Advances in Modeling Wave Propagation

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The statistics of regional seismograms as a function of source type, depth, distance, and frequency are not generally available for regions of the world where seismic and human activity has not provided an historic database of earthquakes, nuclear explosions, large industrial blasts, mine bumps, and rockbursts. Therefore, it is expected that future seismic discrimination practice may rely in part upon theoretical transportation of discriminants tested in regions of the world where various source types are historically available. In order to perform such a theoretical transport of a discriminant, we require an understanding of the discriminant's statistics for all source types in both the old and the new crustal structures.

In this talk we review numerical efforts to model regional seismograms in CTBT research. We categorize these methods as procedures that attempt to model the average 1D layered crustal structure, 2D crustal sections as approximations to lateral heterogeneity, and methods that attempt to model propagation in 3D lateral heterogeneity. The relative merits of the various proposed synthesis methods will be discussed regarding efficiency, completeness, and accuracy. A list of research topics and questions will be presented with examples from some recent work by CTBT researchers.

Key Words: CTBT, Synthetic Seismograms, Seismic Discrimination