

Subsurface storage in different land use catchments evaluated by deuterium excess

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Abstract In order to understand the change of groundwater recharge due to artificial forest plantation, catchment-scale water budget observations were made, including stream discharge, precipitation, evapotranspiration and groundwater level, in the paired forest and grassland catchments of the western foot of Mount Aso, Kyushu, southwest Japan, with conditions of similar geology and surface morphology. The monthly samples of precipitation and stream water discharge from each catchment have been used to analyse the stable isotopes, and those data show clear seasonal fluctuation of the deuterium excess value caused by the change of the source vapour for the local precipitation. The dispersion model, as a flexible transfer function, was used to evaluate the mean transit time of the stream water in both catchments. The results show that subsurface storage in the forest catchment is about 40% larger than that of the grassland catchment despite the similar geology and surface morphology conditions.

Key words mean transit time; subsurface storage; vegetation; dispersion model; deuterium excess