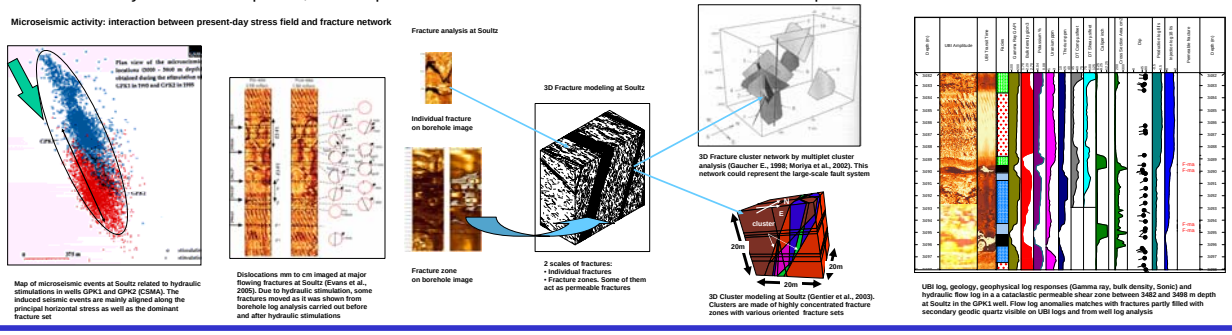
Workshop 1
Defining, exploring, imaging and assessing reservoirs for potential heat exchange
Potsdam, Germany, 6-8/11/2006

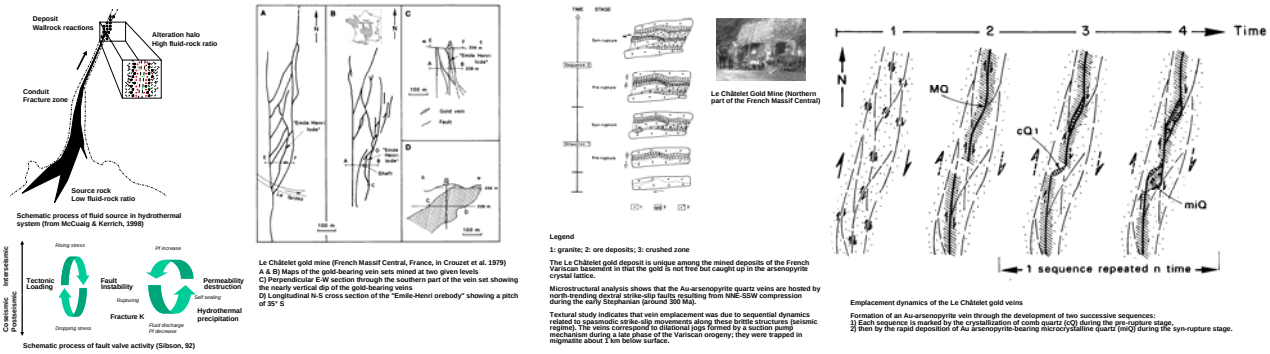
Naturally Mineralized Systems and Mineralisations, a natural analogue of Enhanced Geothermal Systems (EGS)?

One of the most important discoveries of crustal mechanics in the past 15 years is, according to Evans (2006), the realisation that the Earth's crust is generally close to failure, even in tectonically quiet areas. This deduction results especially from induced seismicity recorded during fluid injection in Enhanced Geothermal Systems (EGS) like in Soultz and from in situ measurements (Evans et al., 2005). Monitoring of seismic events shows the progression of microshearing along potential structures perpendicular to the minimum stress direction. However, deformation mechanisms and strain regime remains poorly constrained and hinder prediction and repeatability of stimulation of reservoir by hydrofracturing. Thus, if the link is well established between fluid injection and microseismicity, the resulting increase in permeability of the system after injection and its distribution in 3D remains debated.

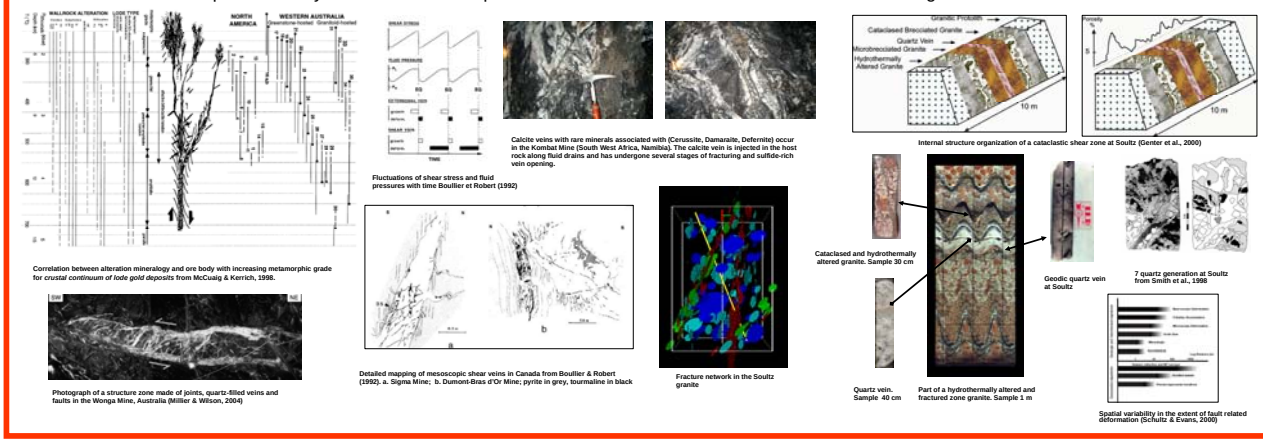
The in situ observation of the induced effects of hydrofracturing should be obviously the best way to increase our knowledge of the processes occurring during fluid injection. This is of course difficult as it requires re-drilling or sophisticated imaging and monitoring. Another way could be to look for a natural analogue for which shearing is caused by an increase in fluid pressure. To explore this way, it is proposed to establish a comparison between EGS and mineralisations systems. In this poster, we compare some fracture studies derived from the EGS European Soultz site with mineralized fracture sites.



Pervasive alteration, vein systems, and stockwerk are among the most obvious signatures of fluid transport in Earth's crust. Concepts like seismic pumping and fault valve systems have been proposed that defines a genetic link between shear zones, fluid pressure and mineralisations (Sibson, 1992). Moreover, a continuum is established through the crust from catazone lode deposits to epizone vein networks (Groves, 1993; Groves et al. 1998; Cuaig and Kerrich, 1998) showing that a whole range of mineralisations are formed at depth that are presently explored in EGS. Finally, Soultz is a Naturally Fractured and Mineralized Systems that has been intensively studied. Fracture networks investigated in some French gold mines (La Châtelet, France) could represent significant naturally mineralized systems.



A first topic for advanced studies could be a comparison between the geometry of these mineralized systems with the available dataset and imagery for EGS. Thus, Boullier and Robert (1992) have shown that gold quartz veins in Archean can be used to reconstitute paleoseismic events. It is considered that such fault-valve mechanisms present many similarities with suspected fluid circulation within the fracture network during stimulation.



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