



Study on Air Temperature Estimation and Snowmelt Modeling over the Tibetan Plateau

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Accumulation and melting of snow are important hydrological processes over the Tibetan Plateau (TP). Accurate and reasonable simulation of snowmelt is useful for water resources management and planning. This study firstly developed a product of daily mean air temperatures over the TP by comprehensively integrating satellite data and field observations. Accumulation and melting of snow over TP was then simulated and analyzed using a distributed degree-day model based on the air temperature data. The proposed air temperature estimation method can reduce the cloud blockage dramatically by integrating all the available MODIS land surface data (LST) at four pass times dynamically and in the meantime keep relatively high estimating accuracies. Through zonal calibration and validation for snow cover modeling, the daily processes of snow accumulation and melting over TP can be successfully simulated. The results indicate that (1) during 2005-2010, annual precipitation over TP was ~ 442 mm/yr among which ~ 88 mm/yr was snow fall with approximately 56 mm/yr melted; (2) snow melt mostly happened in spring over TP, with spring snow melt dominating and accounting for about 53% of the full-year snow melts; and (3) the locations with higher snow melt were mainly in south and east TP and the spatial pattern of snow melts is basically in accordance with that of precipitation.