



A reservoir operation scheme for global river routing models

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A global river discharge simulation is conducted taking into account 500 individually operated reservoirs by locating them on the digital global river network map of TRIP, a global river routing model. An operating rule is allocated for each reservoir with a newly developed algorithm that applies currently available global data such as reservoir storage capacity, intended purposes and simulated river discharge. For irrigation reservoirs, an additional operating scheme to cover water demand downstream of the reservoir is developed, since irrigation water demand has large seasonal variability and is estimated to represent 85% of total annual global consumption. The model reproduces actual reservoir operation well and improves river discharge simulation below reservoirs. Application of the coupled model on a global scale leads to proposed changes to reservoir operating rules that would alter monthly discharge for individual basins substantially (more than $\pm 20\%$). However, averaged over the continental scale, changes in storage and release would largely cancel out, since actively controlled reservoir water volume is small as a proportion of total global runoff.