Geophysical Research Abstracts,
Vol. 11, EGU2009-8196, 2009
EGU General Assembly 2009

COMRAD: a dynamic ray-tracing algorithm for rapid multi-phase seismogram computation

T.A. Stabile (1), R. De Matteis (2), A. Zollo (3), and A. Emolo (3)

(1) AMRA scarl - RISSC-Lab, Via Nuova Agnano 11, Naples, Italy (stabile@na.infn.it / +39 81 2420334), (2) Dipartimento di Studi Geologici ed Ambientali, Università degli Studi del Sannio, Benevento, Italy, (3) Dipartimento di Scienze Fisiche, Università degli Studi di Napoli Federico II, Naples, Italy

We propose an algorithm for the computation of synthetic seismograms based on the asymptotic ray-theory. The method we propose allows the rapid generation of an exhaustive number of seismic-phases that are used to build seismic waveforms having the same complexity of records simulated by complete wave-field techniques. The method uses a hierarchical order of ray and seismic-phase generation, taking into account existing constraints for ray paths and a number of physical constraints. Synthetic seismograms are computed using as core the dynamic ray-tracing program developed by Farra and Madariaga (1987). To validate the code, we have compared its performances to generate synthetic seismograms in a layered medium with a complete wave field simulation approach based on the discrete wave number method. The seismograms are compared according to a time–frequency misfit criteria based on the continuous wavelet transform of the signals. Although the number of phases is considerably reduced by the selection criteria, the results show that the loss in amplitude on the whole seismogram is negligible. The code can take into account both explosive and earthquake faulting sources. Moreover, it allows a fast computation of synthetic seismograms associated to an extended fault, considering a complex source kinematic model for the earthquake rupture process.