

## Heinrich events and activities of winter monsoon recorded in bottom sediment of Lake Inawashiro

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Coastal areas along the Japan Sea are regarded as second largest rainy area in Honshu Island. Relatively heavier rainfall in these areas is caused by heavy snowfall during winter thus named heavy snowfall area by Heavy snowfall area special measures law. In order to know future trend of this snowfall, we selected Lake Inawashiro of Fukushima prefecture, Tohoku region as a monitoring site where melted snow from surrounding mountains flows in during spring. We analyzed grain size of 5 millimeter thick sediment at 2.5 centimeter interval which were drilled at the central part of the lake with 28 meter length. The sediment is composed chiefly of thinly bedded alternation of light and dark layers which have several millimeters thickness and is intercalated by 15 tephra layers and 30 pairs of light and dark layers with several centimeters thickness. We made an age model using dates of widespread tephra and radiocarbon ages of sediments and converted depths of sediments into ages. We analyzed frequency of grain size change with REDFIT method. The result shows 7000 year cycle from 45ka to 10ka. In addition, dates of maxima of grain size well correlates with those of Heinrich events. Also those dates well correlate with those of ice rafted debris weight in Japan Sea sediment. Grain size profile shows reverse grading at the lower part of thick light and dark layers and normal grading at the upper part. In addition, light colored lower parts are rich in periphyton diatoms living preferably in acidic water. These results show that sediment in lake Inawashiro is intercalated by many flood sediments. Based on the results that ages of maxima in grain size profile well correlate with those of Heinrich events and that event sediments are flood sediment origin, we concluded that abrupt cooling made winter monsoon stronger and caused heavy snowfall along Japanese island and large floods by melting snow. Report of IPCC WG1 does not suppose abrupt cooling during this century. Consequently, global warming is expected during this century. In that case, winter monsoon will be weakened and it will be apprehensive that water resources for rice planting and hydroelectric power generation will be decreased.

Keywords: Heinrich events, winter monsoon, lake sediment, drilling core, climate change