Geophysical Research Abstracts
Vol. 17, EGU2015-1260, 2015
EGU General Assembly 2015

Multi-scale hydrologic applications of the latest satellite precipitation products in the Yangtze River basin using a distributed hydrological model

Zhe Li (1), Dawen Yang (1), Bing Gao (2), Yang Jiao (1), Yang Hong (3), and Tao Xu (4)

(1) Department of Hydraulic Engineering, Tsinghua University, Beijing 100084, China, (2) School of Water Resources and Environment, China University of Geosciences (Beijing), Beijing 100083, China, (3) Department of Civil Engineering and Environmental Science, University of Oklahoma, Norman, OK 73072, United States, (4) Three Gorges Water Cascade Dispatch and Communication Center, Yichang 443133, China

The current era of satellite remote sensing has provided unprecedented opportunities for the monitoring and prediction of Earth's terrestrial hydrologic cycle. In the present study, we evaluated three global satellite precipitation products (3B42 V7, 3B42 RT and CMORPH) during 2003-2012 for multi-scale hydrological applications, including annual water budgeting, monthly and daily streamflow simulation, and extreme floods modeling, via a distributed hydrological model (GBHM) in the Yangtze River basin. This regional evaluation is first performed at temporal scales ranging from annual to daily, based on a number of diagnostic statistics, providing useful information on the error characteristics associated with the three satellite precipitation products. Then the work, with an application-oriented view, focuses on the modeling-based evaluation of the three products. The results show 3B42 V7 data generally has a better performance in annual water budgeting and monthly streamflow simulation, but this superiority is not guaranteed for daily simulation, especially for floods monitoring. It is also found that, for annual water budgeting, the positive (negative) bias of 3B42 RT (CMORPH) estimates have been mainly propagated into the simulated runoff, while the simulated evapotranspiration tends to be more sensitive to negative bias. Regarding streamflow simulation, both near-real-time products show region-dependent bias: 3B42 RT tends to overestimate streamflow in the upper Yangtze River; in contrast, CMORPH shows serious underestimation in those downstream sub-basins, while it is able to effectively monitor streamflow into the Three Gorges Reservoir. With 394 selected flood events, the results indicate that 3B42 RT and CMORPH have competitive performances for near real-time floods monitoring in the upper Yangtze, but for those downstream sub-basins, 3B42 RT performs better than CMORPH. Furthermore, the inability of all satellite products to capture some key features of the 2012 July extreme floods reveals the deficiencies associated with them, which will limit their hydrologic utility in local floods monitoring. In summary, this study demonstrates the potential usages of latest satellite precipitation products for hydrological applications in the Yangtze River, and further promotes better utilization of future GPM-era data in operational predictions.