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Preliminary results of SAHKE II low fold seismic reflection profile across the Wairarapa fault, New Zealand

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Oblique plate subduction of the Pacific Plate at a rate of about 42 mm/yr along the Hikurangi margin in the southern North Island contains large amount of margin-parallel component of plate motion (Beavan et al., 2002). This margin-parallel component of plate convergence is partly accommodated by dextral-slip on the NNE-striking faults within the overriding plate including the Wellington and Wairarapa faults (Little et al., 2009; Rogers and Little, 2005; Van Dissen and Berryman, 1996). Unusually high displacement/length ratio for the 1855 earthquake along the Wairarapa fault (Mw~>8.1) suggest that the rupture may extended downward to merge into the underlying subduction megathrust to comprise splay fault systems at depths of 20-30 km beneath the southernmost part of the North Island (Rogers and Little, 2006), also as inferred from seismicity. Aiming to understand structural characters and deeper crustal scale geometry of the Wairararapa fault, and ultimately its structural relations to subducting oceanic lithosphere beneath he southern segment of the Hikurangi Margin, we analysed seismic data obtained by the SAHKE II project seismic experiment to make a low fold stack section across the Wairarapa fault. At this point we carried out preliminary data processing, which includes common depth point stack of densely deployed area after NMO of CDP-sorted, all shots data using a single velocity (6.0 km/s) with a stretch mute, first arrival mute, elevation statics, bandpass filter, velocity filter to attenuate S waves. In the preliminary image several west-dipping reflectors can be seen beneath the Rimutaka Range from depth of about 20 km. Upward projection of a west dipping event among them is approximately coincident with surface location of the Wairarapa fault. Shallower, westerly dipping reflectors from 15 to 22 km depth underlie beneath the Wairarapa event is similar to geometry of subducting Pacific Plate. These seismic characters may imply splay fault signature of the Wairarapa fault extending from the underlying megathrust.

Keywords: Wairarapa fault, low fold seismic reflection profile, Hikurangi subduction margin, active fault, splay fault