gold extraction in the region in the 17th century, with a lack of in-depth studies about the mineralization. The aim of the work is to describe key outcrops, as well as to collect 29 samples for petrography, X-ray diffraction and lithogeochemistry, in order to understand the genesis of the magmatism and the correlation with the mineralization. The results showed that the dykes are tabular bodies of metric to decametric thickness with an ENE-WSW orientation and cut the rocks of the Fm. Tiradentes, but do not intrude the rocks of the Carandaí Basin. In the outcrops, the rocks are locally cut by quartz veins parallel to the foliation. From the petrography, three lithologies were separated: chlorite, porphyritic aphanitic metabasite and porphyritic metabasite. DRX analysis identified chamosite, quartz, epidote, albite, magnetite, pyrite and rutile. The quartz are interpreted as metamorphic and the occurrence of gold is associated with portions of the dykes with quartz veins parallel to the cleavage. During the description of mineral grains, gold was identified in the quartz veins near the dykes, but no gold grains were observed in the mafic rocks. In this context, the dykes may have acted as a physical-chemical barrier to the mineralization.