

When Do Earthquakes Respect Traffic Lights

Meet us at the 82nd EAGE Conference & Exhibition 2020 in Amsterdam in December, where Q-con scientists Stefan Baisch and Pia Carstens present explanations for '(When) Do Earthquakes Respect Traffic Lights?' in the induced seismicity session.

Traffic light systems (TLS) are used in various subsurface energy technologies to limit the strength of induced seismicity. But is their widespread application actually justified by the physics? Building on a previous TLS study published by Q-con ([Baisch et. al 2019](#)), numerical models are being used for studying earthquake evolution and TLS controllability in the context of fluid injection and gas production. We discuss an 'out of the blue scenario', where gas production causes damage relevant seismicity without precursors. We find indications that gas production induced seismicity exhibits a 'characteristic magnitude' signature rather than following a log-linear magnitude frequency distribution. Furthermore, we show the 'stress legacy' resulting from induced seismicity and discuss implications for post-operational seismicity as observed e.g. at DHM Basel or Pohang.

Stress legacy of induced seismicity during hydraulic stimulation. Colour encoding shows the spatial distribution of fracture criticality at the time of shut-in (left) and 3 months later (right). The upper and lower reservoir periphery is extremely close to criticality in the post-operational period.

