Geophysical Research Abstracts
Vol. 19, EGU2017-7892, 2017
EGU General Assembly 2017

Unconventional rheometry: new quantification approach for mechanically-controlled microstructures

Lucie Tajcmanova (1), Evangelos Moulas (1), and Yuri Podladchikov (2)

(1) Earth Sciences Department, ETH Zurich, Zurich, Switzerland (lucataj@gmail.com), (2) Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland

In the classical view of metamorphic quantification approaches, fast viscous relaxation (and therefore constant pressure across the rock microstructure) is assumed, with chemical diffusion being the limiting factor in equilibration. Recently, we have focused on the other possible scenario – fast chemical diffusion and slow viscous relaxation – and brings an alternative interpretation of chemical zoning found in high-grade rocks. The aim has been to provide insight into the role of mechanically maintained pressure variations on multi-component chemical zoning in minerals. Interestingly, we can use the pressure information from the mechanically-controlled microstructure for rheological constrains. Here, we show an unconventional way of relating the direct microstructural observations in rocks to the nonlinearity of power-law rheology at time scales unattainable by laboratory measurements. Our analysis documents that mechanically controlled microstructures that have been preserved over geological times can be used to deduce flow-law parameters and in turn estimate stress levels of minerals in their natural environment.