

## Ecological response of diatom flora in Lake Suigetsu, Japan to seawater intrusion since 1664

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Diatom flora in a 4-m sediment core from Lake Suigetsu was analyzed for examining ecological response of it against seawater intrusion since 1664. The results showed that freshwater planktonic species were dominant in whole sequence, even in section deposited after the seawater intrusion. However, eutrophic diatoms did not occur after the event, whereas they dominated before. This change on diatom flora may have caused by nutrient limitation. Our interpretation is that denser bottom water originated from seawater made strengthen stratification in water column. The stratification restricted nutrient supply from bottom water and effected on diatoms in surface water. Extremely good preservation of lamination after the event also supported that the strong stratification was formed.

Varved sediments from Lake Suigetsu have provided valuable information for paleoenvironments around the lake and East Asia with high resolution. In historical period, the lake changed from freshwater to brackish-water lake. In 1664 an artificial channel was constructed between Lake Suigetsu and Lake Kukushi, neighboring brackish lake connected to the Sea of Japan, and caused seawater intrusion to Lake Suigetsu. Previous works detected the change of water chemistry from authigenic iron mineral composition of sediment core from the lake. They also reported a turbidite deposited at Kanbun Earthquake occurred in 1662. In this presentation, we report sequential changes of diatom flora and attempt to discuss responses of diatom flora against the seawater intrusion.

[Materials and Methods]

In August 2000, SGP-12 sediment core was taken in Lake Suigetsu by Meckereth-type piston sampler. Observations of the sedimentary facies and structure on the sediments and their X-ray radiographs were carried out. Diatom flora occurred from SGP-12 was analyzed.

[Results and Discussion]

SGP-12 is a 385-cm long core mostly consists of silty clay with horizontal laminations. Especially in upper 102-cm section, obvious thin cyclic laminae were observed. A thick turbidite was deposited from 108 to 102 cm deep. Framboidal pyrite was present in upper section than this turbidite according to microscopic observation. This mineralogical evidence suggests that upper 102-cm section corresponds to brackish deposits since 1664 and the thick turbidite to that occurred at Kanbun Earthquake in 1662.

Based on this stratigraphy, diatom responses against the seawater intrusion in Lake Suigetsu were examined. At first, dominance of freshwater planktonic diatoms throughout of the core means that the freshwater species could grow at the site after seawater came into the lake. That is, low salinity is estimated at least in surface water where the diatoms grow and at least on the season when the diatoms were produced.

Species composition of dominant diatoms after the event was different from that before. In *Aulacoseira* spp., *A. granulata* robust-type did not occur in brackish Lake Suigetsu. *Aulacoseira granulata* thin-type and *A. ambigua* decreased to vanish since the seawater intrusion. *Aulacoseira longispina*, however increased after the event and was the most dominant diatom species in brackish Lake Suigetsu. *Aulacoseira granulata* has been reported from many freshwater lakes and is likely to occur in nutrient-rich eutrophic environments. This ecological information suggests eutrophic environment in Lake Suigetsu before the seawater intrusion when *A. granulata* occurred. On the other hand, not enough nutrient supply was estimated owing to absence of *A. granulata* after the event.

The poor-nutrient water estimated from absence of *A. granulata* does not conflict with liminologic systems reconstructed from sedimentary structure of the core. Thin lamination was well developed at the section after seawater intrusion with authigenic crystals of pyrite. These evidences indicate more anoxic deposition at lake bottom and stronger stratification of water column than that before. Seawater which sank to the lake bottom can control strength of the stratification. The strengthen stratification can cause restricted and shallow water mixing delivering recycled nutrient from bottom water to diatoms which grow by their photosynthesis in surface euphotic zone.

[Conclusion]

Limonological change and diatom response at the seawater intrusion is totally interpreted from diatom stratigraphy and sedimentary features of SGP-12 core. Freshwater and eutrophic Lake Suigetsu was changed to strengthen stratified lake caused by inflowed seawater after the channel construction at 1664. The surface water which diatoms grow in came to be provided less amount of nutrient from bottom water.