A case study for soil erosion in the Han river buffer zone, South Chuncheon, Korea

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The objective of this study is to report the relative importance of soil management on organic content of the sediment in relation to soil erosion. The rainfall simulation experiments were carried out under different rainfall kinetic energies and geotechnical conditions. The three soil sampling sites were located on the adjacent farms of the riparian buffer zone of the Han River, Korea. Rainfall simulations were carried out within three months after soil sampling. Lechler full cone nozzles (type 460.648.30.cc) based on measurements using a Distromet Joss-Waldvogel Disdrometer. Tap water with an electric conductivity of 105 uS cm^{-1} was used for each test. The implications of the results will aid the development of models aimed at predicting organic content due to soil erosion. The test results showed that geotechnical conditions and rainfall conditions, such as the ground slope, the compaction ratio, rainfall intensity and duration of rainfall are main factors for soil erosion. However, soil texture was determined to be the most important soil variable influencing soil erosion. Apparently, the severity of soil erosion did not exclusively determine the amount of nutrients lost in runoff from agricultural land.

Metal stable isotopes in Lake Baikal sediments

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Metal stable isotopes of Fe, Zn, Mo, and Cd, have been analyzed for the authigenic portion of a gravity core from Lake Baikal, Russia, in order to study the sources and sinks for these trace metals in the Lake Baikal, the largest fresh water lake in the world, and as potential proxies for the past climate changes in the region [1]. A ~ 3 meters gravity core (GC-99; 52°05'23"N, 105°15'24"E) sampled near the bore hole of BDP-99 in Lake Baikal is used in this study. The core was sampled per cm continuously, and one sample was analyzed for every 10 cm throughtout the entire core in this study. A series of leaching procedures were used to remove the carbonates, and to collect the authigenic fractions for study. Double spike technique is used for all four metal stable isotopic measurements.

In general, significant variations are observed yet no correlation is found among these four metal stable isotopes and their respective elemental concentrations. Direct ^{14}C-dating is currrently undertaken, however, using the sedimentation rate of a nearby sediment core, the 3 m GC-99 seems to have recorded the past ~ 23 ka of sedimentation history of Lake Baikal, with a shift of sedimentation rate at ~ 100 cm that has marked the YD event at ~ 12 ka. The same depth also marked the significant shift of $\delta^{97}Mo/^{94}Mo$ from -0.5 ‰ in the deeper depth to ~ -2.2 ‰ in the upper 100 cm. Simlar shifts from relatively constant at -0.7 ‰ in the deeper depth to more variable, 0 to -1.5 ‰, in the upper 100 cm is also observed for $\delta^{56}Fe/^{54}Fe$. Less pronounced but nonetheless similar shfts also observed for Cd and Zn isotopes. While the vairations of Cd, Zn, and Fe (to some degrees) isotopes are mostly likely reflect the biological activities, booming of diatoms, the isotopic vairations of Mo and Fe (to a lesser degree) can only be explained by the changing of the redox states, towards more oxic from YD event to the present, in Lake Baikal, if the sedimentation rate is indeed correct. Nevertheless, this study marks the first time the metal stable isotopes can be used to study the connections between the local climate events and Lake Baikal using the sedment records. More data, in particular, the chronology and detailed chemical and mineralogical compoisitions of the sediment cores are needed in order to better constrain the relationship between the Lake Baikal and regional climate changes in the past.

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