Synthetic seismograms for 3D Earth model with topography of discontinuities

Seiji Tsuboi[1]

[1] IFREE

We have made a 2D synthetic ground motion movie of the 2002 Denali fault earthquake using CRUST2.0, S20RTS global tomography model, ETOPO5, and a finite fault slip model (Ji et al , 2005). It presents two anomalous wave packets, which travel along the west coast of the North America plate in off-great-circle paths. Later study indicates that these wave packets are Rayleigh waves around 20 sec and appear in the records of the TriNet array too. One of them is the direct wave from the source, whose group arrival-time changes laterally due to the shape of the Oregon coast. Another is the surface wave reflected by a lateral interface around the Rocky Mountains. A linear reflector parallel to the Canada coast and offsetting a few hundred km could explain their arrival times well but the offsetting distances derived from synthetic seismograms and data are inconsistent. The synthetic profile prefers a larger distance around 950 km, while the observational profile favors a smaller value of 600 km. Such a discrepancy suggests a need to update the CRUST2.0 and mantle model used. Our experiment also indicates that the 2D synthetic ground motion movies are useful tools in understanding the wave propagations in a realistic earth structure. Here we show that these anomalous wave packets are also appeared in the synthetic seismograms calculated for 2004 Sumatra earthquake. We dicuss the origin of these anomalous waves and possible implication to the Earth structure.