Downwasting of debris-covered ablation area of Lirung Glacier in Langtang Valley, Nepal Himalayas since 1979

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Larger number of glacier system in Himalayas plays important role to water supply in surrounded country and global sea level rise. Extensive glacier mass change have been measured in various scale/method (ex. laser altimetry and stereo photogrammetry) and projected using model with climate gridded data. However, extensive measurement without field-based validation has uncertainty inherent with sensors. And information about behavior of debris-covered glacier is not enough for incorporating extensive model projection. Here we present detail investigation about recent mass balance of debris-covered type glacier of Lirung Glacier in Langtang Valley, Nepal Himalayas, from elevation change by remotely sensed multi-temporal digital elevation models calibrated by field measurement and surface flow velocity by phase only correlation. Surface lowering (-1.3--1.8 m a^{-1}) are observed all over ablation area of Lirung Glacier. From mass balance calculation by continuity equation reveals it mainly caused by ablation. In upper ablation area, recent accelerated decrease of emergence velocity (+0.3 and 0.0 m a^{-1} before and after 2000 respectively) also contributes to the surface lowering. Energy mass balance model using gridded climate datasets and weather observation. The calculated decrease of emergence velocity could caused by delayed response to accumulation decreasing from 1980s to 1990s. In this context, upper ablation area will accelerated downwasting due to positive feedback between surface lowering and flow velocity decelerating.

Keywords: Himalaya, Glacier, DEM

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