

Benthic subfossils from event layers from the Sukumo core, southwestern Shikoku Island, Japan and their implication for tsunami events

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Kochi facing the Nankai Trough has been suffered from the tsunami at the Nankai earthquakes (Murakami et al. 1996, J. JSNDS, 15, 39-52). Okamura (2009, J.IEIE Jpn, 29, 887-890) already investigated core sediments in lagoons of Kochi and eight tsunami layers in the last 5000 years. Yet tsunami sediments in the marine sediment have not been studied there. In the Sukumo core, event sediments are intercalated in marine clay sediments (Tsuji et al., 2018, JpGU abstract). Here we present benthic subfossils (molluscs, corals, and ostracodes) from the event sediments and discuss whether they are generated from tsunamis.

Between 2 and 27 m depth, sediments consist chiefly of clay and silt. The clay and silt sediments contains molluscan and ostracode subfossils, that were reported from brackish condition and inner bays in the Japanese Islands. At depths of 13.6–19.7 m, the Kikai-Akahoya eruption's layer (K-Ah: Machida & Arai, 1978, Daiyonki-kenkyu, 17, 143-163) and its redeposited layer are found. Below the tephra layer, angular conglomeratic event layer (40 cm thick) is present. Five event layers of sand sediments are found above the tephra layer. The event layers are composed of sand and conglomerate (3–8 cm thick). The sand layers contain gravels, plant, shell fragments. They are poorly-sorted. The layers' base-surfaces are sharp, often showing truncation. The five sand and conglomeratic event-layers include shell, corals, and ostracodes with the following ecological features.

4.10–4.17 m depth (3520 yr cal BP): Brackish shell, *Batillaria* is found. Ostracodes are *Loxoconcha uranouchiensis* and *Pontocythere subjaponica* living in the sand bottom of the bay and in the sand bottom of coasts, respectively.

5.33–5.40 m depth (4840 yr cal BP): Brackish shell, *Batillaria* is included.

8.53–8.58 m depth (5960 yr cal BP): In the ostracode assemblage, *P. bradyformis*, the dominant species, lives in baymouths with a depth of 10–30 m. The rare species are *Ambtonia obai* and *Krithe japonica* that inhabit 10–30 m of water depth under open sea water.

10.53–10.58 m depth (6440 yr cal BP): The ostracode assemblage consists of *P. bradyformis* as the dominant species and *A. obai* as a rare taxon.

19.66–20.06 m depth (7820 yr cal BP): It yields *Chama* sp., rock-reef shell species, and *Cyphastrea* sp., reefal coral. In the ostracode assemblage, *Neonesidea oligodentata* and *K. japonica* are included. They live in a rock reef under the open sea condition.

The event layers contain the benthic subfossils, that did not live in the mouth of the Matsuda River, the drilling site, but dwelled under the influence of open ocean water. The subfossils indicate the event layers were sourced from the open sea condition. The sedimentological characteristics and subfossils' ecology

are consistent with the tsunami sediments or washover sediments during the storm (Fujiwara, 2015, The science of tsunami deposits. etc.). Okamura (2009) reported 3500 yrs cal BP-aged tsunami layer, that is coincident with the event layer at 4.10–4.17 m depth in the Sukumo core. Matsuda et al. (2016, JpGU abstract) and Nanayama et al. (2017, Chikyu monthly special, 67, 99-106) reported coarse sediments, possibly tsunami sediments below the K-Ah layer from the Miyazaki Plain and the Yakushima Island, respectively. The Sukumo sediment core hosts the tsunami sediments.

Keywords: Nankai earthquakes, ostracodes, molluscs, corals, Kikai-Akahoya