IAHS2017-314
IAHS Scientific Assembly 2017

Topography and Vegetation Controls of the Hydrological Responses in a Semi-Arid Forested Headwater Catchment

Yuan-Hao Fang, Xingnan Zhang, and Bo Qu
Department of Hydrology and Water Resources, Hohai University, Nanjing, China

Solar radiation is the driving force for terrestrial ecohydrological processes. In mountainous regions, solar radiation reaching the land surface is strongly affected by topographic (e.g., terrain slope and aspect) and vegetation conditions, resulting in unevenly distributed solar radiation. This further affects ecohydrological processes including evapotranspiration, snowmelt, and runoff. However, most distributed hydrological models directly use measured or directly interpolated (e.g. IDW) solar radiation as inputs, not accounting for the topographic effects on solar radiation distribution. In this study, we first implemented a solar radiation spatial interpolation scheme to a fully integrated catchment-scale ecohydrological model by taking into account the topographic effects on direct (shading), diffuse (scattering) and reflected solar radiation. Then we applied the scheme to Gordon Gulch catchment, a semi-arid forested headwater catchment in Colorado, U.S. We set up the model at 10 m spatial resolution to resolve the topographic and vegetation characteristics and evaluated the modeled results against various filed measurements. Based on modeled results, we investigated the effects of topography and vegetation on hydrological processes in the Gordon Gulch catchment.