

A new method for basin-wide solid precipitation(snowfall) correction through the distributed hydrological modeling and satellite data

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Reliable estimate of basin wide winter precipitation (snowfall) is critical in snowmelt modelling of snow-dominated mountainous river basins for accurate assessment of water resources. Up to now, there are no any methods available for correction of basin wide snowfall, however systematic bias corrections are generally adopted to account the biases in point observations. In this study, a new method has been established to correct the basin scale snowfall amount by analyzing the satellite based snow cover area and discharge at the basin outlet through spatially distributed hydrological modeling (WEB-DHM-S hydrological model). The model has been successfully applied in modeling the snow cover distribution in Himalayan catchment of Nepal. In this research, a case study of Okutone river basin (1700 km²) in Upper Tone River at northeast Japan is selected due to the availability of dataset and its importance as the snowmelt runoff is the major source of water to the main Tokyo Metropolitan Area in spring season. WEB-DHM-S was run at hourly time step at 500 m grid for November 2000 to November 2004. An elevation dependent basin wide correction factor is proposed based on the multiyear analysis of simulated spatio-temporal distribution of snow distribution with MODIS snow product and simulated snowmelt runoff with observed discharge. This approach can be applied anywhere and shows the potential to correct the snowfall from reanalysis products and atmospheric model outputs which would be very supportive in the climate and land surface hydrological researches.