



## **Glacier changes in Chinese Altay Mountains during the last ~50 years**

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Mountain glaciers are not only indicator of climate change, but also important water resources for oases and for the sustainable development of the ecological environment, industry and agriculture. However, due to climate warming, most of glaciers are in a state of rapid retreating. Altay Mountains, located in the border of China, Russia and Mongolia, foster the highest latitude glaciated region in China, providing important water resources for local economic development and people living. However, research on glacier change is limited in the Altay Mountains. Taking this into account, based on topographic maps in 1959, ASTER remote sensing data in 2008 and digital elevation models (DEMs), glacier changes in the Altay Mountains including glacier area, length, thickness and volume changes were analyzed in the support of 3S technology. Results showed that the total area and number of 226 glaciers investigated have reduced by 32.5% and 27.9% from 1959 to 2008. The average area reduction rate of glaciers with size <1 km<sup>2</sup> and in 1-5 km<sup>2</sup> is -66.7% and 27.9%, respectively. The reduction rate is more than 70% for the glaciers with size less than 0.5 km<sup>2</sup>. Glaciers have retreated by 253 m with the reduction rate of 18.3%. Furthermore, for 58 selected glaciers in the Youyi Area, the mean ice elevation decrease by 24.12 m with the volume loss of 2.649 km<sup>3</sup>, corresponding to the annual glacier runoff of  $4.88 \times 10^6$  m<sup>3</sup> during 1959-2008. Analysis indicated that the relative area reductions of small glaciers were usually higher than those of large ones, which exhibited larger absolute loss, indicating that the small glaciers were more sensitive to climate change than large ones. Glacier changes exhibited obvious spatial differences, indicating that the reduction rate of glaciers in the south slope of the Youyi Area was larger than in the north.