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A survey of tsunami sediments in Miyako Islands

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The 1771 Yaeyama tsunami (Meiwa-tsunami) was possibly M8 class interplate earthquake in the Ryukyu Trench (Nakamura, 2009). The transport ages of tsunami boulders, which were moved from coral reef to land by tsunamis, concentrate to five periods for 3000 years (Kawana, 1994). This suggests that the mega-tsunami occurred frequently in the south Ryukyu Trench. Thin sand layer overlying the basement of buried old house has been reported in the ruin of the Miyako-Yaeyama region. They has been interpreted as the tsunami deposit. However, there is no evidence for the tsunami deposit since the origin of the sand is unclear. Then, we employed the trench-surveys in the Miyako Island and investigated the origin of the sand layers using the analysis of foraminiferal. The survey was conducted on the day of 18-21 June 2012 at Tomori (Miyako Island), Ikema Island, and Irabu and Sawada (Irabu Island).We digged a trench about from 1m to 3m depth and observed. The silt layer with sand is distributed at the depth from 30 cm to 50 cm in Tomori. We collected 8 samples from 15cm to 110cm depth including this layer. Since layer consists of muds from 0 cm to 160 cm in Ikema Island, we could not find sand layer. In this site, we collected samples from 45cm to 155cm depth. A medium grain sand is distributed at the depth from 80 cm to 115 cm, and brown-colored fine grain sand or silt is distributed at the depth from 120 cm to 200 cm in Irabu. We collected 6 samples at the depth from 80cm to 160cm. In Sawada, the sand layer with grading from medium to coarse is distributed at the depth from 170 cm to 290 cm. We collected 9 samples from 190cm to 290cm depth. Next, we washed mud . Then, the samples separate by 2mm mesh, 1mm mesh, 0.5mm mesh, 0.25mm mesh, 0.125mm mesh and 63um mesh and we pick not more than 150 foraminiferas by from 0.5mm mesh to 1.0mm mesh at a microscope. If sample’s amounts are increasing, we divided for simple divider. In foraminifera, we divided into priority species (Calcarina, Hispida, Baculogypsina, Elphidium) and the others. In addition, we observe species for inhabiting sediment in the others. The mud content is lower and the layer contains coarse sand at the depth from 115 cm to 150 cm in Irabu. From the foraminiferal analysis, sample of 150cm depth contains

Eponides sp., Pseadorotalia sp., Lenticulina sp., Ammonia sp. and A. bicirculata. These five species live in the sediments of reef and lagoon (Uchida, 2007: Shiba, 2012). Furthermore, Lenticulina sp., Ammonia sp. and A. bicirculata were not included in Toguci Beach’s samples. This suggests that the sand at the depth of 150 cm in Irabu is transported from reef, lagoon and beach. The sand would have been tsunami sediment because the sand of reef and lagoon could not be transported to the site by the storm wave. The sand originates from sand of reef, lagoon, and beach also suggest the sand is tsunami sediment. The grading structure at the depth from 170 cm to 290 cm in the Sawada suggests that the layer is tsunami sediment. Furthermore, the bottom of the grading layer includes Ammonia sp., Cibicidoides sp., Anomalinella, Eponides sp., Pseudorotalia sp. and Ammonia sp.. In addition, Cibicidoides sp., Anomalinella, and Eponides sp. was not included in Sawada Beach’s samples. In addition, at this depth’s sample was a result of a large number of individuals that live in the shallow-water zone inside Elphidium. I mean, I can guess it deposits due to the tsunami because the sand of the beach sand and lagoon and reef are mixed and sand location where waves are difficult to reach are transported to land. Even more, sand from 290cm depth’s sample was a result of a large number of individuals that live in the shallow-water zone inside Elphidium, too. In addition, we also observed planktonic foraminifera and Ammonia sp. . We suggest to tsunami trace, too.

Keywords: tsunami sediments, foraminiferal analysis