Shallow to deeper structures of the Median Tectonic Line active fault system in Shikoku illuminated by new hi-resolution seismic reflection profiling, southwest Japan

*Tatsuya Ishiyama[1], Naoko Kato[1], Shin Koshiya[2], Hiroshi Sato[1], Makoto MATSUBARA[3], Tomoko Elizabeth Yano[3], Taro Koike[4], Katsuya Noda[4]

1. Earthquake Research Institute, University of Tokyo, 2. Department of Civil and Environmental Engineering, Faculty of Science and Engineering, Iwate University, 3. National Research Institute for Earth Science and Disaster Resilience, 4. Geosys, Inc.

Median Tectonic Line (MTL) active fault system is one of the most pronounced, trench-parallel active dextral slip faults in SWJapan, extending for approx. 300 km (Okada, 1992). With ubiquitous proximity to the north dipping terrane boundary MTL between Samgawa metamorphic rocks (Sm) and Ryoke granitic rocks to the north, their structural links with active strands of the MTL have been widely discussed. Seismic experiments in Kinki (Wakayama) clearly illuminate that near-surface steeply dipping fault plane appears merge into underlying more shallowly dipping reflectors correlated with top Sm (Sato et al., 2015). In Shikoku, however, previous seismic sections have not fully resolved such structural linkages of the major fault strands of the MTL, whereas pioneering deep seismic experiments successfully imaged northerly dipping MTL (Ito et al., 1995). To define structural characters of the shallow to deeper subsurface geometry, we collected new seismic reflection profiles across MTL active fault system in Shikoku island. Our new, processed seismic profile across the Okamura Fault, Komatsu Fault (Goto and Nakata, 1998), and the MTL and its preliminary interpretation suggest northerly dipping Sambagawa metamorphic rocks beneath the northern flank of the Ishizuchi Mountains and Niihama plain to the north. As is the case with previous seismic results, downward extensions of the MTL apparently dips northward, in contrast to near-surface steep fault planes identified in outcrop and trench exposures. In addition, northerly dipping clouds of microseismicity also suggest its deeper extension. Similarly, in our new seismic profile in Wakimachi, Tokushima, Chichio fault (Okada and Tsutsumi, 1997), active dextral slip fault that dips vertically at ground surface, is apparently underlain by very strong and continuous north dipping reflectors from the top of Sm. This observation also suggests that the Chichio fault may merge into, rather than cut across these Sm reflectors. We will mainly discuss on (1) detailed structural characters identified in the new seismic data, (2) their structural linkages with near-surface structures of the active strands, and (3) implications for overall shallow to deeper geometry of the MTL based on both new and previous seismic data, regional seismicity based on JUICE catalogue (Yano et al., 2017), and crustal structures estimated from seismic tomography (Matsubara et al., 2017).

Keywords: Active fault , Median Tectonic Line active fault system, Seismic reflection profile, Seismicity, Shikoku

