

Attribution of inhomogeneous glacial fluctuation in High-Mountain Asia

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Glacier shrinkage under global warming have significant contribution to global sea level rise. Particularly in Asia, water demand exceeds supply due to rapid population growth, with glacier meltwater being a crucial water resource in some river basins. Recent studies of Asian glaciers elucidated that Karakoram glaciers were slightly gaining mass while nearby Himalayan glaciers were rapidly losing mass. These different glacial behaviors have been attributed to one of two possible causes: inhomogeneity in recent climate change⁹⁻¹¹ or differing glacial responses to climate change. We examined both the climate forcing and the response causes, specifically, we calculate the mass-balance sensitivity to temperature change in high-mountain Asia. Then, in support of the response cause, we find a strong correlation between observed glacier-surface-elevation changes and glacial mass-balance sensitivity. It suggests that spatial heterogeneity of climate change could not be the main cause of that in glacier mass change.

Keywords: High Mountain Asia, glacier fluctuation, climate change, mass balance