

Tsunami Depositional Sequence Model in Bay Sediments and Tsunami Potential of Northeastern Margin of the Philippine Sea Plate

Osamu Fujiwara[1], Takanobu Kamataki[2]

[1] JNC, [2] Neotectonics Res. Gr., Tono, JNC

Tsunami deposits in an early Holocene drowned valley on the southwestern Boso Peninsula, Pacific coast of east Japan, are composed of a stack of four units, Tna, Tnb, Tnc and Tnd.

Unit Tna is composed of poor sorted coarse to very coarse sand with high mud content, and erosionally overlies the bay mud. This unit deposited under the landward paleocurrents in upper-flow-regime forming plane beds and antidunes.

Unit Tnb consists of a stack of several subunits and well reflects the tsunami waveform in detail. Each subunit bounded by the first-order erosion surfaces of hummocky cross-stratification is attributed to oscillating high-density current. The subunits are composed of the lower inverse and upper normal graded intervals. Sorting becomes best in the middle horizon of the subunits. Mud content decreases upward in the inverse graded interval, and increases upward up to 20% in the normal graded interval. The inverse graded interval seems to be traction carpet and/or transport-lag. The normal graded interval suggests a long stagnant stage of current, which allows fallout of mud particles. Paleocurrents, reconstructed from the sedimentary structures, show each subunit corresponds to the up-flow and/or return-flow.

The stack of subunits showing saw-toothed curve in grain-size parameters indicates the oscillation of high-energy currents with long period. This long period oscillated flow can be explained by the tsunami with 10-minutes order wave period. An extremely coarse-grained subunit intercalated in the middle horizon of the unit Tnb can be explained by deposition from the largest wave of a tsunami wave train. Delayed arrival of the largest wave in a wave train is due to edge wave effect indicating the reflection on the continental shelf, and a remarkable feature of the tsunami originated in deep ocean.

Unit Tnc also shows cyclic deposition of plant debris laminae and poor sorted sandy silt layers, and is attributed to the relative small waves in the later stage of a tsunami.

Unit Tnd is composed of sandy silt layer including subsequent foundering of wood and plant debris after the tsunami.

The southwestern coast of Boso Peninsula was protected from the tsunamis sourced in Pacific side by the Boso Peninsula. The historical tsunamis from the Nankai Trough were relatively small in size due to tsunami propagation process. Then, the source of great tsunami striking the southwestern coast of Boso Peninsula is almost restricted to the northeastern margin of the Philippine Sea Plate. Recurrence interval of these great tsunami estimated from the tsunami deposits is 150-300 yrs.