Geophysical Research Abstracts
Vol. 16, EGU2014-13869, 2014
EGU General Assembly 2014


# Can vein patterns be used to estimate rock permeabilities?

Daniel Koehn (1), Anna Vass (1), Irfan Ghani (2), Renaud Toussaint (3), Paul Bons (4), Enrique Gomez-Rivas (4), Janos L. Urai (5), Max Arndt (5), Simon Virgo (5), Frank Wendler (6), Philipp Blum (6), and Jens-Oliver Schwarz (2)

(1) School of Geographical and Earth Sciences, University of Glasgow, UK (daniel.koehn@glasgow.ac.uk), (2) Institute of Geosciences, University of Mainz, Germany, (3) Institut de Physique du Globe de Strasbourg, Université de Strasbourg/EOST, CNRS, Strasbourg, France, (4) Section Geosciences, Science Faculty, University of Tuebingen, Germany, (5) Structural Geology, Tectonics and Geomechanics RWTH Aachen University, Geologie-Endogene Dynamik, Aachen, Germany, (6) Karlsruhe Institute of Technology (KIT), Institute for Applied Geosciences (AGW), Karlsruhe, Germany

Fracturing of rocks due to tectonic stresses or local high fluid pressures and the formation of fluid pathways is important for a whole range of industrially relevant processes in the Earth's upper crust reaching from groundwater transport, hydrocarbon migration to geothermal systems. Fracturing and the opening of fluid pathways become especially important in tight rocks where fluid migration through the rock matrix is restricted. In addition observations show that fractures are often partly or completely sealed and occur as veins in geological systems. How can we interpret the permeability of these vein systems? The internal structure of veins often indicates that they are formed by several cracking and sealing events. In addition some geological systems contain partly sealed veins that have a preserved porosity and may add to the overall permeability of the system. We are comparing field areas that contain different vein patterns with hydrodynamic numerical models where fractures develop as a function of gravity, extension and fluid pressure gradients. In addition fractures seal where the developing veins can have variable properties in terms of elasticity, breaking strength and porosity. Results indicate that permeability in such systems is not a constant but may vary strongly over time. In an active system the amount of veins and number of open fractures depends not only on the timing of sealing but also on the breaking strength of the veins. Strong veins can clog the system whereas weak veins tend to lead to possible connected fracture networks. In addition one cannot link veins directly to fluid flow, intense veining does not mean that the system has or had a high permeability. We will present a first attempt to classify different fracturing and sealing systems based on field observations and numerical models.