

Typhoon and Baiu-season precipitation reconstructed by the flux of suspended detrital material in Lake Suigetsu

SUZUKI, Yoshiaki^{1*}; TADA, Ryuji¹; NAGASHIMA, Kana²; IRINO, Tomohisa³; YAMADA, Kazuyoshi⁴; NAKAGAWA, Takeshi⁵; KOJIMA, Hideaki⁶; SG12/06, Project members⁷

¹Univ. Tokyo, ²JAMSTEC, ³Hokkaido University, ⁴Museum of Natural and Environmental history, Shizuoka, ⁵Ritsumeikan University, ⁶Wakasa-Mikata Jomon Museum, ⁷none

To resolve the mechanism of climate change such as monsoon variability and change of typhoon track, it is important to reconstruct long-term precipitation changes from the site influenced by these rainfalls. Although it is difficult to quantitatively reconstruct past precipitation, we can utilize the flux of river origin suspended detrital material. Flux of suspended detrital material transported by the river has empirical relationship with river discharge known as the "rating curve". Because the flux of the river water reflects the precipitation in the drainage area under the humid condition, it is possible to reconstruct the past precipitation from the flux of detrital material for the lake sediment that effectively trap detrital material from the watershed.

Lake Suigetsu, in central Japan is under strong influence of precipitation by EASM (East Asian Summer Monsoon) and Typhoon. Suspended detrital material in Lake Suigetsu is coming from Hasu River, which is the main water source for Lake Suigetsu but its water does not come directly from the river into the lake but through Lake Mikata. Because Lake Mikata traps most of the coarse fraction of detrital material, only fine suspended detrital material is supplied and deposited in Lake Suigetsu. It is also known that high resolution age-depth model was established for Lake Suigetsu sediment based on over 100 ¹⁴C dates in the Holocene interval, which constitutes quasi-ideal opportunity to apply the reconstruction method.

To apply this method, we have to establish the "rating curve" specific for Lake Suigetsu and its catchment. In this study, we focused on the near-surface sediment of Lake Suigetsu which can be correlated to the observational record of precipitation in this area, and measured the flux of suspended detrital material to the lake. The bottom of Lake Suigetsu is anoxic since 1664, when seawater flowed into Lake Suigetsu because of opening of the Urami channel. Therefore, near surface sediment of Lake Suigetsu has annual lamination (varve). Varve counting and radioactive nuclide analysis were conducted to obtain high resolution age model. The age model was further fine-tuned based on correlation between observational flood events and event layers which are considered to be deposited by flood event. Finally, we obtained high precision age model from 1920 AD to the present with exceptionally low uncertainty such as +/- 1 year or less. Temporal changes in the flux of suspended detrital material were reconstructed based on this age model, which have good correlation with Baiu-season precipitation assuming the power law. It is also revealed that deposition of event layers occur mainly by the typhoon which arrives in the area through the southwestern Honshu from south to north. Based on these results, we would be able to reconstruct precipitation caused by Baiu-rainfall and frequency of typhoon landing event, respectively for the deeper part of the core.

Keywords: varved sediment, precipitation, East Asian Monsoon, typhoon, paleoclimate