Mechanical effects of rock cement alteration quantified using digital rock physics

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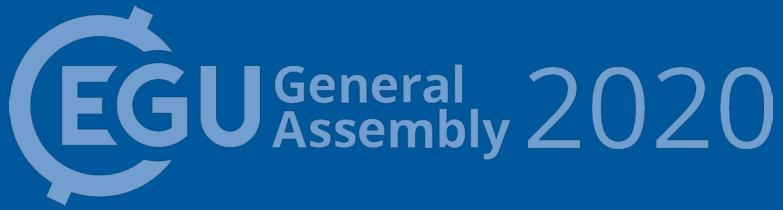
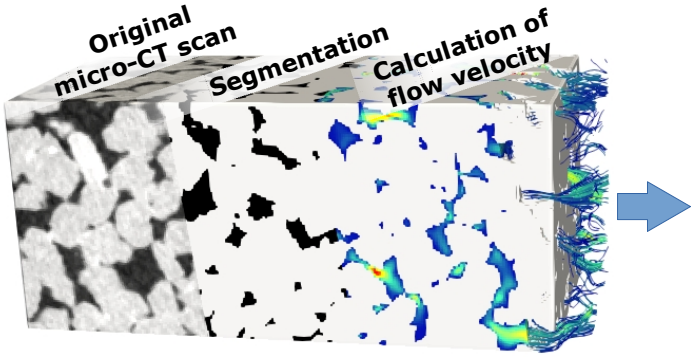
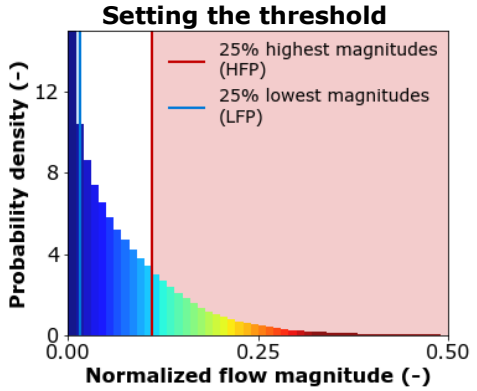


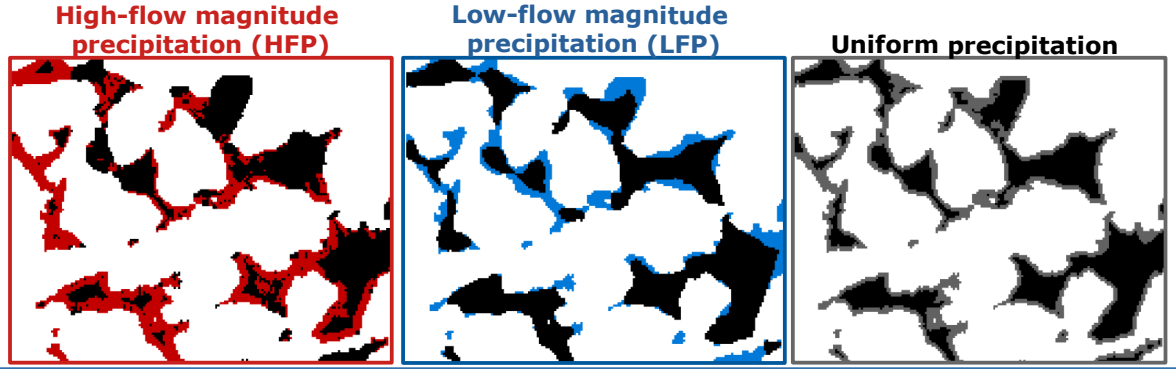
ERE 6.1 - Process quantification and modelling in subsurface utilisation
Thursday, 07 May, 10:45–12:30

Simulating velocity-dependent mineral precipitation in a sandstone

- Micro-scale chemical processes affect hydraulic and mechanical rock behavior at the macro scale
- Elastic moduli and permeabilities are calculated based on a Bentheim sandstone micro-CT scan
- Three different spatial precipitation patterns based on the magnitude of fluid flow







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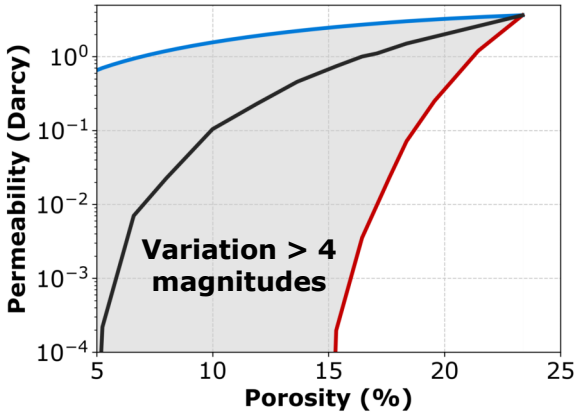
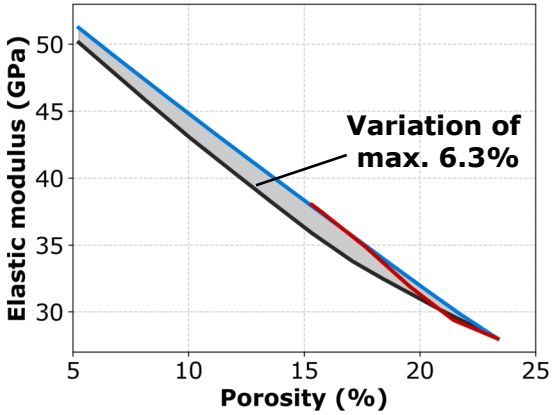
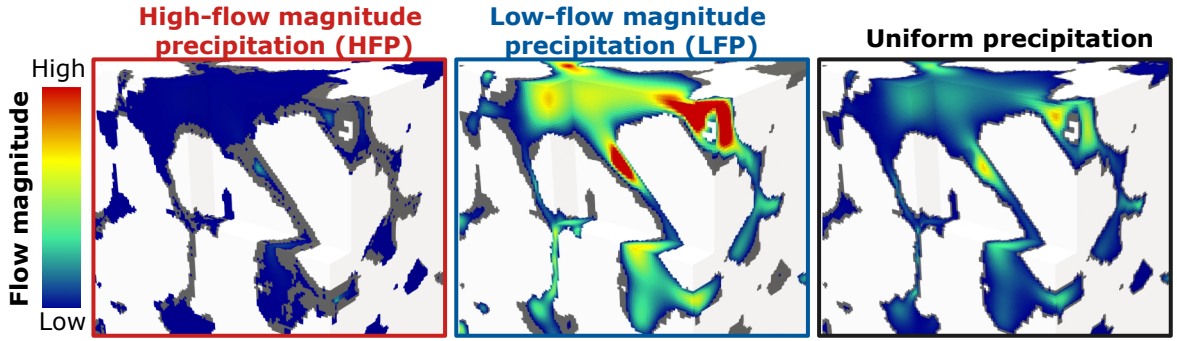
Location of precipitation is crucial for permeability evolution







- High-flow magnitude precipitation leads to clogging of throats and a high permeability decrease
- Permeability highly depends on the pore space alteration pattern varying by up to four magnitudes
- Spatial mineral distribution has only limited impact on elastic properties

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