Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SSS34-01 Room:104 Time:May 21 09:00-09:15

Wide-angle OBS velocity structure along the SAHKE transect, lower North Island, New Zealand

MOCHIZUKI, Kimihiro[1*], Stuart Henrys[2], YAMADA, Tomoaki[1], SHINOHARA, Masanao[1], Rupert Sutherland[2], SATO, Hiroshi[1], IWASAKI, Takaya[1]

[1]Earthquake Research Institute, Univ. of Tokyo, [2]GNS Science

As part of the Seismic Array HiKurangi Experiment (SAHKE), we acquired wide-angle reflection / refraction seismic data using ocean bottom seismometers (OBSs) along a transect across the southern North Island of New Zealand, where the Hikurangi Plateau subducts westward beneath Wellington. The SAHKE project was designed to investigate the physical parameters controlling locking at the plate interface beneath the southern North Island and characterize slip processes in a major segment of the Hikurangi system. We deployed 16 OBSs with 5 km spacing off the east coast and 4 OBSs with 10 km spacing off the west coast. Controlled airgun sources were shot at every 100 m along a 350 km onshore-offshore transect. Although data from OBSs at shallow depths (˜100 m) contain large amplitude ambient noise, first arrivals from the airgun sources can be traced up to over 100 km offset on record sections of most OBSs. We applied first-arrival travel-time inversion in order to obtain P-wave velocity structure along the 80 km-long OBS profile off the east coast. The velocity structure to ˜20 km depth was resolved, and the down going slab was clearly imaged. The final RMS travel time residual is 31.7 ms from 6104 first-arrival travel-time picks. We, then, picked travel times of reflected waves, and projected reflection points by applying a travel-time migration method using the first arrival velocity model. Reflection interfaces including the plate interface, the Moho of the Hikurangi Plateau and a possible interface between the upper and lower crusts are imaged. The thickness of the subducting Hikurangi Plateau crust is 12 km. Very fast P-wave arrivals with apparent velocities of $>$8 km/s from near the Chatham Rise were observed on OBSs in the east of the profile. Travel times of shallow refractions can be well explained by the velocity structure of the Hikurangi Plateau. Such fast P-arrivals may be considered as either PnP, and represent the velocity of the upper most mantle beneath the Hikurangi Plateau or a deeper eclogite layer of the Hikurangi Plateau itself (Reyners et al 2011).

Keywords: Active seismic survey, Subduction zone, Hikurangi, Ocean Bottom Seismometer, New Zealand