

Seismic scatterer distribution beneath the Wellington region, southernmost part of New Zealand's North Island

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The wellington region is sited at the southern end of the Kermadec-Hikurangi subduction zone where the Pacific plate subducts beneath the Australian plate. A detailed crustal and upper mantle structure of the subducting Pacific plate and the overlying Australian plate is inevitably important to constrain the physical process of earthquake occurrence. In May of 2011, the second phase of the Seismic Array Hikurangi Experiment (SAHKE) was conducted to obtain the detailed subduction structure beneath the southern North Island. The transect line was extended from the Wairarapa coast to the Kapiti coast. Data collected from on the survey line have high signal-to-noise ratios, from which we can easily recognize not only the first arrival phases but also latter phases. The seismic coda waves are interpreted as scattered waves from inhomogeneities in the Earth [e.g., Aki, 1969]. Array recordings of seismic events are useful to locate scatterers. In this study, array analysis is applied to the waveform data for imaging seismic scatterer distribution, using semblance analysis [Neidell and Tarner, 1971]. In this study we assumed an isotropic scattering model. To locate scatterers, we established 3-D imaginary grid points beneath the survey area. The velocity structure beneath the survey area was derived by refraction tomography method [Zelt and Barton, 1998]. This velocity structure is used to calculate travel times between a source/receiver to a grid point. If a scatterer exists near the grid point, a semblance coefficient value is expected to be high. The distribution of scatterer was obtained down to a depth of about 30 km. The high westward dipping value zone is visible at the depth of about 25 km. A high value zone can be also recognized beneath Kaitoke.

Keywords: Seismic scatterer, New Zealand, subduction zone