



The hydrological behaviour of a forested catchment during two contrasting summer monsoon seasons

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The climate of South Korea is strongly influenced by the East Asian summer monsoon. It is hypothesized that the high precipitation regime of the summer monsoon causes significant changes in the hydrological behaviour of forested catchments, namely in water quantity, quality and flow paths. We conducted high frequency hydrometric, isotopic, hydrochemical and meteorological measurements in a forested catchment before, during and after two contrasting summer monsoon seasons. The catchment is located within the Lake Soyang watershed, where recent trends of increasing eutrophication, sediment load and organic carbon load have been observed. We studied the temporal variability of catchment runoff in relation with the spatial and temporal variability of water flow paths. The 2013 and 2014 summer monsoon seasons were, respectively, the longest and shortest that occurred in this region since 1973 and accounted for 206% and 32% of the average precipitation for the summer monsoon since 1973. For the period from June through August, the precipitation of 2014 was the lowest on record since 1973. Catchment runoff for the summer monsoon totalled 559 mm and 12 mm for 2013 and 2014, respectively. The Q50 of the flow duration curve for 2014 was more than four times lower than that for 2013. A total of 18 storm events were monitored, ranging between 13 mm and 126 mm in precipitation. A principal component analysis (PCA) and an end-member mixing analysis (EMMA) were performed in order to quantify the contribution of different end-members to catchment runoff and highlight the differences between both years. The combination of the hydrometric, isotopic and hydrochemical approaches allowed us to test our hypothesis and to shed light on the hydrological behaviour of the catchment under contrasting environmental conditions. The findings of this study could be useful for the estimation of the water balance of the Lake Soyang watershed as well as for the management of Lake Soyang.