Paleoenvironmental changes of Lake Shinji and the Izumo Plain in Shimane Prefecture during the Holocene: sediment analyses of grain size and ITRAX μ-XRF for the HK19 core

*Aan Dianto[1], Tetsuya Sakai[1], Kota Katsuki[2], Koji Seto[2], Toshimichi Nakanishi[3], Yoshiki Saito[2]

1. Graduate School of Natural Science and Technology, Shimane University, Shimane, Japan, 2. Estuary Research Center, Shimane University, Shimane, Japan, 3. Museum of Natural and Environmental History, Shizuoka, Japan

Grain size analysis and Itrax μ-XRF analysis were performed on the Holocene succession of the 33.89 m long HK19 core. This core, taken from the eastern Izumo Plain (west of Lake Shinji), was used to study the paleogeography and paleoenvironmental changes of Lake Shinji and the Izumo Plain during the Holocene. The core site was a center of Paleo Shinji Bay during the early to middle Holocene. The Holocene interval consists of marine to brackish sediments and was divided into five units (Unit 1 to Unit 5 in ascending order) mainly based on changes in mean grain size, sorting, and sand content. Unit 1, below 32.1m depth, from about 10 to 9.7 ka is characterized by a fining upward succession from lower Holocene sandy silt to clayey silt with very little or no sand fraction, it is formed in near intertidal environments. Unit 2 through Unit 4 consist of clayey silt sediment facies. Unit 2 is the interval from 31.4m to 22.9m depth, ca. 9.7 ka to 7.5 ka, and is characterized by a slightly upward coarsening succession with little or no sand content, it deposited in response to the development of the paleo bay. Unit 3 is the interval from 22.9m to 15.7m depth, ca. 7.5 ka to 3.8 ka. It is characterized by greater variations in grain size and degree of sorting; it also contains much more sand than the underlying and overlying units. This unit is characterized by the occurrence of fine-grained laminated sediments resulting from anoxic bottom water conditions. Unit 4 is the interval from 15.7m to 11.4m depth, ca. 3.8 ka to 0.7 ka, and is characterized by little or no sand content, similar to Unit 2. The loss of sand content indicates less influence from the main river. Lastly, Unit 5 from a depth of 11.4m to the ground surface is characterized by sandier sediments consisting of an upward coarsening succession from clayey silt to medium sand with an overlying upward fining succession caused by the inflow of the Hii River. These changes from units 1 to 5 are closely related to the paleogeography of the study area. The Itrax μ-XRF data were available on laminated sediments or in part of Unit 3 (22.9 m to 14.3 m). The Itrax μ-XRF time series were interpreted using a combination of principal component analysis (PCA) and k-means clustering. The PC-1 results allow the μ-XRF data to be classified into the group that has a strong loading on the elements Ca, Sr, Mn (positive axis) and the group that has a strong loading on the detrital elements: Ti, K, Si, Zr, Rb and Fe on the negative axis. The distribution of each group of elements along the core has been drawn by clustering. This cluster is closely related to the boundary between units 3 and 4.

Keywords: Izumo Plain, Hii River, Lake Shinji, Paleoenvironment, Grain size, μ-XRF

