# Reconstruction of the Holocene Relative Sea Level Changes based on electric conductivity of many borehole cores in the Nobi Plain

# Yuichi Niwa[1]; Toshihiko Sugai[2]; Takashi Ogami[2]; Eiji Sasao[3]

[1] Natural Environmental Studies, Univ. of Tokyo; [2] Environmental Studies, KFS, UT; [3] JAEA

To evaluate the stability of coastal lowland, we tried to reconstruct the Holocene relative sea level changes by means of electric conductivity (EC) of seven drilling cores in the Nobi Plain (Niwa et al, 2007). The Nobi Plain is tilted toward west by the Yoro fault system. During the middle to late Quaternary, the subsidence rate and tilting rate of the plain is about 1m/kyr and $0.86*10^{-4}$/kyr respectively (Sugai and Sugiyama, 1999). These cores (AN, KM, NK, KZ, KZN, OYD, and YM) are located various distances from the Yoro fault. These cores show a typical deltaic succession influenced by the sea level changes. The sediment is litholigically divided into LSM (fluvial ~delta sand/mud), MM (inner bay mud), US (delta sand), and TSM (flood plain sand/mud) in ascending order. EC was measured with the below method at 5 to 200 cm interval of core depth. Samples were parched at $110^oC$ more than 24 hours, followed by milling with vibrating sample mill (TI-100; CMT). 5.00g of each sample and 60ml of distilled water was poured into sample vial and stirred. Then EC was measured with conductivity meter (COND METER ES-51; HORIBA). In this research, we use the value of EC for seven days after making stirred water. We use depositional curves (Ogami et al, 2006) reconstructed from over a hundred of $^{14}C$ ages and two tephra layers of K-Ah (7.3ka) and U-Oki (10.7ka) to estimate depositional age of the each sample.

The value of EC in the uppermost of MM is proportional to the thickness of US for the seven cores. Because US constructs delta front and because the top of the delta front almost shows the mean sea level, the thickness of US indicates the water depth at the time of deposition around the boundary between US (delta front) and MM (prodelta). Thus, EC can be considered to indicate paleo-water depth. Based on the assumption that in inner bay, the value of EC in MM is proxy of water depth and that the influence of ion leaching and exchange on the value of EC is negligible, EC was transferred to water depth using function y=5.72x (x: the value of EC (mS/cm) ; y: water depth(m)). Relative sea level is roughly estimated as ((altitude based on depositional curve) + (water depth transferred from EC)). For the seven cores, relative sea level has been increasing and reaches highest at present. These curves are typical of subsiding areas. Continuous rising of relative sea level after 6000 cal yr BP when the rate of sea level rise caused by glacial eustasy is low is probably caused by subsidence triggered by the Yoro fault. For the NK1 core which is the farthest from the Yoro fault among the cores, the rate of relative sea level rise after 6000 cal yr BP is lowest. The trend of the relative sea level curve of NK is similar with that of tectonically stable areas (e.g. Barbados (Fairbanks, 1990)). This indicates that subsidence rate is lowest at the NK core and increases toward the Yoro fault probably because of tectonic tilting during the Holocene.

In this presentation, we will reconstruct the Holocene sea level changes of the three cores (KNG, MW, and MC) added to these of the seven cores above and discuss the spatial resolution and error of the relative sea level calculated by the above method.

Reference

Fairbanks, R. G. 1990, Paleoceanography, 5, 937-948.

Niwa, Y. et al., 2007. Abstracts Volume of International Symposium on Quaternary Environmental Changes and Humans in Asia and the Pacific, 79.

Ogami, T. et al., 2006.17th International Sedimentological Congress, Abstract, 143.

Sugai, T., and Sugiyama, Y., 1999.Geological Survey of Japan Interim Report, EQ/99/3, 77-87.