

Earth surface processes and lake-catchment information in Pan-Japan Sea area

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1. Introduction

Changes in earth surface systems are closely related to physical conditions of the earth's surface environment, such as topographical, vegetational and hydrological conditions. They are also corresponding to tectono- and climato-environment in the studied areas. In a lake-catchment system, which is a typical earth surface system, erosion, transportation and sedimentation processes are often observable. In the heavy rainfall periods, a large amount of sediment is often produced, transported, deposited and retransported in the catchment area and finally deposited in the downstream lake. Then, the lake bottom sediments may receive some information on the conditions in the catchment areas including direct input to the lake. Lakes and ponds have been used as natural sediment traps to reconstruct modern environment as well as paleoenvironment. To correlate observable modern catchment processes with lake sedimentation will also provide a great insight for postdicting relationships between past processes and sedimentation.

2. Research areas and methods

Three lake-catchment systems (Takidani-ike, Kawauso-ike and Dojo-ike) are used in Japan and one system (Jinheung-je) is set in Korea for observation of present earth surface processes. Two sediment traps have been set on each floor of the reservoirs. Water level gauges and rain gauges have been set in some reservoirs. Sediment core samples were obtained in Lake Biwa and Lake Yogo by Kanazawa Univ. and Byeokgolje by KIGAM in addition to the reservoirs mentioned above, mainly for reconstructing temporal environmental changes. The samples (both trap and core) have been used for physical and chemical analyses. Data for rainfall in Seoul observed by Lee Dynasty were also used as meteorological data for the past 200 years in Korea.

3. Some analytical results

Some results for Japanese systems are (Takidani-ike, Kawauso-ike, Lake Yogo and Lake Biwa);

- 1) heavy rainfall periods are printed in lacustrine sediments (grain size is large in the periods).
- 2) artificial earth surface changes in catchments are reflected to sedimentation rates.
- 3) Earthquake is related to increase in sedimentation rate (not grain size).

Some results for Korean systems are (Jinheung-je),

- 1) Comparative small values for grain size (mineral and whole) may be corresponded to the interval of 1965-1978 (comparatively small annual rainfall years).
- 2) Gradual decrease since ca. 1945-1950 in grain size and mineral content suggests that mineral grain is less transportable because of vegetation growth, etc. in the catchment as well as the pond.
- 3) Normalized grain size fluctuations are well corresponded to 50 mm excess annual rainfall (annual summation for excess amount of daily rainfall over 50mm), suggesting that grain size may be an index for rainfall intensity.
- 4) There is a close relationship between physical parameter (e.g., water content, mineral grain size) and heavy metals (e.g., Pb(208), Zn(67)), suggesting sedimentary conditions as well as artificial activity are related to chemical parameters.
- 5) Sedimentation rate is roughly proportional to rainfall except spring cultivating season and artificial disturbance.