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Abstract:

The High Mountain Asia (HMA) area is characterized by the largest number of mountain glaciers in the world, complex terrain, and fragile ecosystems under changing climate. This project will focus on producing a number of datasets over relatively long time periods from satellite remote sensing observations to improve the understanding of the regional heat and water exchanges, the glacier dynamics in relation to regional climate change, and to provide data support to other projects.

The key research contents include:

- (1) Glacier and lake changes monitoring. This is to extract multi-phase areas of both glaciers and lakes from multi-source remote sensing data with high spatial resolution, and to estimate the changes of glacier thickness and lake level using satellite altimetry data in some typical areas and further calculate the glacier and lake volume changes. The driving factors of glacier and lake dynamic changes and its impact on regional water balance will also be explored.
- (2) Surface water and heat flux estimation. The objective of the study is to improve the existing remote sensing-based surface water and heat flux simulation model by considering the complex terrain, ice and dynamic snow cover, soil freezing and thawing status, and alpine vegetation physiologies in the High Mountain Asia area. Long-term surface evapotranspiration dataset will be generated to analyze the spatial-temporal variation of land surface water and heat fluxes in High Mountain Asia area.
- (3) Remote sensing-based energy and mass balance modeling in the High Mountain Asia area. This is to establish the glacier ablation model and energy and mass balance model using remote sensing-based multi-variables factors, and to further analyze the impact of the climate and glacier features on glacier melting.