A Water Cycle for the Anthropocene

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Billions of people and many ecosystems worldwide are threatened by water crises caused by land conversion, land-use change and other human actions. Understanding how the human water footprint interacts with hydrology at multiple scales is essential for the collective ability of societies to secure water for both people and the environment. For many people, a visualization of the water cycle is the starting point for their understanding of water resources. Even though water cycle diagrams may not be intended as comprehensive and quantitative representations of ecohydrological science, they effectively play that role for many people, including educators and policymakers. This means that systematic inaccuracies in the representation water cycle could compromise efforts to tackle the challenges of water security. Core scientific principles are also implicit in the water cycle, such as the conservation of mass and the possibility of human activity causing global scale changes that have acute local effects. Thus it is important that the content of water cycle visualizations is analyzed and reflected upon. This presentation is based on an analysis of over 450 water cycle diagrams gleaned from both academic and popular sources in 12 different countries. We compared these diagrams to a new estimate of the global water cycle compiled from 50 recent modelling and empirical studies. We found striking biases and misrepresentations in the visualizations, largely independent of their source or age. Particularly striking was the neglect of human interventions in the water cycle as well as distortion in the relative sizes of water pools and fluxes including underrepresentation of the role of the ocean. Depictions of the global water cycle consistently conveyed a false sense of water security, with only 2% of diagrams showing climate change or water pollution—two of the central causes of the global water crisis. These misrepresentations correspond with specific dimensions of water mismanagement, suggesting that flaws in water cycle visualizations reflect and contribute to misunderstanding of global hydrology by both specialists and non-specialists. Integrating human activities into water cycle diagrams is an initial step to communicating a more realistic picture of global water resources and socio-hydrology in the Anthropocene. Hence, we created a revised water cycle diagram that attempts to do this and also address the challenges of accurately visualizing the water cycle.