

Varved lacustrine sediments as high-resolution archives of global climatic changes

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Paleoclimate researchers have cool view of the role for the tropics since 1976 low SST estimations during the last glacial time by CLIMAP. Also, many researchers believed that the North Atlantic was much better placed than the tropics to play a important role in climatic changes. Since 1990, paleoclimate data from Greenland ice cores have pointed to the region as the site of the most dramatic and abrupt climatic shifts. Then, these climatic shifts of the last glacial age caused sensitive turning points of the thermohaline conveyor belt as prime mover of global climate. However, the new data of the past SST based on alkenone unsaturation ratios of tropical Pacific gave us many information of the tropics as strengthening cooler during the last glacial. Also, high resolution analysis of isotope in Antarctica ice core, based on correlation of methane concentration changes, provided strong evidence for asynchronous temperature changes in Greenland and Antarctica during last glacial.

These paleoclimatic interpretations ask us to investigate whether there was a lead and lag present in onset and end of warming or cooling among North Atlantic, Antarctica and tropical Pacific.

We carried out sampling of varved lacustrine sediments and loess-paleosols in East Asia and analyzing in high-resolution since 1995. Our research will give many information to discuss whether warm pool of western Pacific is birth place or not. Because Asian monsoon intensity are controlled by magnitude of SST in West Pacific warm water pool and of snow covered area on the Tibetan Plateau in winter season. Research of varved lacustrine sediments in East Asia will give many information to solve our questions through detection of Asian monsoon activity from sediments. Wang et al. (1999) have proposed new interpretation based on AMS ^{14}C dating and carbon isotope data of marine sediments in Southern China Sea and clarified that deglacial climatic events, controlled by Asian monsoon since Last glacial have gone ahead of those in North Atlantic.

We investigated changes of eolian dust flux calculated from accurate sedimentation rate on the base of varve counting in Lake Suigetsu varve and fluvial detrital quartz flux in Lake Suwa sediment. Illite is one of main components of clay minerals in recent eolian dusts and loess-paleosol of Chinese Loess Plateau. Time-series changes indicate that decreasing of dust flux due to expansion of vegetation cover in dust source area occurred since 15,500 years BP. Also, Organic carbon flux due to increasing primary production in surface water have increased in Lake Suigetsu since about 16,000 years BP. Then, stratified water mass in summer in Lake Suigetsu have been stable since 18,000 years BP, because main component of iron minerals changed over from Mn-rich vivianite to siderite and siderite precipitated in thermocline formed in only summer. In Lake Suwa, we clarified that there were high precipitation events, estimated from fluvial quartz flux, before forest vegetation cover existing since late glacial and that these events are possible to correlate closely to deglacial events of Asian monsoon introduced by Wang et al. (1999). These evidences give us three important paleoclimatic information as follows; 1) Warm and humid climate by Asian summer monsoon expanded from Japanese Islands to the inland areas of China since 16,000 years BP. 2) Abrupt onset of warming climate in inner areas of East Asia occurred earlier than that of GISP2 ice core with time lags more than 1,000 years. 3) Trigger of global changes is possible to locate around West Pacific warm water pool rather than North Atlantic.