OKI Taikan Lab.

[Global Hydrological Cycle
The Frontier Technology of Observation and Prediction]

Department of Human and Social System

Global Hydrological System

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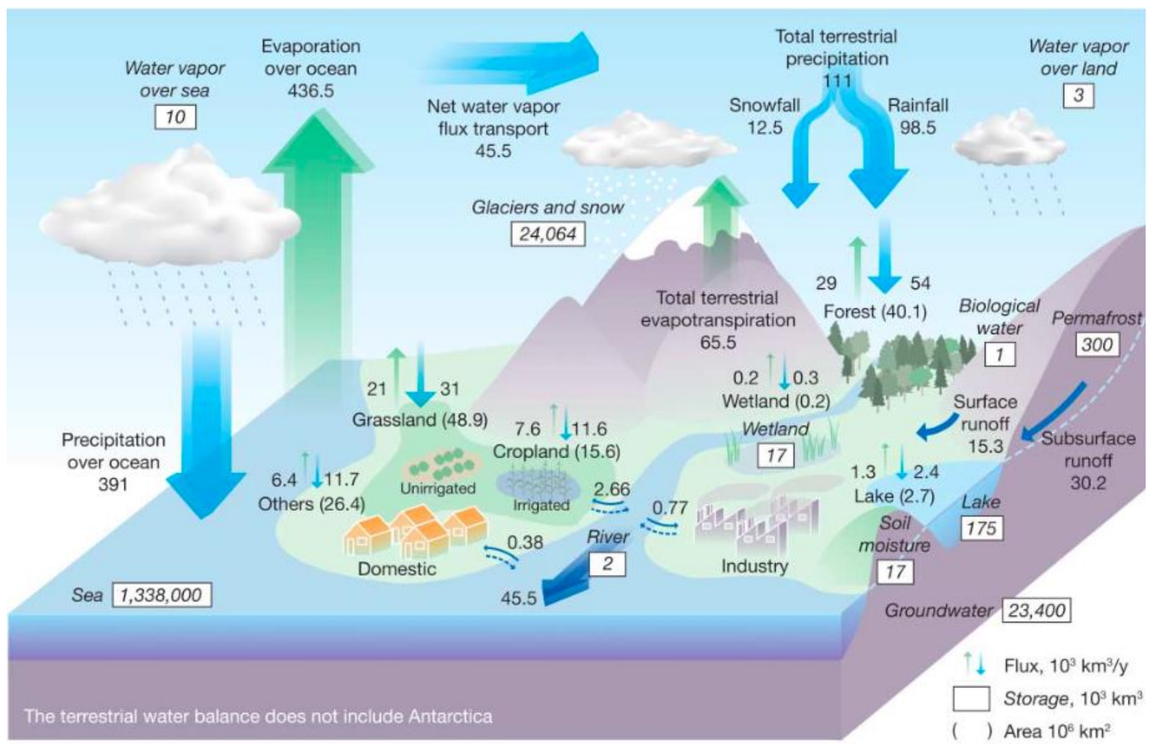
http://hydro.iis.u-tokyo.ac.jp/indexJ.html

Estimating Global Hydrological Cycles

Water scarcity occurs around the world because of the temporal variation and spatial heterogeneity of water availability, rather than by the absolute shortage of water resources. The global simulation model predicting the fluctuation of hydrological cycles is useful to provide scientific basis to tackle with water issues, and also contribute to predict how climate change influences the water risks such as floods and droughts. Utilizing big data, such as high resolution boundary conditions from satellite data, we're challenging to develop quasi-real-time simulation system, and also to estimate the hydrological variations on millennium scale.



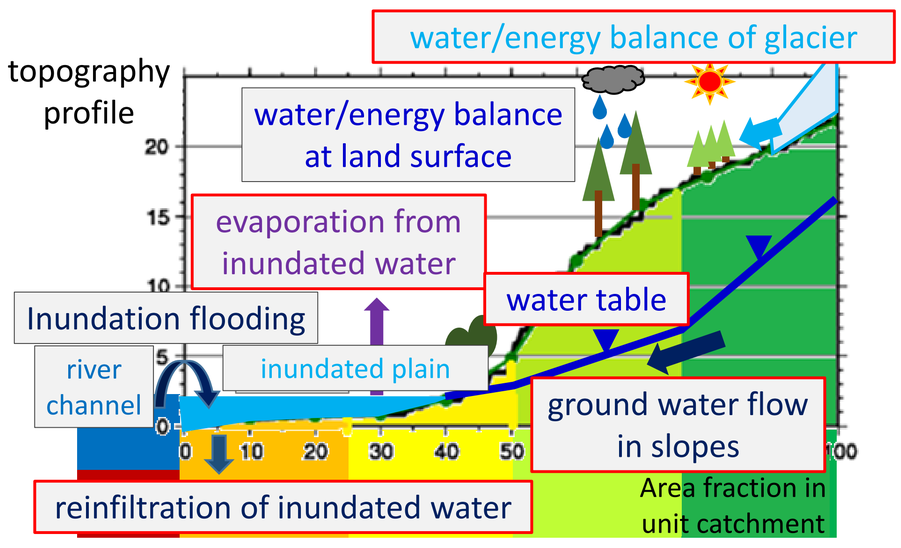
Water Circulation on the earth[Oki and Kanae (2006)]

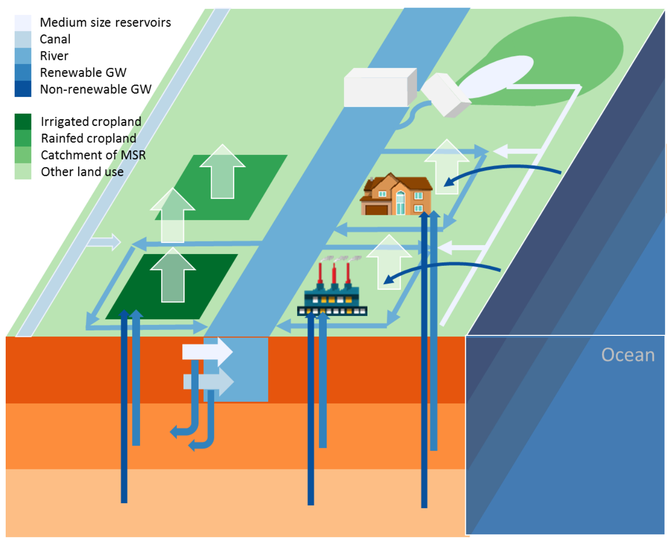
Future Terrestrial Model：from "Natural" nature to "Real" nature

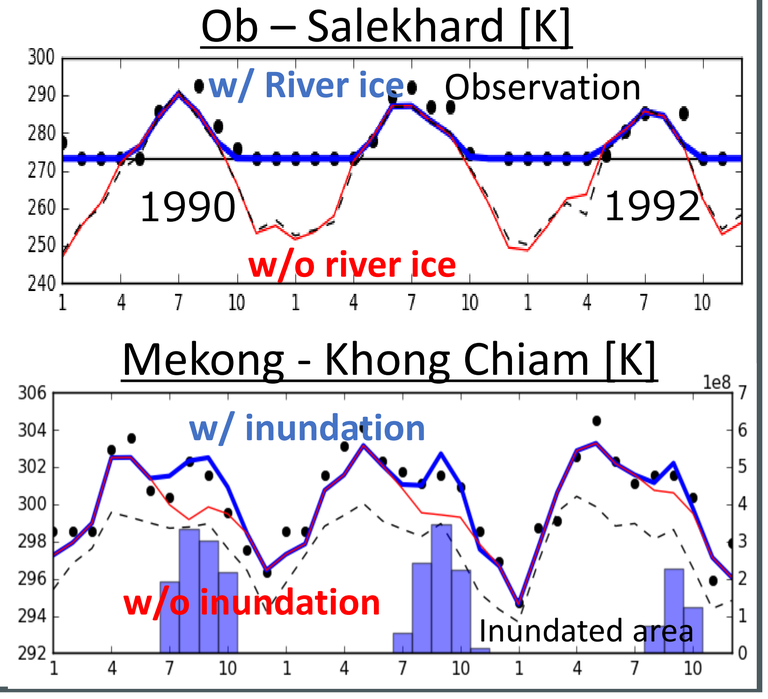
In order to provide more *realistic* information for decision-makers, we include anthropogenic interventions on hydrological cycle, such as reservoir operation and water withdrawals ("real" system), in our terrestrial model, when we improve the biogeophysical processes ("natural" system) of the model. Further, we dedicate ourselves to develop better boundary conditions crucial for terrestrial models, such as topography, water surface, and glacier areas, by reducing errors in high resolution global dataset estimated based on earth observation from space. The datasets are shared and widely used.

The Hot Topic：Development of a Global River Temperature Model

We developed a global river temperature model in order to estimate the influence of various kinds of water use such as agriculture, industry and power generation, to evaluate the global circulation of energy and water, and to improve the physical processes in the terrestrial model. This model well simulates water temperature globally, by considering geophysical processes such as river ice and energy balance on the inundated plain, without calibration or localization of parameters in the model.







Land surface processes (left), human interventions on hydrological cycles (middle) and validation results of river temperature model (right)