

Stratigraphy and chronology of the late quaternary sediments from Lake Imuta-ike, Kagoshima, southern Kyusyu

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We present the stratigraphy and chronology of the sediment core from Lake Imuta-ike, southern Kyusyu over the last 30,000 years.

Lake Imuta-ike, is a volcanic crater lake, located on the southern part of Kyushu Island. The lake serves a protected natural habitat of rare animals, and is a registered wetland under the Ramsar Conservation. The environment of the lake and its vicinity is of particular importance, because there have been no geological studies so far.

We collected sediment cores from the lake in February 2011 for reconstructing the past environmental history of the lake since the last glacial period. Using the core, we undertook a series of analysis, e.g., lithological observation, non-destructive X-ray CT scanning, identification of tephras, ¹⁴C dating and sequential measurements of physical properties and paleomagnetism. A part of these were used to build up the stratigraphy and the precise chronology of the core.

Sediment cores were taken up to the 25-m depth from the lake bottom, according to an overlapping method (e.g., Nakagawa et al., 2011) using a thin-wall and vibro-hitting sampler.

The lithology of the cores was composed of a peat layer to the 7.6-m depth, a mud layer (7.6 to 13.0 m) and a volcanic material complex called Shirasu (below 13.0 m). Six volcanic ash layers were visibly intercalated within peat layer, and four of these were wide-spread tephras: Sakurajima-5 (Sz-5) at 3.25 m (thickness: 7 cm), Kikai-Akahoya (K-Ah) at 4.53 m (21 cm), Sakurajima-11 (Sz-11) at 5.75 m (1 cm) and Sakurajima-Satsuma (Sz-S) at 6.60 m (32 cm).

Radiocarbon dates shows no stratigraphical contradiction. The date above the Shirasu layer (12.66 m) was 30,040±300 cal BP, showing a good agreement with the previously reported age of a pyroclastic flow when the Shirasu was deposited. The age-depth plots indicated that the beginning of the peat deposition could be at 15,000 cal yr B.P. This corresponds to the onset of B/A warm interstadial in LGIT. The average sedimentation rate was ca. 0.5 mm/year for the peat layer. The falling ages of the volcanic layers in Lake Imuta-ike were estimated to be 5.5, 7.1, 10.5 and 12.8 ka for Sz-5, K-Ah, Sz-11 and Sz-S, respectively. Our results are reasonably comparable with the those obtained from the eastern area of the Osumi Peninsula (e.g. Okuno et al., 1997).

The sediment of Lake Imuta-ike has a great potential for the paleoenvironmental study in this region over the last 30 ka.

Keywords: Lake Imuta-ike, tephra, the Sakurajima Volcano, the Ito pyroclastic flow, peat