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## Types and amounts of the precipitation changes in recent 50 years of the Babao River basin

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Being an important water resource of the local and downstream living hoods, precipitation amount is experiencing drastic changes in the Babao River basin in the northeast of the Tibetan Plateau. Precipitation types also have great impacts on the runoff. However, in usual cases, weather stations only record precipitation amount without discriminating its type. Here, we compared results from three methods at improving precipitation type (solid and liquid) estimation with discontinuous 24 years precipitation type records of the Qilian gauging station. The results (bias rank of the three methods is  $2.5\% < 17.3\% < 20.1\%$ ) showed that the estimation of different thresholds for wet season ( $4\text{ }^{\circ}\text{C}$ ) and dry season ( $5.5\text{ }^{\circ}\text{C}$ ) is the closest to the actual records. Based on the precipitation type distinction, the precipitation type and its amount changing trend in recent 50 years of the Babao River basin was examined. On average, snowfall accounts for 10.7% in whole year, and mainly happens in March, April, May and October (8.9% in whole year). In the context of climate warming, the annual precipitation and rainfall increasing significantly while the annual snowfall decreased slightly. Furthermore, on the perspective of monthly changes, rainfall amounts of May and August enhanced significantly while snowfall amount decreased significantly in June and September. The above conclusions indicated the warming climate also changed the precipitation pattern in the Babao River basin which would likely cause drought in the spring season and bring challenge to the local agriculture.