AGA 2: Seismic and Accoustic Modeling for Verification

Time: Wednesday 16:30–17:30 Location: H3

AGA 2.1 Wed 16:30 H3

Nuclear Safeguards for an Underground Final Repository - Seismic-Signal Modelling and Theory — •Jürgen Altmann — AG Physik und Abrüstung, Experimentelle Physik III, TU Dortmund

Final repositories for spent nuclear fuel need to be put under safeguards of the International Atomic Energy Agency (IAEA) to detect undeclared access, during and after the emplacement phase. Following a measurement project, the propagation of seismic signals from mining activities through a salt dome and its surroundings was modelled, again for the German Support Programme to the IAEA. Due to many different layers and complex geometry, numerical computation was needed. As excitation a norm force pulse and an explosion with a norm seismic moment were used at several source positions. The resulting seismic velocity was computed at many potential monitoring sites. The amplitudes scale with the force or seismic moment, respectively; both are not known for most sources. Since the model calculations have shown that the transmission through geological-layer boundaries does not change the seismic amplitude drastically, the hope is justified that the analytical expressions that exist for a homogeneous medium can provide reasonable estimates of the signal strengths and that comparison with measured values can allow conclusions on the respective source strengths.

AGA 2.2 Wed 17:00 H3

Acoustic-Seismic Coupling of Broadband Signals - Analysis of Potential Disturbances during CTBTO On-Site Inspections — Mattes Liebsch and •Jürgen Altmann — Experimentelle Physik III, Technische Universität Dortmund

In the framework of the verification of the Comprehensive Nuclear Test-Ban Treaty (CTBT) the localization of possible buried nuclear explosion sites is important. In order to localize these sites sensitive seismic measurements of so-called aftershocks can be performed, which, however, can be disturbed by signals caused by airborne acoustic sources: When sound of aircraft hits the ground it excites soil vibrations which can mask the weak aftershock signals. With a better understanding of the acoustic-seismic coupling we aim to suggest new guidelines to improve sensitive seismic CTBT on-site inspection measurements. We measured sound pressure and soil velocity caused by overflying jet aircraft. In the seismic data we observed frequency- and angle-dependent interference patterns. These can be used to determine soil properties such as propagation velocity and depth of a buried boundary layer and to estimate the path of propagation of acoustically induced soil vibrations.