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Unravelling multiple reactivation of the Malta Fault in he Rio do Peixe basin through in-situ Rb-Rr dating

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Abstract

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The Rio do Peixe Basin is one of the intracontinental rift basins formed in Northeast Brazil as a consequence of the West Gondwana breakup and the South Atlantic opening. The Malta Fault is the major fault of the southern border of the basin with around 70 km of extension. It strikes E-W and has high-angle dips northwards. Its kinematic indicators indicate a down-dip movement, suggesting normal fault kinematics. The Malta Fault development is related to the brittle reactivation of the ductile Patos shear zone.

Recent advances in mass spectrometer reaction cells have made it possible to perform *in situ* Rb-Sr dating, allowing linking geochronological data with microstructural observations. In order to constrain the subsequent brittle deformation history of the Malta Fault, we carried out meso-and microstructural analysis combined with *in situ* Rb-Sr dating.

Analysis of syn- to post-kinematic K-bearing minerals along fault planes, such as illite and biotite, reveals three episodes of fault reactivation and fluid percolation at 350±20 Ma, 212±10 Ma, and 124±11 Ma. These results indicate that the Malta Fault accommodated stresses since the late Devonian. The oldest age is coeval with the Santa Helena group, a pre-rift succession of the Rio do Peixe Basin. Other basins in Northeast Brazil, such as Parnaíba and Jatobá, record stratigraphic sequences at this age, suggesting a regional tectonic activity at that time. The Triassic and Cretaceous ages are in agreement with the U-Pb dating of carbonates from related brittle structures in the Borborema basement. They coincide respectively with the tectonic events of the Central Atlantic rift and the CAMP magmatism, and the South Atlantic rift and LIPs of the Paraná-Etendeka and EQUAMP. Therefore, the Malta fault is an example of brittle reactivation of a regional-scale shear zone that experienced a complex and long-lived history, documenting multiple reactivation events.

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Track

- 4. Low Temperature Geochronology Applied to Tectonics and Geomorphology

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