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EVALUATION OF C-AXIS QUARTZ GEOTHERMOMETER: FROM AN ISOTROPIC GRANITE, PASSING THROUGH A HIGH GRADE MYLONITE AND FINISHING WITH A MEDIUM TEMPERATURE DEFORMED STROMATIC MIGMATITE

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RESUMO: In the region between Areado and Alfenas, MG, the Campos Gerais Complex is represented by a diversity of rocks, including granitoids, migmatite, mafic and ultramafic rocks exhibiting different degrees of deformation. An isotropic, coarse-grained granite, with phenocrysts of orthoclase, up to 8 cm long, at the structural top of the complex records static metamorphism with presence either of garnet grains developed between biotite and feldspars, or titanite coronae that separates Fe-Ti oxide from plagioclase. The best outcrops are in an old quarry 5 km south of Areado and on a hill north of Alfenas, 25 km east of Areado. In the hill granite was transformed into two different rocks: *i*) at the top of the hill crops out a high-temperature garnet mylonite, mostly lacking biotite, locally with in-source or in situ garnet+hornblende-bearing leucosome, which are parallel, or discordant, to the mylonite foliation; *ii*) an envelope of strongly deformed stromatic migmatite occurs around the core of high-temperature mylonite. A higher degree of partial melting occurred, which lowered rock strength and localized deformation produced a compositional banding, stretched porphyroclasts and transposition of leucosome veins. The samples from the core of the high-temperature garnet mylonite and low-temperature stromatic migmatite are used to evaluate a new version of the empirical c-axis quartz geothermometer (Faleiros *et al.*, this volume). All thin sections were from cuts perpendicular to foliation and parallel to stretching lineation. The samples of the high-temperature garnet mylonite contain typical high-temperature fabric, characterized by quartz grains with lobate forms, and chessboard-like subgrains. The main concentration of c-axes lies at 10 degrees from stretching lineation, already an indication of high-temperature deformation. An opening angle of 129 degrees implies in temperature of ~ 820 °C, with another fabric due to lower temperature reworking at 650 °C, inferred with a subsidiary opening angle of 88 degrees. The lower temperature samples were collected at the structural bottom of shear zone, where foliation varies from flat lying to moderate dip and a sub-horizontal strike slip stretching lineation. In these samples there are two main domains, one characterized by high-temperature quartz microstructures and another, which is dominant, of medium temperature deformation. Quartz microstructures are characterized by very fine-grained aggregates of recrystallized grains, in which subgrain rotation is the dominant mechanism of recrystallization. Quartz c-axis concentrations around Z structural direction present an average opening angle of 57 degrees, indicating deformation temperatures of 460 °C, compatible with late muscovite and epidote defining foliation. In the investigate case, high-temperature metamorphism, low degree of partial melting and deformation occurred at temperature of 820 °C. Some H₂O may have infiltrated the borders of shear zone, resulting in a higher degree of partial melting and further deformation, continuous from high to medium temperatures, extending from granulite to green schist facies. The c-axis geothermometer is useful to investigate temperature of deformation, especially for rocks lacking a mineral assemblage suitable for classic thermobarometry.

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PALAVRAS-CHAVE: CAMPOS GERAIS COMPLEX; GEOTHERMOMETER; QUARTZ C-AXIS.