

# **Hydrologic modeling for the glacier and snow melt fed basins in the Tibetan Plateau—*uncertainties related to the precipitation input***

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The upper Indus, Yarkant, and Brahmaputra basins are three major glacier and snow concentrated basins in the Tibetan Plateau (TP), having nearly 35% of the total glaciers in the entire TP. Snow and glacial melt are important hydrologic processes in these basins, however, the hydrology in these highly diversified and complex mountain regions is poorly understood. The magnitude and distribution of high-altitude precipitation, which provides the basic and critical input for hydrological assessment, mass balance and climate change studies, is one of its largest unknowns. The existing gauge-based gridded precipitation datasets are largely underestimated because the gauge stations are often located at low altitudes, and the underestimated precipitation is often compensated by overestimated snow/glacier melt rates in hydrological models. Further, the quality of the existing remote sensing or reanalysis precipitation datasets are often insufficient to capture the precipitation characteristics over the complex mountainous region. All these pose a great challenge to the hydrologic simulation and prediction over these mountain basins. Here, we report the precipitation status, observation improvements, hydrological simulations, and future observation plan in the three major glacier and snow melt fed basins in the TP.