

Reconstruction of the Paleo-hydrology under the paleo-land-use and paleo-climate conditions

○Pingping LUO, Hans Renssen, Bin HE, Kaoru TAKARA, APIP, Daniel Nover, Kenichiro KOBAYASHI,
Yosuke YAMASHIKI

Due to urbanization, climate change, environmental conditions and land use have changed significantly between the past and the present. The changes to land use and climate condition have dramatic effects on flood frequency, water quality, climate, and ecosystem structure and function. Paleo-hydrological studies can help us understand the historical effects from environmental change as well as climate change. Paleo-hydrology is the study of hydrologic systems and past conditions including the occurrence of flood events, historical flows, etc.

Reconstruction of hydrologic response under the paleo-environment can be used to confirm and connect statistic analysis and discontinuous historical evidence of paleo-floods. Based on previous studies, historical information such as old books, drawings, pictures and paper maps can be used to reconstruct paleo-land-use. The paleo-land-use reconstruction (PLUR) program is developed in this chapter using basic rules generated by using digital land-use data and historical document. Base on the process of the new approach for the reconstruction of paleo-land use, we reconstructed three paleo-land use periods for 1843, 1927 and 1902.

The paleo-climate condition is also one of the key component for this study. In this study, we will use a very-high-resolution (0.05°) long-term (1900–) daily gridded dataset over Japan (APHRO_JP) and the daily observed rainfall from 1900 at Kyoto station. The study includes reconstructing of the paleo-hydrology under the four land use of 1843, 1902, 1927 and 1976

with the extreme rainfall events and comparing the impacts of land use change on hydrologic responses. In this study, we also try to reconstruct the paleo-hydrology in a long-term period by using the hydrological model STREAM and the Cell-based Distributed Rainfall Runoff Model (CDRMV3) with the output the daily gridded dataset of APHRO_JP and the daily observed rainfall from 1900 at Kyoto station and compare the results from the two hydrological models with the three types of daily rainfall.