

Understanding and communicating the global freshwater system

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While drainage basins and aquifers are typical spatial units for hydrological analyses and water management, global-scale hydrological analyses covering all land areas of the Earth are important for two reasons. On the one hand, the spatial distribution and dynamics of water flows and storages on the continents are relevant for understanding atmospheric processes, global biogeochemical cycles, sea level rise and gravity field variations. On the other hand, quantitative estimates of water flows and storages as well as of human water uses support the sustainable management of water, food and energy in a globalized world. Such estimates inform environmentally conscious consumers, companies having globally distributed production sites or sources and policy-makers responsible for internationally relevant investments in sustainable development and in climate change adaptation and mitigation. Understanding of the global freshwater system is facilitated by global hydrological modeling, which brings together a myriad of data with process knowledge. In my medal lecture, I will introduce the state of the art of global hydrological modeling and expound its challenges. I will show examples of interesting modeling results, also discussing the identification of appropriate indicators. This will lead me to ways of communicating scientific knowledge about the global freshwater system to various audiences, focusing on freshwater-related risks of climate change.