AOGS 2005

HydroKorea - Understanding and Nowcasting of Ecohydrological Cycles in Complex Landscapes of Korea

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HydroKorea is a multi-/inter-disciplinary research aiming for understanding and nowcasting of ecohydrological cycles in a typical Korean forest from tower (footprint) to regional (catchment) scales. The focus is on linking flux footprint, ecohydrologic schemes and satellite images to bridge the gaps between different scales of water cycles in a forest with complex landscapes. The research is in progress since the fall of 2004. The Gwangneung forest supersite, equipped with flux towers and long-term ecohydrological data, has been selected as the main study site. The site has been redefined on the basis of its catchment characteristics and the compatibility to the satellite image (i.e., MODIS) grid. Evapotranspiration (ET) has been measured from the two 40 m flux towers near the top and bottom of the hill slope with contrasting vegetation and catchment properties. Each tower is equipped with two eddy covariance and an eight-level profile systems for water/energy fluxes to better estimate the water budget components. Other components such as interception, groundwater recharge, baseflow are also being monitored. Stable isotope analysis for the vapor, precipitation and river water is being conducted to partition ET into its components both at footprint and catchment scales. High-resolution satellite images such as IKONOS and LANDSAT TM along with Geographic Information System have been used to quantify the spatial characteristics of the site and, by using geo-statistical analyses, the distribution of various flux indices and geomorphological components have been analyzed. The ecohydrological models, the central tool to derive the scaling logic, are being field-calibrated and improved parameterizations are in progress. MODIS algorithm for calculating ET, and field- and model-derived information have been collected to improve MODIS products. HydroKorea has joined CUAHSI (Consortium of Universities for the Advancement of Hydrological Science, Inc.) as an affiliate member, initiating proactive international collaborations. In short, HydroKorea serves as a 'pathfinder' that will lead to developing new methodologies to assess water cycles at various temporal, spatial, and process scales. The scaling methodologies developed from HydroKorea will be used to monitor water and energy cycles from local to continental scales beyond the political boundaries, thereby providing options needed to minimize damage and to allow and encourage sustainable use of our valuable but vulnerable natural resources in Monsoon Asia. (Acknowledgment: HydroKorea is supported from Sustainable Water Resources Research Center of 21st Century Frontier Research Program - Grant code: 1-8-2).

Keywords: Ecohydrological Cycle; Eddy Covariance Flux; Gwangneung Forest Supersite; HydroKorea; Modeling; Satellite Image Analysis; Scaling Logic