Supplements for

Modelling rock glacier velocity and ice content, Khumbu and Lhotse Valleys, Nepal

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Figures S1 and S2

The debris–covered glaciers (DCGs) investigated in this study show a discontinuous and inconsistent velocity field due to its heterogeneous and fast motion which is unfavorable for InSAR measurements (Fig. S1). Figure S2 presents that the DCGs exhibit similar and stable kinematic features in mean and median velocities as rock glaciers, yet Chola DCG shows a standard deviation in mean velocity as 15.4 cm yr^{-1}, much higher than that of the rock glaciers (3.4 cm yr^{-1}). The maximum velocity is variable with the largest value of 215.9±29.7 cm yr^{-1}, as shown in Chola DCG (Fig. S2b). However, those statistics of velocity distribution of debris-covered glaciers based on InSAR cannot characterize the heterogeneous kinematic behaviors of the entire landform because of the spatially incomplete record, as illustrated in Fig. S1.

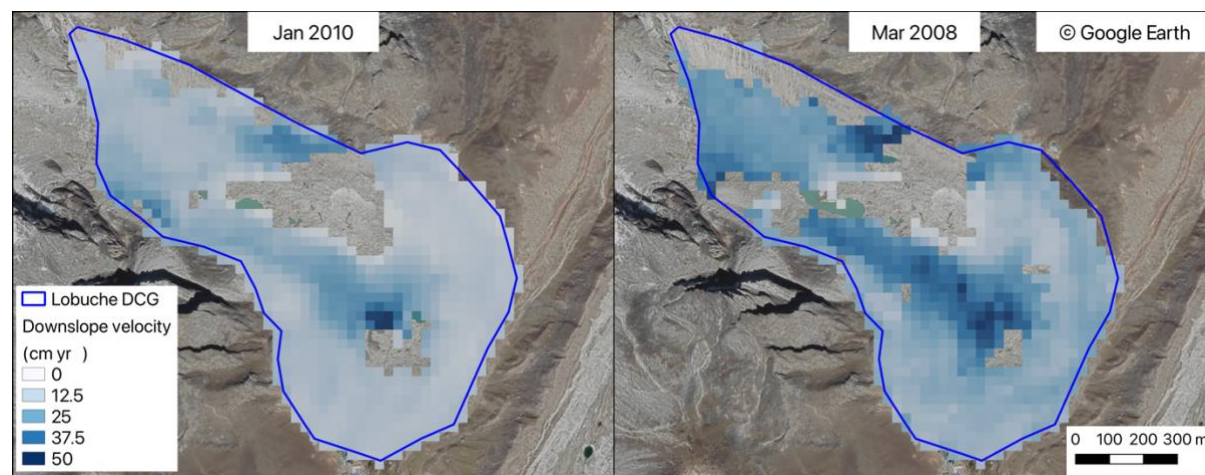
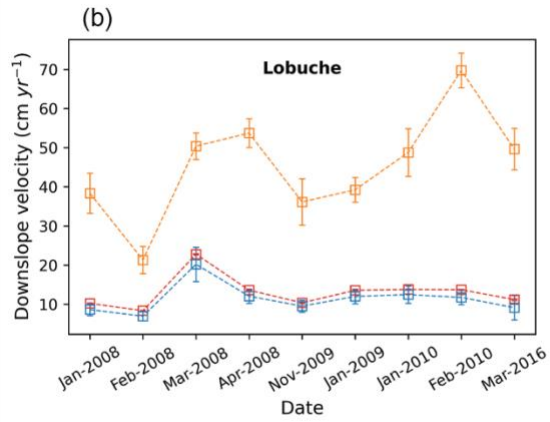
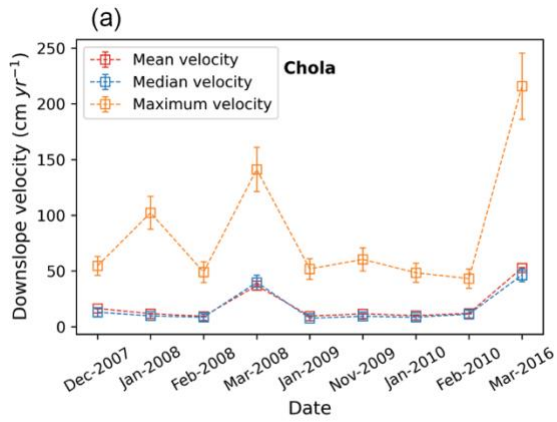



Figure S1: Velocity field map showing the discontinuous and inconsistent surface velocity distribution of Lobuche DCG.

20   **Figure S2: Time series of the InSAR-derived downslope velocities of the two debris-covered-glaciers. The spatial mean velocities and uncertainties during each period are shown (black squares and error bars) as well as the median (blue) and maximum (red) velocities.**