A Near Real-time High-Resolution Satellite-based Precipitation Estimation System for hydrological applications

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A Near Real-time High-Resolution Satellite-based Precipitation Estimation System for hydrological applicationsYang Hong, Kuo-lin Hsu, Soroosh SorooshianCenter for Hydrometeorology and Remote SensingDept. of Civil and Environmental Engineering, E/4130 Engineering Gateway, University of California, Irvine, 92697Corresponding author: yanghong@uci.edu, 1-949-2326525Precipitation is produced by atmospheric processes which are highly nonlinear and interact at a wide range of scales. Some of the main challenges to hydrologists and atmosphere scientists are to quantify uncertainties in precipitation measurements, estimates, and forecasts at all temporal and spatial scales and the role of these uncertainties in meteorological and hydrological applications. Both scientific communities have been very active for a number of years in the study of precipitation fields. However, a clear distinction exists in the research interests of the two groups. Atmospheric scientists have mainly been concerned with numerical modelling and prediction of precipitation. Hydrologists, on the other hand, have mainly focused attention on the measurement of precipitation. Introduced is a near real-time precipitation estimation system using computer image processing and pattern recognition techniques to develop a patch-based cloud classification and precipitation estimation system based on co-registered passive microwave and infrared images from Low Earth-orbiting and geostationary satellites, respectively. The computational strength of Neural Network enables us to build up a database of cloud type-rainfall mapping relationships, which are undergoing recursive (in space and time) data assimilation and system training, allowing for flexibility in the adjustment of the cloud-precipitation mapping relationships as new ground or space-based microwave/radar measurements become available. The operational system provides global/regional precipitation estimation at a resolution of 30-minute and 4 x 4 km2, suitable for applications toward watershed planning/management and flash flood forecasting. Of particular interests are also addressed the progress and challenges of generating global/regional satellite-based precipitation estimates for hydrological applications: Moving towards 4km x 4km spatial resolution and beyond.