

T-wave excitation modeling: a new approach to realistic earth media

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There have been several studies about empirical relation between the seismic source parameters (e.g., focal depths, focal mechanisms, magnitudes) and T-wave observation. However, to delineate the relation, we need to theoretically understand how earthquakes generate T-waves. In an attempt to investigate source radiation and wave scattering effects in the oceanic crust on T-wave envelopes, we perform three-dimensional numerical modeling to synthesize T-wave envelopes by assuming that excited T-phase energy is proportional to the seismic energy distribution on the seafloor. We calculate seismic P- and SV-energy on the seafloor using Direct Simulation Monte Carlo (DSMC) which can take into account realistic focal mechanism and wave scattering in a heterogeneous medium as well, and then estimate excited T-wave energy by normal mode computation. We synthesized T-wave envelopes for two different source types, two different source depths, and for two different cases of seismic wave propagation. The synthesized T-wave envelopes show directional changes of T-waves caused by anisotropic source radiation, focal depth effects on the slopes of T-wave envelopes and effects of seismic wave-scattering on shape of the envelopes.

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