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NASA Energy and Water Studies Climatology Project: Estimation of human consumptive water use from the world's rivers

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Although streamflow is a key term in the land surface water budget, observational records of continental freshwater discharge to the ocean are incomplete. Furthermore, the degree to which human water consumption impacts the quantity and timing of continental discharge cannot be determined directly from currently available observations. We used new model-simulated runoff to infill data gaps and estimate contributions from unmonitored drainage areas to revise the global streamflow data set created by Dai et al. [2009]. As in previous work, runoff in unmonitored regions is extrapolated from these observations based on a scheme that prorates observations using overlapping model-based predictions. After comparing the resultant data set to previous estimates of global freshwater runoff, we examine the differences between the runoff simulated by the hydrologic model and the observation-based runoff data set. We hypothesize that the differences are due in large part to human modifications to the system and present estimates of seasonal and annual human consumptive water use across the globe.