

P and S wave velocity structure beneath the northern Fossa Magna basin derived from a dense array observation

Eiji Kurashimo[1]; Naoshi Hirata[1]

[1] ERI, Univ. Tokyo

To clarify the process of deformation of island arc crust and the mechanism of earthquake, we need the details of a heterogeneous structure of the crust and deep structure of active faults. The northern Fossa Magna (NFM) basin is a Miocene rift system produced in the final stages of the opening of the Japan Sea. The northern part of Itoigawa-Shizuoka Tectonic Line (ISTL) bounds the western part of the northern Fossa Magna and continues to the southern coast of central Honshu. To understand the active tectonic in this area, seismic velocity structure, deep structure of active faults and the micro-seismicity near the active faults are fundamental information. In the autumn of 2002, we conducted the seismic array observation across the northern part of the ISTL active fault system and the NFM to obtain a structural image beneath the NFM. 60 three-component portable seismographs were deployed along a linear array from September 18 to November 2, 2002. Each seismograph system consisted of a 1-Hz, three components seismometer and a long-term, low-power digital audio tape (DAT) recorder (Shinohara et al., 1997). Waveforms were continuously recorded at a sampling rate of 100 Hz. Seismographs were installed with a spacing of about 1 km in order to obtain a crustal structure in detail. In this area, deep seismic reflection and refraction/wide-angle reflection profiling were undertaken using vibroseis and explosive source (Sato et al., 2003). DAT recorders recorded these controlled seismic signals. During the seismic array observation JMA and ERI determined the hypocenters of 570 earthquakes in the latitude range of 35.4°–37.2° N and longitude range of 137.5°–138.7° E. We tried to select the local crustal events which are distributed uniformly in this study area. Picking P- and S-wave arrival time data from 55 events at 112 seismic stations (including offline recorder and telemetered seismic stations), 2849 P- and 2055 S-wave arrival times were obtained for the inversion analysis. Arrival times of local earthquakes were used in a simultaneous inversion for hypocenter and three dimensional P and S wave velocity structure [Thurber, 1983]. P wave velocity structure shows that low velocity zone is located at the western side of the survey line and high velocity zone is located at depth of 5–15 km at the central part of the survey line. The velocity structure beneath the survey line shows good correlations with the surface geology.