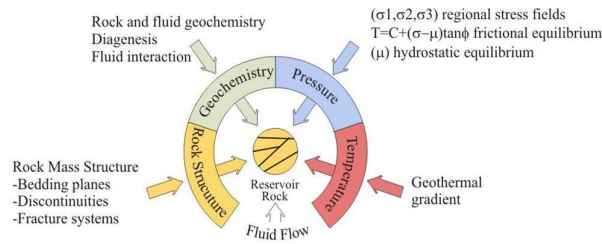


1. Coupled processes

Design and build of new testing cell capable of recreating in-situ reservoir conditions at 3km depth for experimental investigation of coupled processes (THMC) relevant to reservoir performance and caprock integrity at bench scale (circa 20 cm diameter core).

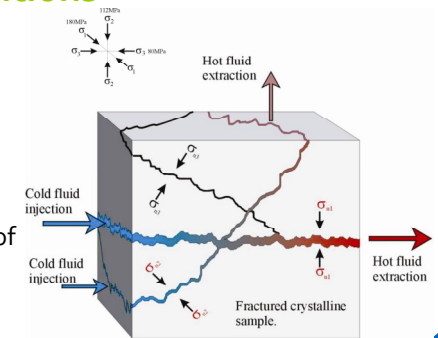


2. In-situ conditions

True in situ anisotropic stress i.e. the three principal stresses ordered $\sigma_1 > \sigma_2 > \sigma_3$

Temperatures of up to 120°C are required for 3D fluid flow

Stress anisotropy ($\sigma_1 > \sigma_2 > \sigma_3$) impacts on a number of factors including the generation of permeability anisotropy, the opening and closing of fractures and microfractures, dissolution at grain boundaries and normal stress across a fracture



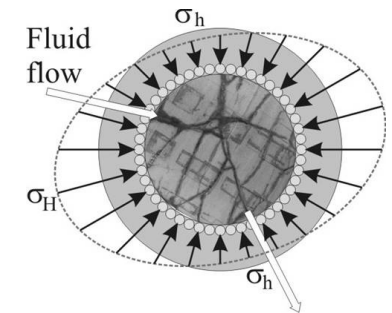
3. Sample scale

- Ability to investigate new scale of rock mass responses under in situ conditions
- Facilitate representative upscaling
- 18cm diameter samples will include fractures and matrix
- Bridge the scale gap between conventional experiments and field measurements



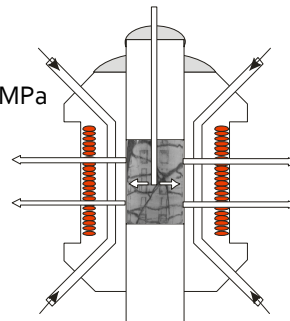
4. GREAT cell technology

- An array of Pressure Exerting Elements (PEE) replace the single annulus which traditionally generates the uniform radial stress in conventional triaxial cells
- Selective pressurization of the PEE's enables differential radial stresses to be generated
- Axial stresses are applied through steel platens



5. Design capabilities

- Maximum stress up to 100 MPa (1000bar, 14000psi)
- True triaxial stress $\sigma_1 > \sigma_2 > \sigma_3$, max. stress anisotropy 50MPa
- Fluid Pressures to 40MPa (400bar, 5600psi)
- Temperature to 120 °C (248 °F)
- Vertical and cross sample fluid flow and sampling
- Multiphase flow / Dense phase (supercritical) flow
- 20cm diameter rock samples
- Complicated 3D Rock Mass and different rock types
- Acoustic, electrical and resistance imaging



6. Applied Geoscience applications

- Hydrocarbon extraction
- Caprock integrity
- Geothermal reservoirs
- CO₂ sequestration
- Nuclear waste containment
- Reservoir fracking
- Enhanced Oil Recovery
- Mantle studies

