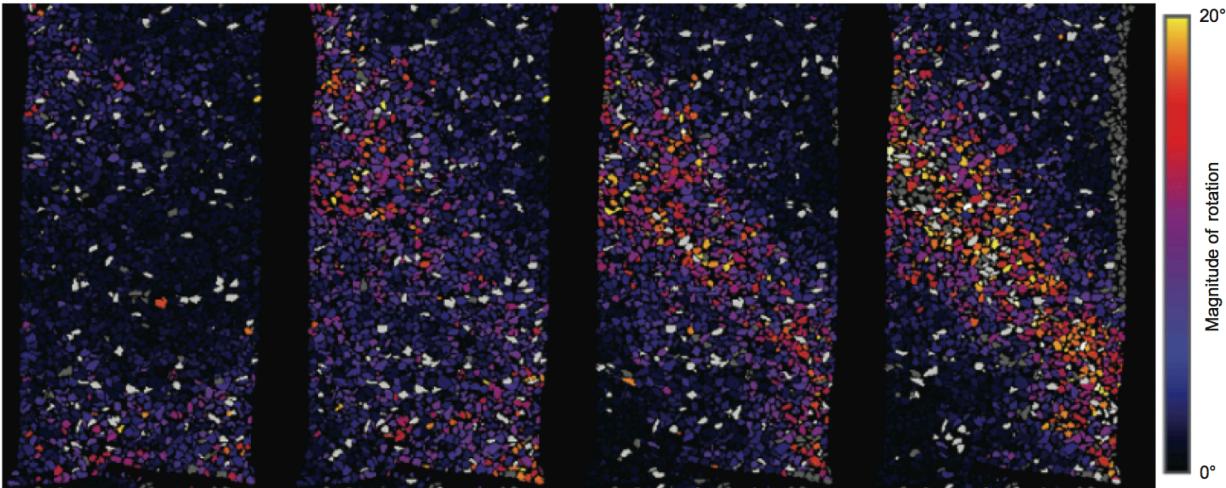
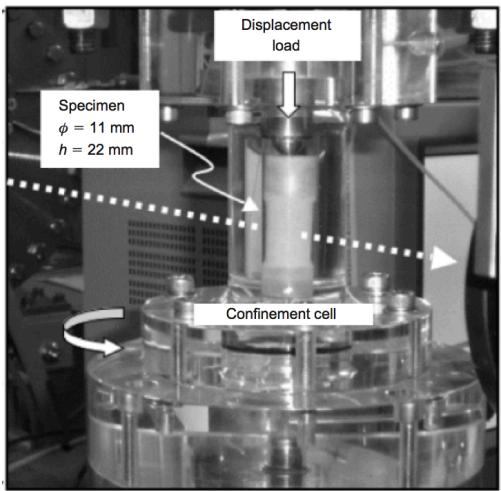


(a) Uncemented or poorly cemented rock →

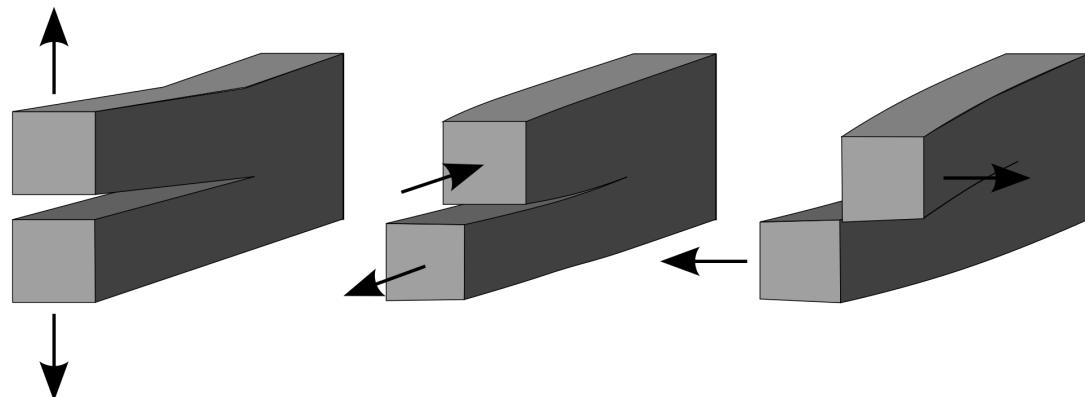
grain friction, dilation, grain crushing/rotation



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(b) Cemented rock →

Propagation of microfractures, grain friction/crushing



Mode I:
Opening

Mode II:
In-plane shear

Mode III:
Out-of-plane shear

Stress intensification at
the tip of fractures

Propagation starts at
fracture tips