Hydrological Observatories

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Sustainable water management as well as prediction of the hydrological consequences of climate and anthropogenic changes requires a solid scientific understanding of hydrological processes at the catchment scale. The fluxes of water and matter within and between the hydrological compartments occur across a variety of spatial and temporal scales in consequence of the complexity and heterogeneity of catchment characteristics. In recent years, new developments in ground-based, air-borne, and satellite-borne instrumentation have made it possible to measure states and fluxes at unprecedented spatial and temporal resolutions for catchments. This has enabled the creation of databases of long-term time series of states and fluxes, providing a basis for improving our understanding of integrated hydrological behavior and for testing hydrological science questions.

A number of hydrological observatories have been established across the world representing various climatic, hydrological, topographical, and subsurface conditions. Typically, besides monitoring of basic climatic and hydrological variables, dedicated measurement programs as well as dedicated experiments are also carried out in such observatories. These unique observatories and their associated databases are crucial for the advancement of the hydrological sciences including development of the integrated hydrological models, which consider nonlinear feedback mechanisms between the hydrological compartments. It is of crucial importance to increase the awareness and knowledge of these infrastructures to the international hydrological community to increase their utilization for the exploration of new hydrological and interdisciplinary hypotheses.

This special section aims to increase the visibility and communicate the scientific value of hydrological observatories in operation worldwide by providing information on (i) catchment characteristics and available data, (ii) research questions being addressed, (iii) new insights and novel scientific findings, and (iv) future perspectives. Contributions are encouraged to follow a general layout to facilitate easy comparison of data and results from the different observatories.