

Stratigraphic correlation of multiple coring sites in Lake Suigetsu, Fukui prefecture, central Japan

YAMADA, Keitaro^{1*}; NAKAGAWA, Takeshi²; SAITO-KATO, Megumi³; STAFF, Richard⁴; KITABA, Ikuko²; KITAGAWA, Junko⁵; HARAGUCHI, Tsuyoshi⁶; SMITH, Victoria⁴; MCLEAN, Danielle⁴; GOTANDA, Katsuya⁷; ALBERT, Paul⁸; HYODO, Masayuki⁹; SUZUKI, Yoshiaki¹⁰; MATSUSHITA, Hayato¹¹; YAMASAKI, Akiteru⁶; TAKEMURA, Keiji¹

¹Graduate School of Science, Kyoto University, ²Research Centre for Palaeoclimatology, Ritsumeikan University, ³Department of Geology and Paleontology, National Museum of Nature and Science, ⁴University of Oxford, ⁵Fukui Prefectural Satoyama-Satoumi Research Institute, ⁶Department of Geosciences, Graduate School of Science, Osaka City University, ⁷Faculty of Polycy Informatics, Chiba University of Commerce, ⁸Swansea University, ⁹Research Center for Inland Seas, Kobe University, ¹⁰Department of Earth and Planetary Science, Graduate school of Science, The University of Tokyo, ¹¹Department of Earth and Planetary Science, Kobe University

Lake Suigetsu in Fukui prefecture, central Japan, is a tectonic lake related to the active Mikata Fault (Okada, 2004), which measures 3 km east-west by 3 km north-south. The sediments of Suigetsu are important for Quaternary science, as they are annually-laminated (varved) over the last ca.70 kyr (Nakagawa et al., 2012). The varved sediment also contains a significant number of microscopic event layers (e.g. associated with earthquakes and floods; Schlolaut et al., 2014). Two long cores (SG93, SG06) have previously been recovered from the centre of the lake, and an exceptionally precise age model has been established for the cores through a combination of over 800 radiocarbon dates and high precision varve counting (Staff et al., 2011; Marshall et al., 2012; Schlolaut et al., 2012; Bronk Ramsey et al., 2012). In 2014, a new core (SG14) was recovered by the Fukui prefectural government from a boreholes ca. 500 m to the east of the SG06 coring site. This core was obtained mainly for public display but also provides additional samples for the scientific analysis of the event layers, tephtras, palaeoclimate, palaeomagnetism, and others. High-resolution photographs of the half-core sections were taken before oxidation could take place, under precisely controlled lighting conditions. Long soft X-ray images were subsequently taken on 1 m long giant thin-section slabs of the core. From there, we visually correlated the SG14 core with the SG06 core using event layers, so the age model from SG06 core can be used for SG14.

The SG14 core was obtained from 4 separate boreholes (E, F, G, H) to ensure overlapping with each other. The combined core sections were nearly 100 m long, going ca. 30 % deeper than the SG06 core, and were almost wholly continuous except for two cm-scale gaps. Almost all of event layers of the SG14 core, such as tephtras, turbidites, could be correlated with that of the SG06 core. On the basis of this correlation, average sedimentation rate of the SG14 core was equivalent to that of SG06; however, the coarse layers of turbidites were different in thickness between each core. These observations support the idea that most of event layers spread out over wide areas of the lake bottom. Furthermore the variation in thickness between the cores provides key geographical origin and pathways of these event layers. The upper parts of the SG14 core (0 to 44 m in composite depth) are mainly dominated by varved sediments. Whilst the middle (44 to 65 m in composite depth) and lower parts (65 to bottom in composite depth) of the SG14 core lack laminated sediment; the middle parts primarily consist of massive sediment, and the lower parts are composed of black-brown peat and cyclically intercalated with more inorganic grey sediments. These stratigraphic transitions probably indicate hydrological change of the lake catchment.

References

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