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Reconstructing the history of human interactions using a lacustrine sediment with special reference to Taritsu Lake

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Lacustrine sediments is one of the useful material to reconstruct environmental history since it contains no bias by people. Using sediment records, the history of Kiso-hinoki cypress forest was reconstructed comparing historical records to sediment records.

Kiso-hinoki cypress is one of the most beautiful trees in Japan. Over 10,000 trees have been cut every 20 years for *Shikinen-sengu* (rebuilding shrine) at Ise shrine. Therefore, the imperial forest was set up in 1906 to prevent the depletion of the forest. The forest was severely deforested in the early 17th century when many castles were built, but it was regenerated by the conservation during Edo period. The survey of buried wood also show the evidence. To understand the utilization of the forest and regeneration processes, 10 cores were recovered from Taritsu Lake on Shirasu mountain pass by a Russian peat sampler. Pollen analysis and phytolith analysis have been carried out on No. 6 and No. 10 cores because sedimentation was stable in western part of the lake where these cores were recovered. ¹⁴C analysis indicated that the bottom of No. 10 core was about 1000 cal. yr. BC and that of No. 6 was about 800 cal. yr. AD.

Dominant pollen taxa were Cupressaceae and *Quercus* subgen. *Lepidobalanus* type in all period. The analysis of No. 10 core indicates that stable cypress forest has been established before Christ. Cypress became one of the most dominant element around AD400. After the enactment of *Shikinen-sengu* at Ise shrine every 20 years, pollen of Cupressaceae decreased and the forest was gradually replaced by *Quercus* subgen. *Lepidobalanus*. The analysis of No. 6 core shows that the percentages of Cupressaceae pollen decreased dramatically and the expansion of secondary forests is surmised by the increase of *Quercus* subgen. *Lepidobalanus* in the early 17th century. However, the decrease of the concentration of *Quercus* pollen can be observed indicating the depletion of the forest. After that, *Tomeyama* (the area prohibited to use all forest resources), prohibition to cut 4 kinds of Cupressaceae trees and prohibition to cut 5 kinds of Cupressaceae trees were enacted in 1662, 1708 and 1720, respectively. Since then, the forest seems to recover based on the pollen analysis, but the productivity became less than before the early 17th century. Entering the Meiji restoration, the imperial forest was set and conservation activity continued. Recovery of the forest can be observed by pollen analysis, but *Quercus* forest expanded. It may be ascribed to the production of charcoal for economical development during Japanese industrial revolution and building rail roads. After the world war II, *Pinus* forest developed due to the reconstruction of the devastated county.

It is considered that cutting undergrowth was carried out from the old time to promote the growth of cypress seedlings and therefore active regeneration occurred. Also, it is considered that the recent less activity of cutting undergrowth prevents the regeneration of cypress trees. To understand the management of the forest during Edo period, phytolith analysis was conducted at the depth of 73-75cm which is around AD1610, 39-40cm which is late 19th century when Meiji restoration occurred and 3.5cm which is close to the present. The result shows that there is no remarkable difference among the samples in the number of phytolith of *Sasa* type. Not cutting undergrowth seems not to be the factor which prevents the regeneration of cypress trees. *Sasa* has constantly grown around Shirasu mountain pass. Both results at the depth of 73-75 cm and 39-40cm showed the similar tendency. The phytolith of *Pleioblastus* type was observed at both depths. It indicates that *Pleioblastus* invaded to the open space where cypress trees were cut down. However, the phytolith of *Pleioblastus* type was not observed at the depth of 3-4 cm. The area has become the place which received little sunshine.

Keywords: *Kiso-hinoki* cypress, Taritsu Lake, pollen analysis, phytolith analysis, shikinen-sengu (rebuilding shrine), conservation