Hydrology and Water Resources Research

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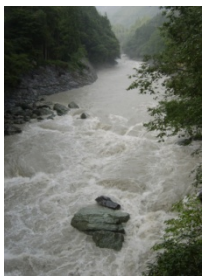
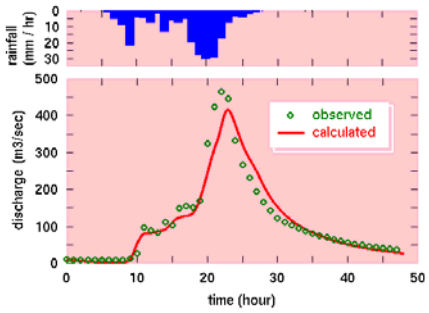
Towards a better relationship between human society and water resources

We study physical mechanisms of the hydrologic cycle with energy and material transport. The research topics include analysis and numerical modeling of hydrological processes such as surface-subsurface flow, atmosphere-land surface interaction with human activities. Based on the understanding of the physical process in hydrology, we develop fundamental technologies for river planning, water resources management, real-time hydrologic forecasting and water-related disaster mitigation.

Analysis and numerical modeling of hydrologic processes

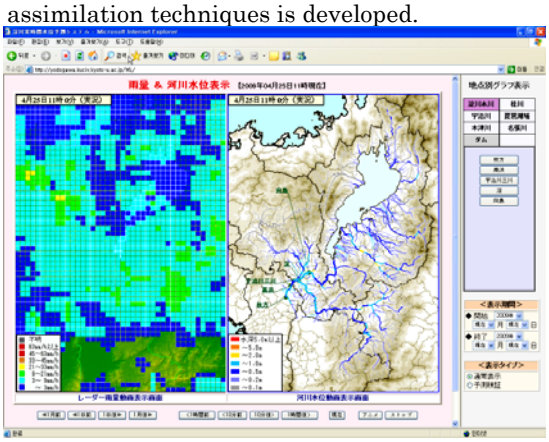
Understanding the hydrologic cycle is the basis for river planning and mitigation measures against water-related disasters. We analyze hydrologic phenomena in various aspects and improve our understanding of the hydrologic cycle.





Fundamental technologies for river planning and real-time hydrologic forecasting

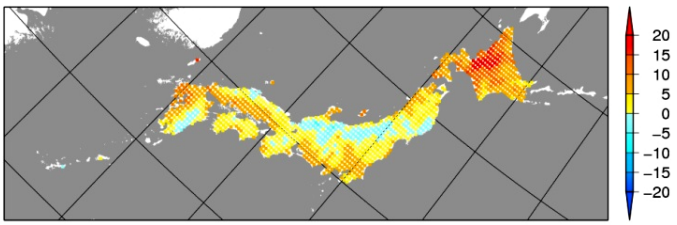
Based on the sound understanding of the hydrologic cycle, we develop fundamental technologies for river planning and real-time hydrologic forecasting. Research topics include: Development of a hydrologic modeling system: Development of a real-time flood forecasting system: A real-time hydrologic prediction system which incorporates data assimilation techniques is developed.



Climate change impacts on water resources

Climate change will give us a serious impact on our life. We develop a method to diagnose hotspots of river discharge change, a down-scaling method of GCM outputs for local scale water resources analysis, and a bias correction method of GCM output for proper river discharge projections. Then we analyze a change of future hydrologic cycle to examine the impact on water resources and to detect the changes of frequencies and magnitudes of water-related disasters.

Annual Mean Precipitation Ratio of Future to Present



Land surface modeling for global water resources analysis

The hydrologic cycle is the central focus of hydrology. Atmosphere-land surface interaction plays a dominant role on the hydrologic cycle. We develop a land surface model including agricultural human activities. Using the developed land surface model, spatiotemporal changes of hydrologic variables are globally analyzed.