Supplement table captions

Table S1 Datasets used to delineate glacier outline for the WNT (1976-2020)

Table S2 The comparison of previous studies and this study on glacier change over the WNT

Table S3 Comparison of glacier area between this study and study of Wu et al. (2016) in specific years

Table S4 Mass balance (BN) of Zhadang Glacier and Gurenhekou Glacier in this study, and their mass balance derived from in-situ observations.

Table S5 Mass balance estimates (from geodetic and altimetry studies) over the WNT and comparable subregions/catchments.

Table S1 Datasets used to delineate glacier outline for the WNT (1976-2020)

Data	Satellite and sensor	Spatial Resolution (m)	Suitability of scene	Utilizations
1976/01/07	Hexagon KH-9	8	Seasonal snow in the northeast	Glacier inventory in 1976 for whole study area
1976/12/17	Landsat MSS	30	Little seasonal snow in the northeast	Glacier inventory in 1976 for whole study area except for a small part of the southeast
1977/03/17	Landsat MSS	30	Some clouds	Additional information for glacier of 1976
2000/11/01	Landsat ETM+	30	Seasonal snow in the northeast	Glacier inventory in 2000 for whole study area
2000/11/17	Landsat ETM+	30	Seasonal snow in the northeast	Glacier inventory in 2000 for whole study area
2001/02/05	Landsat ETM+	30		Additional information for glacier of 2000
2014/08/12	Landsat OLI	30	Little clouds	Glacier inventory in 2014 for whole study area
2014/10/15	Landsat ETM+	30	Some stripes	Additional information for glacier of 2014
2014/06/17	Landsat ETM+	30	Some stripes	Additional information for glacier of 2014
2016/08/05	Sentinel-1	2.3x14.1		Check debris glacier
2016/08/29	Sentinel-1	2.3x14.1		Check debris glacier
2020/09/29	Landsat OLI	30	Little clouds	Glacier inventory in 2000 for whole study area
2020/10/15	Landsat OLI	30		Glacier inventory in 2000 for whole study area

Table S2 The comparison of previous studies and this study on glacier change over the WNT

Time period	Region	Area change (%)	Data	Method	Study
1970-2000	Nam Co Basin	-15.4	Aero-photo topographic map, Landsat ETM+	Manual	Wu & Zhu (2008)
1976-2001	Nam Co Basin	-6.8±3.1	Hexagon KH-9, Corona, Landsat MSS/TM/ETM+	Band ratio and revised manuallv	Bolch et al.(2010b)
1970/80-2000	Southwest of WNT near Lhasa	-19.8	LandSat Series, ASTER,	Band ratio	Franenfelder & Kääb (2009)
1977-2000	Southwest of the WNT	-15.6±3.27	Hexagon KH-9, Landsat MSS/TM/ETM+	Band ratio and revised manually	Wang et al. (2012)
2000-2010		-8.11±3.09			
1970-2000	The WNT	-5.7	Aero-photo topographic map, Landsat ETM+, ASTER	Manual	Shangguan et al. (2008)
1970-2000	The WNT	-11.7 ±3.6	Chinese Topographic Maps, Landsat TM/ETM+	Band ratio and revised manually	Wu et al. (2016)
2000-2014		-17.8±4.9			
1976-2000	The WNT	-12.98±4.91	Hexagon KH-9, Landsat MSS/ETM+/OLI	Band ratio and revised manually	This study
2000-2014		-15.78±5.91			

Table S3 Comparison of glacier area between this study and study of Wu et al. (2016) in specific years

	Glacier Area (km^2)				
	1970	1976	2000	2014	2020
Wu et al. (2016)	892.61±17.76	-	788.47±25.59	648.23±23.54	-
This study	-	884.90±29.71	770.03±33.44	648.55±30.88	589.17±31.72

Table S4 Mass balance (B_N) of Zhadang Glacier and Gurenhekou Glacier in this study, and their mass balance derived from in-situ observations.

Name	1976-2000 B_N (m w.e.a^{-1})	2000-2020 B_N (m w.e.a^{-1})	in-situ B_N (m w.e. a^{-1})
Zhadang	-0.25±0.99	-0.55±1.18	−0.59
Gurenhekou	-0.27±1.39	-0.42±1.29	−0.31

Table S5 Mass balance estimates (from geodetic and altimetry studies) over the WNT and comparable subregions/catchments.

Time period	Mass balance (m w.e.a^{-1})	Data	Study
1976-2000	-0.25±0.15	KH-9 and SRTM	Zhou et al. (2018)
2003-2009	-0.20±0.29	ICESat	Neckel et al. (2014)
2000-2013	-0.22±0.23	SRTM and ZiYuan-3 Three-Line-Array stereo images	Ren et al. (2020)
2013-2017	-0.43±0.06		
2000-2017	-0.30±0.19		
2000-2014	-0.24±0.13	SRTM and TerraSAR-X/TanDEM-X images	Li & Lin (2017)
2000-2014	-0.26± 0.06	SRTM and TerraSAR-X/TanDEM-X images	Zhang & Zhang (2017)
1976-2000	-0.26±0.09	KH-9 and SRTM	This study
2000-2014	-0.28±0.15	ASTER DEMs	
2000-2020	-0.37±0.15	ASTER DEMs	

Supplement figure captions

Figure S1 (a) Coverage of KH-9 image and the number of valid ASTER DEMS after cloud and outlier removal in the buffered area shown. Label I represents the SW section and label II represents the NE section of the WNT (inset, same map scale). (b) and (c) show the total area of glaciers and glacier area covered by the datasets respectively during 1976-2000 and 2000-2020.

Figure S2 After alignment-correction and elevation related deviation correction, elevation change of stable terrain varies with elevation, slope, and aspect during (a), (b) and (c) 1976-2000 and (d), (e) and (f) 2000-2020.

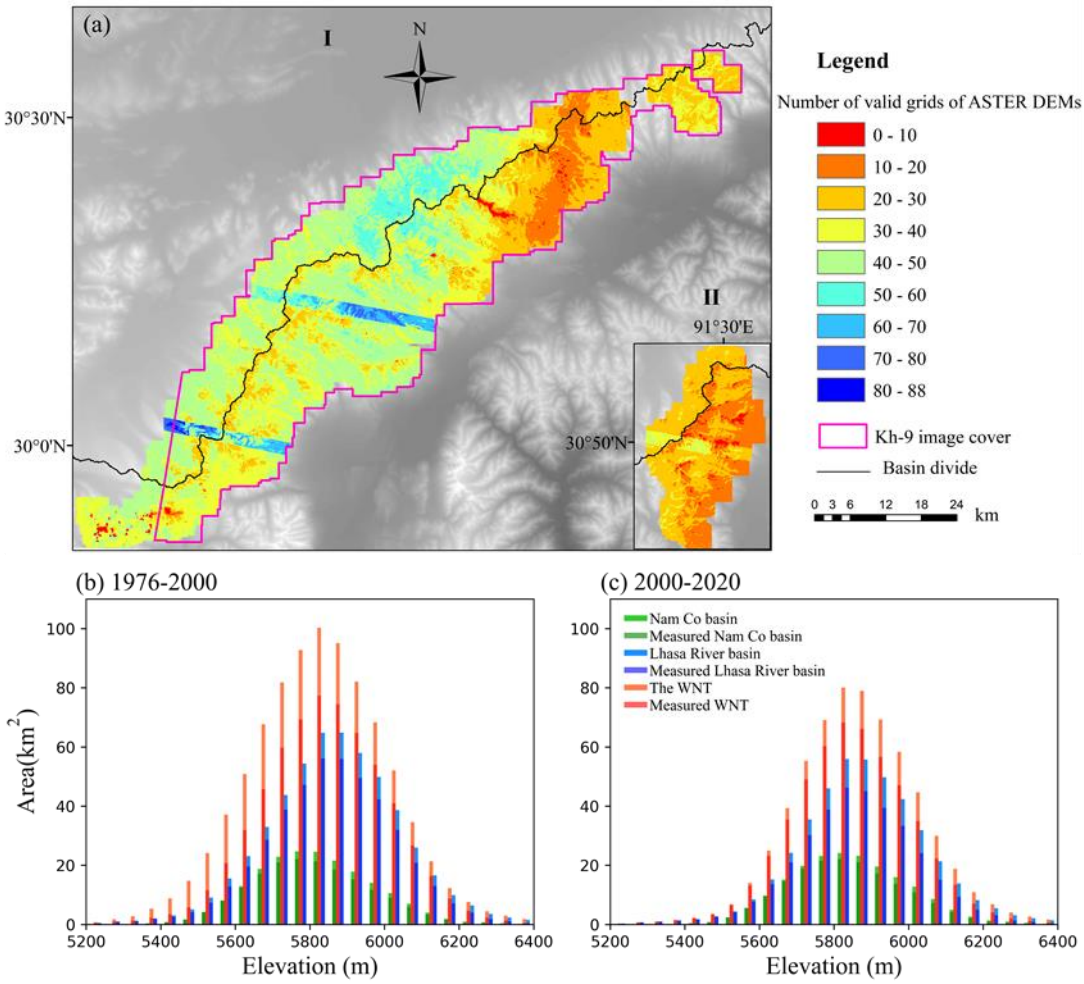

Figure S1 (a) Coverage of KH-9 image and the number of valid ASTER DEMS after cloud and outlier removal in the buffered area shown. Label I represents the SW section and label II represents the NE section of the WNT (inset, same map scale). (b) and (c) show the total area of glaciers and glacier area covered by the datasets respectively during 1976-2000 and 2000-2020.

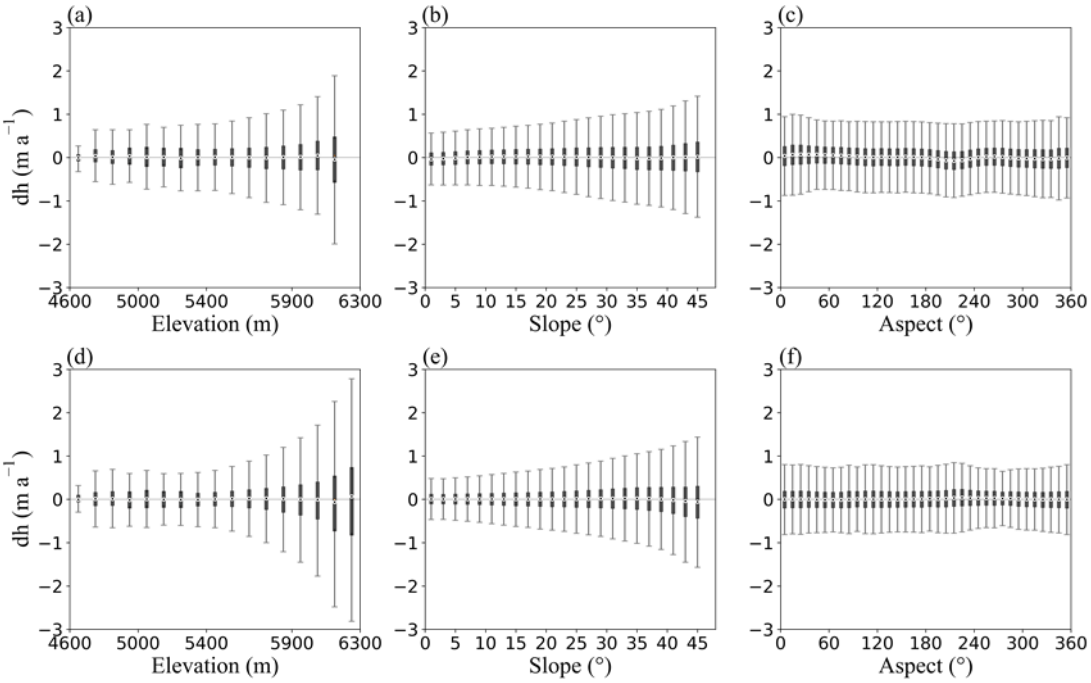

Figure S2 After alignment-correction and elevation-related deviation correction, elevation change of stable terrain varies with elevation, slope, and aspect during (a), (b) and (c)1976-2000; and (d), (e) and (f) 2000-2020.