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of advanced seismic waveform inversion for detection of underground cavities – a case study

Underground nuclear explosions (UNE) characteristically generate cavities that serve as key indicators during On-Site Inspections (OSI). Active seismic methods involving advanced inversion methods are pivotal in detecting these underground anomalies by identifying static signatures associated with the explosion-induced cavities. The seismic waveform inversion technique is adept at resolving complex subsurface structures, including hidden low-velocity layers, which are crucial for cavity detection.

This presentation centres on a case study where joint seismic travel time and waveform inversion techniques were applied to seismic data from a known geological cavity in Eastern Hungary. The results highlight the efficacy of these advanced seismic techniques in practical OSI scenarios. The presentation delves into both the technological opportunities afforded by seismic waveform inversion and the challenges encountered.

The case study demonstrates the capability of seismic inversion techniques to detect subsurface cavities and underscores the broader applicability and potential improvements these methods offer to the field of OSI. This talk contributes to the ongoing dialogue on advancing nuclear verification capabilities through innovative seismic technology by highlighting the challenges and solutions in implementing these technologies.

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