Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MIS25-01 Room:201B Time:May 24 09:00-09:15

The foraminifera assemblages in tsunami sediments on Ishigaki Island, southwestern Japan

TU, Yoko[1*] ; CHIEN, Chih-wei[2] ; ANDO, Masataka[3] ; KITAMURA, Akihisa[4] ; SHISHIKURA, Masanobu[5] ; NAKAMURA, Mamoru[6]

[1]Department of Natural History Sciences, Hokkaido University, Japan, [2]Department of Earth Sciences, National Central University, Taiwan, [3]Center of Integrated Research and Education of Natural Hazards, Shizuoka University, [4]Institute of Geosciences, Faculty of Science, Shizuoka University, [5]Institute of Earthquake and Volcano Geology, National Institute of Advanced Industrial Science and T, [6]Faculty of Science, University of the Ryukyus

Foraminifera, single celled protists, are widely applied to paleoenvironmental, paleooceanic, stratigraphic and sedimentological investigations due to their abundant populations. Moreover, they are sensitive to living environment and have high preservation potential within the sediments (Mamo et. al, 2009). Although foraminifera assemblage analysis is remarkable tools for geoscience researchers to understand the variation of paleoenvironment, however, the use of foraminifera assemblage has not been developed well in palotsunami research. Up to the present, not only investigation methods but also analytic procedures have not been established.

In 1771, a destructive tsunami struck Ishigaki Island, southwestern Japan, with the maximum run-up height of 30 meters to cause about 9000 fatalities (half populations of Ishigaki Island), and the mortality rates of 25 villages on the eastern and southern coasts reached 10- 90%. For the mechanism of this tsunami, Nakamura (2009) proposed the source should be a large subduction thrust earthquake that occurred near Ryukyu trench axis, while Goto et al. (2010) suggested a model of extensive submarine landslides triggered by an intra-plate earthquake. Furthermore, Ando et al. (2015) identified four tsunami evens from tsunami sediments for the last 2000-2500 years.

In this study, we tried to identify tsunami events based on foraminifera assemblage in soil deposits. In order to approach this aim, we analyzed forty-seven soil samples obtained from five excavation sites on both eastern and western coasts in this island. A total of 117 foraminifera species from 36 genus were recognized through our analysis. Subsequently, we classified all foraminifera tests into three clusters based on the result of Hatta and Ujiie (1992): shallow-water foraminifera ($<$15m), inter-mediate depth foraminifera (15m to 50m) and deep-water foraminifera ($>$50m). After this procedure, we took the ratio of individual numbers in deep-water + inter mediate-depth to total amount for each soil sample. This analysis yields that samples with high ratios ($>$0.2) were identified as tsunami deposits, conversely those with low ratios ($<$0.15) as beach sand or terrigenous sediments. This suggests that foraminifera assemblage analysis can provide significant tool to identify paleotsunami deposits from other sedimentary processes. Our analysis of foraminifera assemblages provides at least three tsunami events in 1771, AD 1000 to 1300, and BC 300 to 600 that struck Ishigaki Island.

Keywords: foraminifera assemblages, tsunami sediments, Ishigaki Island, 1771 tsunami, Ryukyu subduction zone