First stage to reveal the structure of the Fujikawa-kako Fault Zone by the integrated seismic experiments across the northwestern region of the Izu collision zone, central Japan

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The Fujikawa-kako Fault Zone (FKFZ) is one of the most alarming active fault zones in Japan, because it is composed of the northwestern border of the Izu collision zone and its vertical slip rates are thought to reach up to 7 m / 1000 year (MEXT, 1998, 2010). However, thick pyroclastic materials and lavas from Mt. Fuji obscure surface structures, and inevitably make it difficult to examine the subsurface ones. As these difficulties are serious for evaluation of the activities of the FKFZ, we carried out the following integrated seismic reflection experiments in order to reveal deep to shallow structure of FKFZ, especially the relationship between the deeper part of FKFZ and the upper surface of the Philippine Sea Plate (PHS) as well.

FIST (from FKFZ to the Itoigawa-Shizuoka Tectonic Line :36km in length) was done using 4 vibrators (17 tons) and 2 dynamite shots (100 kg) in 2012. Main targets were deep structures. Quasi-3 D high resolution (Hoshiyama Hills: 6 lines and 16 km in total length) was done using 2 vibrarors (6.8 tons) in 2015. Main targets were shallow structures of the Omiya and the Iriyamase faults along the eastern margin of the Hoshiyama Hills.

The results are summarized as follows based on seismic profiles obtained from the experiments: The N-trending area of FKFZ is filled by the early to middle Pleistocene Ihara group (P wave <3.6 km / s) and overlying pyroclastic and lavas from the Mt. Fuji. The total vertical displacement of FKFZ is estimated to be 2000 m. Supposed that the base of the Ihara group is 1.5 Ma, the average vertical displacement rate is about 1.3 m/1000 years. The Shibakawa fault, westernmost of FKFZ, contributes mainly to the total vertical displacement. Its deep structure is not clear in the profile. The Omiya fault is generated from the upper surface of the PHS as a 30-degree-dipping reverse fault at several km in depth considering the recent results of the seismic profiling across the Suruga Bay. The Omiya fault reaches the tip point about 500 m in depth forming a kind of a wedge thrust structure above the tip point. Within the hanging wall of the wedge thrust, a fault-bent fold occurs forming a steep limb along the northeastern margin of the Hoshiyama Hills. The limb was formerly misunderstood as a normal fault. On the contrary, within the wedge, complicate chevron folds are developed suggesting horizontal shortening along subhorizonntal detachments in the Hoshiyama Hills. The Iriyamase fault may be a high-angle tear fault related to the Omiya fault. The precise structure and of the surface trace of the Iriyamase fault is unclear.

Although these results present new scope to us, we still remain in the first stage of revealing the structure of FKFS. In the next step we try to challenge to establish the subsurface stratigraphy with age-scale by scientific drillings in and around the Hoshiyama Hills. After then we will be able to interpret the profiles more precisely, reconstruct the history of FKFZ, and evaluate the activities of FKFZ.

Keywords: Fujikawa-kako fault zone, Izu collision zone, integrated seismic experiment, Omiya fault, Iriyamase fault, Shibakawa fault