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Water Balance Analysis Based on Severe Drought Period in Republic of Korea

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The hydrological cycle continuously replenishes the water resources and is the foundation of human life. However kinds of research results show that the hydrological cycle has been changed because of the surface temperature rising, changing precipitation patterns, the evaporation increase and the seasonal variation of streamflow in Republic of Korea. The hydrological cycle change will more frequently expose us to drought and flood risk.

In Korea, the national water resources planning is based on a relatively short period such as thirty years which has been recommended by WMO to calculate the mean annual precipitation of a station. However, the annual precipitation of Republic of Korea is varied with large range and the trend of variation is different by the period. In other words, the mean annual precipitation and the standard deviation of annual precipitation are different by the computation period. Therefore, it is required that we analyze effects of variations of the annual precipitation on the assessment of water supply reliability to secure sustainable developments.

In this study, we surveyed characteristics of water resources, long term temporal variations of the precipitation and impacts of climate change on water resources using observed precipitation data from 1770 to 2003 in Republic of Korea. Recession Model developed by KICT (Korea Institute of Construction Technology) was applied to the large river basin in Republic of Korea: the Han River basin. For the applied basin, daily runoff was simulated with daily precipitation and pan evaporation data from 1777 to 2003. Using simulated runoff, we conducted the water balance analysis in the Han River basin (41, 956.97). The results show that water supply reliabilities of water resources use system are different from 23 % to 69 % depending on the analysis period.