Geophysical Research Abstracts
Vol. 20, EGU2018-7695, 2018
EGU General Assembly 2018
© Author(s) 2018. CC Attribution 4.0 license.

Performance assessment and bias correction of precipitation datasets using streamflow observations from several thousand catchments worldwide

Hylke E. Beck and Eric F. Wood
Princeton University, Department of Civil and Environmental Engineering, Princeton, NJ, USA

Accurate precipitation (P) data are critical to enhance hydrological model performance and improve our understanding of hydrological processes and their parameterization. In this talk, we present our recent research results with respect to the performance assessment and bias correction of P datasets using a large global dataset of streamflow (Q) observations. In the first half of the talk, we present the performance assessment of nine gauge-adjusted P datasets using hydrological modeling for 9053 catchments ($< 50\,000$ km^2) worldwide. To this end, we calibrated the simple conceptual hydrological model HBV against daily Q observations with P from each of the different datasets, and compared the resulting calibration scores. We found that the P datasets incorporating daily P gauge data (CPC Unified and MSWEP) generally provided the best calibration scores, although the performance of the fully gauge-based CPC Unified is unlikely to translate to regions with sparse P gauge networks. The good results obtained using MSWEP emphasize that careful data merging can exploit the complementary strengths of gauge-, satellite-, and reanalysis-based P estimates. In the second half of the talk, we address the systematic P underestimation frequently observed in mountainous and snow-dominated regions across the globe. We present a novel approach in which the "true" P is inferred using the Budyko equation in combination with Q observations and potential evaporation estimates for 13 762 catchments (10 000 to 4 691 000 km^2) worldwide. The resulting bias correction factors exhibit more plausible global patterns than those derived using the conventional approach based on WMO gauge under-catch correction equations and hence were used to improve the long-term mean of the MSWEP global P dataset. Our results emphasize the value of analyses based on large catchment samples, the importance of P dataset choice for research and operational hydrological applications alike, and the need to maintain and expand P and Q data collection efforts.