

Paper Number: 4470

## Metamorphic modelling of high aluminium metapelite with pseudosection and Zr-in-rutile thermometer: Example of the Luminárias Nappe, SE Brazil

Fumes, R.A.<sup>1</sup>, Luvizotto, G.L.<sup>1</sup>, Ferraz, E.R.M.<sup>1</sup> and Moraes, R.<sup>2</sup>

<sup>1</sup>Department of Petrology and Metallogeny, São Paulo State University, Avenida 24A, 1515, 13506-900, Rio Claro, Brazil; regianefumes@gmail.com

<sup>2</sup>Department of Mineralogy and Geotectonics, University of São Paulo, Rua do Lago, 562, 05508-080, São Paulo, Brazil

The Luminárias Nappe (LN) is located in the southern portion of the Neoproterozoic Brasília Orogen, which borders the São Francisco Craton; both crop out in Minas Gerais, Brazil. The LN is composed of rocks of the Carrancas Group, and high aluminium metapelites and quartzites are the main rock types. The present work focuses on the metamorphic characterization of the metapelites of the LN using pseudosection modelling and the Zr-in-rutile thermometer. The pseudosection was calculated using THERMOCALC v3.40 [1]. Trace element concentration in Rt (abbreviations after [2]) were measured using EPMA (JEOL-8230 Superprobe, at the São Paulo State University in Rio Claro) and the Zr-in-rutile temperatures were calculated with the calibration of [3].

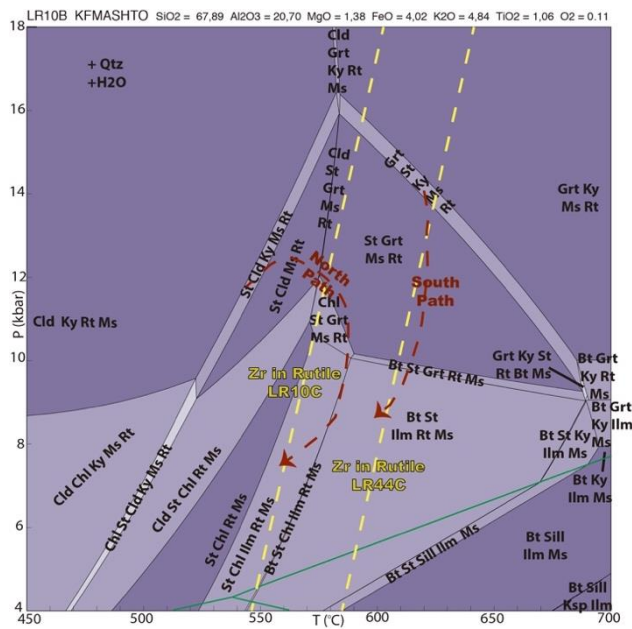


Figure 1: *P-T pseudosection in KFMASH TO (+qtz+H<sub>2</sub>O) for the sample LR-10C (North of LN). The yellow dashed line show the Zr-in-Rt thermometer and the red show the P-T path.*

The LN is an N-S elongated structure over 40 km in length. In the northern portion of the LN, the paragenesis is Cld + St + Ky + Rt + Qtz + Ms (Sample LR-5). Approximately 1 km southward, the paragenesis is St + Grt + Rt + Qtz + Ms with retrograde Bt, Chl and Ilm (Sample LR-10C). In the southernmost part of LN, the peak mineral assemblage is Grt + St + Ky + Rt + Qtz + Ms. The *P-T* conditions and metamorphic evolution traced with the pseudosection (Figure 1) indicates that region underwent metamorphism at the boundary between amphibolite and eclogite facies. Prograde metamorphism crossed the Ctd stability field, which destabilized to produce St and Ky, and in some samples retrograde Bt and Ilm occur. For sample LR-10C (northern portion), the Zr-in-rutile thermometer yields a *T* of 580 °C, calculated at 12 kbar (7 rutile grains). For sample LR44C (southern portion), the Zr-in-rutile thermometer yields a *T* of 620 °C, calculated at 15 kbar (9 Rt grains). Lines with average Zr concentrations, for both samples, are presented in Figure 1.

With the observed variation in the mineral assemblage, information from the pseudosection and the Zr-in-rutile calculated temperatures, it is possible to confirm the metamorphic gradient described in the literature (*P-T* Increases from N to S).

The absence of Sill and the occurrence of only Ky indicate higher-pressure conditions when compared with the classic Barrovian area. Using textural relationships between minerals, it is possible to infer the metamorphic  $P$ - $T$  paths (Figure 1). The northern portion records a clockwise path and the southern portion only records decompression.

*References:*

- [1] Powell R and Holland TJB (1988) *J Metamorphic Geol* 6(2): 173-204
- [2] Kretz R (1983) *Amer Mineral* 68(1-2): 277-279
- [3] Tomkins HS et al. (2007) *J Metamorphic Geo* 25(6): 703-713

