Geophysical Research Abstracts
Vol. 21, EGU2019-9492-3, 2019
EGU General Assembly 2019

Deep shear focusing along transform faults: the ultramafic-ultramylonites of the St. Paul Fracture Zone

Alden Adriao (1,2), Christophe Hemond (1), Daniele Brunelli (2,3), and Marcia Maia (1)

(1) Universite de Brest, CNRS, Intitut Universitaire Europeen de la Mer, Laboratoire Geosciences Ocean, France, (2) Dipartimento di Scienze Chimiche e Geologiche, Universita degli studi di Modena e Reggio Emilia, Modena, Italy, (3) Institute for Marine Sciences CNR-ISMAR, Bologna, Italy

The St. Paul Transform System (SPTS) displays one of the most complex tectonic settings composed by four transform faults separated by three intra-transform ridge segments that offset by 630 km the Equatorial Mid Atlantic Ridge. A set of granulitic ultramafic ultramylonites have been recovered along the northern transform fault during the COLMEIA cruise (Maia et al., 2016). These rocks record a multistage focused shear occurring at the spinel facies conditions (Adriao et al., 2017). Elemental mapping shows that the onset of the mylonisis and shear focusing is possibly triggered by local melt addition to the rock. Estimated melt composition reveals the presence of enriched MORB components possibly derived by low melting degrees of cold upper mantle sources. The main deformation event occurs at near-anhydrous conditions in the 900-700 °C range. We suggest that the mechanical resistance of the transform fault at SPTS is high. Weakening by lubricating minerals as talc or serpentine only affects the shallowest part of the system, while the deep system suffers local weakening by spare melt injections. The effect of melt injections is to favour shear focusing not enough to sustain the deformation process. We hypothesize the Brittle-Plastic Transition to occur at depth of around 15 km under the STPS.

Maia, M. et al., 2016. Extreme mantle uplift and exhumation along a transpressive transform fault. Nat. Geosci. 1–6. doi:10.1038/ngeo2759
Adriao et al., 2017. Mechanical mixing and metamorphism of mafic and ultramafic lithologies during mylonisis... AGU Fall meeting 2017. Abs T33D-2618