

Reconstruction of sedimentation rates during the last ca. 50,000 years using multiple cores in Lake Suigetsu, central Japan

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Lake Suigetsu in Fukui Prefecture, central Japan, is a one of the tectonic lake located in a subsiding area related to the active Mikata reverse Fault (Okada, 2004). The sediments of Lake Suigetsu annually laminated over the last ca.70 kyr (Nakagawa et al., 2012) with a significant number of event layers (e.g. associated with earthquakes and floods; Scholaut et al., 2014), which record paleoclimate and palaeoenvironment changes. Two long cores (SG93, SG06) have previously been recovered from the centre of the lake in 1993 and 2006, respectively, 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; Scholaut et al., 2012; Bronk Ramsey et al., 2012). Recently, new cores (SG14) were recovered by the Fukui prefecture from boreholes ca. 500 m to the east of the SG06 coring site. In this study, we report those sedimentation rates of Lake Suigetsu during ca. 50,000 years and its triggers on the basis of these cores and the precise age model.

The SG14 core was obtained from 4 separate boreholes (E, F, G, H) to ensure overlapping with each other. Half cut sections of these cores were immediately photographed before oxidizing under precisely controlled lighting conditions. Furthermore, long soft X-ray images were taken on 1 m long giant thin-section slabs of these cores. On the basis of these images, we stratigraphically correlated the SG14 core with the SG06 core at more than 300 points in ca. 70 m lengths using a number of event layers to apply the precious age model of the SG06 core.

Focusing on the age of 0 to 50 ka, the SG14 core was deposited at 0.5 m/kyr and show strong correlation with that of the SG06 in depth. The rate increases after 13 ka and has gradual several thousand-year cycles. These cycles may relate to global environmental change. Furthermore, the rate drastically increases at the some horizons, which are able to classify into two types on the basis of comparison with the rate of the SG06 core: synchronous type and asynchronous type. The synchronous type increase the rate in each site at the same time, indicating the rate is likely affected by relatively large-scale event. On the basis of the age model, one of the this type is correlative with Kanbun historical earthquake in 1662. Therefore, this type may be induced by tectonic event. The rate of asynchronous type is clearly different between each site, indicating the rate is strongly affected by local event such as turbidites. As a result, we probably detected global environmental changes, tectonic events, and local events on the basis of high precise correlation between the SG14 and SG06 cores. Additional correlation data between the SG14 and SG06 are necessary in future research to improve understanding of the sedimentary process of Lake Suigetsu.

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