Geophysical Research Abstracts
Vol. 16, EGU2014-15548-1, 2014
EGU General Assembly 2014

Pressure Variations in Metamorphic Rocks: Implications for the Interpretation of Petrographic Observations

Lucie Tajčmanová
ETH Zurich, IGP, Zurich, Switzerland (lucataj@gmail.com)

Metamorphic petrologists and structural geologists, using direct measurements, bring the only direct observational constrains for validating geodynamic models. Therefore, petrological and structural geological observations are essential for the quality and reproducibility of geodynamic reconstructions and models. One of the important assumptions for geodynamic reconstructions arises from the pressure and temperature estimates in the petrology analysis. Pressure is commonly converted to depth through the equation for lithostatic pressure and so the original position of the rock sample within the Earth's interior can be constrained. The current assumption that the studied sample corresponds to uniform pressure may not be correct, and if so, it has serious implications. Increasing evidence from analytical data shows that pressure is not constant even on a grain scale, posing new challenges because, if ignored, it leads to an incorrect use of petrology data in constraining geodynamic models. Well known examples of the preservation of coesite and diamond in a host mineral like garnet show that high pressure inclusions are preserved during decompression. Tajčmanová et al. (2014) has shown that grain-scale pressure variations can develop and that these pressure variations allow compositional zoning in minerals preserved over geological time scales. A new unconventional barometric method based on equilibrium under pressure variations has been developed . Such pressure variations are also connected with differences in fluid pressure in open systems and can be thus observed at all scales.

Tajčmanová L., Podladchikov Y., Powell R., Moulas E., Vrijmoed J. and Connolly J. (2014). Grain scale pressure variations and chemical equilibrium in high-grade metamorphic rocks.Journal of Metamorphic Geology, doi:10.1111/jmg.12066

This work was supported by ERC starting grant 335577 to Lucie Tajcmanova