



SIMPÓSIO NACIONAL DE ESTUDOS TECTÔNICOS
XIII INTERNATIONAL SYMPOSIUM ON TECTONICS

ANAIS

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XIII INTERNATIONAL SYMPOSIUM ON TECTONICS

Campinas, São Paulo
2025

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USING ELASTIC GEOBAROMETRY TO UNVEIL SUBDUCTION-COLLISION AND RAPID EXHUMATION IN THE WEST GONDWANA OROGEN: APPLICATION TO HIGH-T/HP ROCKS IN THE NW PART OF THE BORBOREMA PROVINCE, NE BRAZIL

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Elastic geothermobarometry is a method used to estimate pressure and temperature (P - T) conditions based on the residual pressure exhibited by mineral inclusions entrapped in a host. In this study, we present micro-Raman spectroscopic data for quartz inclusions in host garnet from a retrograde mafic granulite and a retrograded eclogite from the Cariré Granulite Zone and Forquilha Eclogite Zone, Ceará Central Domain, northwestern Borborema Province, northeastern Brazil. Elastic modeling using the Quartz-in-Garnet geobarometer suggests residual pressure (P_{inc}) values between $-0.14(6)$ and $-0.01(6)$ GPa for the mafic granulite, and a range of $0.06(6)$ to $0.54(4)$ GPa for the eclogite, indicating that some inclusions are under tensile stresses (i.e., negative P_{inc}) while other experienced compressive stresses (i.e., positive P_{inc}). Isomekes built using Equations of State (EoS) for almandine garnet yield an entrapment pressure (P_{trap}) value of $1.35(2)$ GPa at 910 °C for the retrograde mafic granulite, whereas retrograded eclogite isomekes indicate a P_{trap} value of $1.68(6)$ GPa at 770 °C. These findings suggest that the volumetric response of quartz inclusions to pressure and temperature changes during exhumation to Earth's surface resulted in compressive and tensile stresses, consistent with the pressure conditions for the Forquilha and Cariré zones, as determined by conventional geothermobarometry. Compressive and tensile stresses result from decompression within the stability field of alpha-quartz. Retrograded eclogite entrapment pressure (P_{trap}) of $1.68(6)$ GPa suggests metamorphism at the base of a thickened continental crust. In contrast, the retrograde mafic granulite pressure of $1.35(2)$ GPa indicates peak metamorphic conditions during the collisional stage. The observed variability in residual pressures suggests a relatively fast exhumation for this segment of the West Gondwana Orogen.