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Moment Tensor Inversion for Source-Type Identification

The use of regional distance long-period, complete waveform data to determine the seismic moment tensor is now a routine and reliable approach in determining the source mechanism of natural and manmade seismicity and may be used to identify or discriminate different types of seismic sources. Such source-type identification is important for better understanding the physics of earthquakes, geothermal and volcanic seismicity, seismicity in ice, as well as seismicity induced by anthropogenic activities such as mining, oil and gas operations, and explosions. The successful applications of the regional moment tensor method at the past nuclear test sites and the North Korea nuclear tests show that the method is robust and capable for source-type discrimination of nuclear explosions at regional distances. The goals of this project are to study the uncertainty in regional distance seismic moment tensor estimation due to the effects of limited station coverage, assumptions in subsurface Earth structure for Green's function estimation, effects of shallow source depth and free-surface conditions, as well as expanding the seismic moment tensor database to low-magnitude chemical shots (Source Physics Experiment) and regions with limited data (Middle East and Eastern Caucasus).

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