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二つの湖の堆積物比較による 広域気候変動と局地的変動の分離
The separation from global and local components of climate signals by comparison between two lake sediments

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East Asian Monsoon (EAM) is dictating many parts of East Asia including Japan. In summer, EASM (East Asian Summer Monsoon) brings moist and warm climate in the region, whereas EAWM (East Asian Winter Monsoon) is characterized as cold and relatively dry air originated from Siberian High, which intensified in boreal winter. According to paeloclimate archives, there had been frequent rapid climate changes both in and outside of North Atlantic region during the last glacial period, which ended up at around 10 ka. The ultimate mechanisms are still unknown though it has been pointed out that ocean circulation had been played an important role (Yokoyama and Esat, 2011).

In order to reconstruct past environments, stable isotopes are a useful tool and can be used as fingerprints of events because of their unique values of each materials. One of which is stable 87Sr isotope and is usually produced by decay of 87Rb. From measured 87/86Sr isotopic value of samples and expected source, it is able to estimate the source areas of sample materials, and also their degree of contribution.

Lake Biwa and Lake Suigetsu are located only 20 km in distance at very similar latitude, so they are expected to have influences from regional climate in similar fashion. However, these two lakes have different catchment areas, so it is expected to be able to separate global and local signatures of environmental changes comparing two lakes.

In this study, samples from Lakes Biwa and Suigetsu are analyzed by ICP-MS. Concentrations of 61 elements are measured, and Sr isotopic ratio using TIMS for 30 samples from sediment of Lake Biwa are also analyzed. Sedimentary fluxes are fluctuated in the sediments, though the timing and magnitude of changes are not identical. From comparison of data sets of two lakes, the fluctuation of Aluminum flux indicated that sedimentation of lakes are correlated to each other, suggesting that the sedimentation of two lakes are mainly controlled by climate systems, whereas the period between 45~37 ka are not correlated. The divergence found in the sedimentary characteristics might have controlled by local environmental changes in these two lakes. Further, Aluminum flux fluctuation showed clear cyclic peak during Last glacial to present which timings are correlated to Heinrich Event (which is known as ice rafting event of North Atlantic).

Strontium isotopic ratios in Lake Biwa sediment showed similar peak with Aluminum, which are correlated with HE. This indicates the change of source areas of sediment had occurred at the time of HE.

This study demonstrated that the merits of measuring two nearby lakes, which have different geological settings. From comparison of two lake sediments, regional and local influences to two lakes were successfully separated.

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