## Glacier Runoff Variation and Its Influence on River Runoff During 1961–2006 in the Tarim River Basin, China

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Using monthly precipitation and temperature data from national meteorological stations for 1961-2006, 90 m resolution DEM and a digital vector map of modern glaciers from the Chinese Glacier Inventory, the glacier mass balance and glacier runoff in the Tarim River Basin (TRB), China, were estimated using a monthly degree-day model for 1961-2006. The results suggest that the modified monthly degree-day model can simulate the long-term changes in glacier mass balance and glacier runoff, which have been confirmed by short-term observed data and other literature results. The characteristics and trends of mass balance and glacier runoff variation were analyzed. It was found that the mean annual glacier mass balance during 1961-2006 was139.2 mm per year and the cumulative mass balance over the 46 year period was6.4 m in the TRB. The glacier mass balance displayed a clear decreasing trend over the entire TRB during 1961-2006. The average annual glacier runoff in the TRB was 144.16×10<sup>8</sup> m<sup>3</sup> for 1961–2006. The results also show that glacier runoff has increased in the last 46 years, especially since the 1990s with 85.7% of the increased river flow being derived from the increased glacier runoff caused by loss of ice mass. Over the entire TRB, glacier runoff accounts for 41.5% of the total river flow during the period 1961–2006. The impact of glacier runoff on river flow has increased in the TRB as a result of glacier shrinkage.

Glacier mass balance, Degree-day model, Glacier runoff, Tarim River Basin