



## **Spontaneous soil and ecosystem development during 50 years of primary succession and its effect on water runoff, a case study using experimental catchments.**

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The aim of this study was to characterize stage of ecosystem development in spontaneously developing catchment (Morning glory) and compare them with reference experimental catchment (Hydrohill). Both of these experimental catchments were constructed side by side near Nanjing (China) in 1978, consisting from vadose zone on impermeable surface, which offer unique opportunity to measure total runoff including subsurface runoff. In Hydrohill, the soil profile was reconstructed by importing 80-100cm of soil, grassy vegetation was established and kept by mowing. In Morning glory, no soil was added and initial surface was formed by solid rock covered by rock debris which gradually weather and form soil on which spontaneous vegetation developed by primary succession. Here we benefit from existence historical data describing rainfall-runoff including chemistry and isotopic composition of both catchments measured in 1989, which can be compared to situation in 2018. Soil data show that most of measured soil parameters including water field capacity and soil microbial biomass in Morning glory were comparable with soil in Hydrohill, however average depth of soil profile was significantly lower and plant biomass both above and below ground significantly higher in Morning glory catchment. As concern runoff parameters in many of them such as pH,  $^{18}O$ , Morning glory become similar to Hydrohill in 2018 than in 1989 but some differences remain such as F content in runoff. Interesting is comparison in nitrates which were absent in Morning glory in 1989 and higher than Hydrohill in 2018 apparently due to N fixing plants and organic matter accumulation in Morning glory soil. To conclude after 50 years of development by primary succession soil had much lower depth but parameters of topsoil are comparable with reference, which is reflected in runoff characteristics.