Table S1. List of optical, ASTER L1A stereo-pairs, DEM dataset used for inventory, debris cover change and volume estimation of the glaciers.

Sensor/Map	Path/Row	Scene/Product ID	Acquisition Date	Spatial Resolution	Temporal Resolution
LANDSAT 5 (TM)	147 / 37	LT51470371992227ISP00	1992/08/14	VIS + MIR (30 m)	16 days
ANDSAT 5 (TM)	147 / 38	LT51470381992227ISP00	1992/08/14	VIS + MIR (30 m)	16 days
LANDSAT 5 (TM)	147 / 37	LT51470371993229ISP00	1993/08/17	VIS + MIR (30 m)	16 days
LANDSAT 5 (TM)	147 / 38	LT51470381993229ISP00	1993/08/17	VIS + MIR (30 m)	16 days
LANDSAT 7 (ETM)	147 / 37	LE71470372000289SGS00	2000/10/15	VIS + MIR (30 m)	16 days
LANDSAT 7 (ETM)	147 / 38	LE71470382000289SGS00	2000/10/15	VIS + MIR (30 m)	16 days
LANDSAT 5 (TM)	147 / 37	LT51470372011295KHC00	2011/11/22	VIS + MIR (30 m)	16 days
LANDSAT 5 (TM)	147 / 38	LT51470382011295KHC00	2011/10/22	VIS + MIR (30 m)	16 days
LANDSAT 5 (TM)	147 / 38	LT51470382010276KHC00	2011/11/30	VIS + MIR (30 m)	16 days
LANDSAT 7 (ETM)	147 / 37	LE71470372010284ASN00	2010/10/11	VIS + MIR (30 m)	16 days
LANDSAT 7 (ETM)	147 / 38	LE71470382010284ASN00	2010/10/11	VIS + MIR (30 m)	16 days
LANDSAT 8(OLI)	147 / 37	LC81470372019253LGN00	2019/09/10	VIS + MIR (30 m)	16 days
LANDSAT 8(OLI)	147 / 38	LC81470382019253LGN00	2019/09/10	VIS + MIR (30 m)	16 days
SRTM DEM	-	-	2000	30m	-
ASTER L1A V003		AST_L1A_00310012009053525_20220304011602_16377	2009/08/08	30m	-
ASTER L1A V003	-	AST_L1A_00309232012053507_20220304011602_16379	2012/10/11	30m	-
ASTER L1A V003	-	AST_L1A_00309112014054759_20211114232753_14337	2014/09/11	30m	-
ASTER L1A V003	-	AST_L1A_00308192014054153_20211004042747_566	2014/08/19	30m	-
ASTER L1A V003	-	AST_L1A_00310302017054141_20211114232753_14335	2017/10/03	30m	-
ASTER L1A V003	-	AST_L1A_00309202020054124_20211001051549_17095	2020/09/03	30m	-
ASTER L1A V003	-	AST_L1A_00309202020054133_20211001051549_17090	2020/09/03	30m	-
ASTER L1A V003	-	AST_L1A_00309132020053523_20211001051459_12495	2020/09/13	30m	-
*TM thematic mapper; *ETM enhanced thematic mapper; *VIS visible; *MIR mid infra-red					

Table S2. Offset of various ASTER L1A stereo pairs used for DEM generations.

ASTER L1A stereo pairs	X offset	Y offset	Z offset
AST_L1A_00310012009053525_20220304011602_16377	+29.44	-5.51	+9.04
AST_L1A_00309232012053507_20220304011602_16379	+18.00	+5.36	+6.12
AST_L1A_00309112014054759_20211114232753_14337	-3.61	+11.23	+13.74
AST_L1A_00308192014054153_ 20211004042747_566	+1.44	-1.96	+16.36
AST_L1A_00310302017054141_20211114232753_14335	-10.17	-1.31	+18.66
AST_L1A_00309202020054124_20211001051549_17095	+6.11	-4.93	+18.22
AST_L1A_00309202020054133_20211001051549_17090	+5.63	-4.76	+23.74
AST_L1A_00309132020053523_20211001051459_12495	+25.60	+3.75	+13.06

Table S3. Decadal changes in glacier area over some representative glaciers (marked in Fig. 1.) in the CB Basin.

S.No.	Glacier	Area change (km^2)		
		1993-2000	2000-2010	2010-2019
1.	Hamtah	0.30±0.001	0.04±0.002	0.35±0.002
2.	Sakchum	0.12±0.001	0.04±0.0002	0.05±0.003
3.	Chhota Shigri	0.09±0.0001	0.03±0.002	0.03±0.001
4.	Bara Shigri	0.25±0.02	0.06±0.003	0.24±0.014
5.	Batal	0.26±0.002	0.03±0.001	0.04±0.002
6.	Sutri Dhaka	0.28±0.0003	0.15±0.0008	0.05±0.003
7.	Samudra Tapu	0.11±0.005	0.98±0.0005	0.13±0.007
8.	Gepang Gath	0.73±0.004	0.14±0.008	0.36±0.02
9.	Yoche Lungpa	0.31±0.0003	0.47±0.002	0.03±0.002
10.	Mulkila	0.34±0.0001	0.24±0.001	0.05±0.003
11.	Panchi II	0.17±0.0001	0.02±0.0001	0.04±0.002
12.	Panchi I	0.44±0.001	0.04±0.002	0.03±0.002
13.	Patsio	0.30±0.0001	0.02±0.0008	0.16±0.001

Table S4. Model bias for different shape factors inputs. MT=Model mean thickness (m).

Glacier	Sections	Observed mean thickness (m)	Shape factor (f)							
			f=0.4		f=0.6		f=0.7		f=0.8	
			MT (m)	Bias (m)	MT (m)	Bias (m)	MT (m)	Bias (m)	MT (m)	Bias (m)
Chhota Shigri	CS1	96	218	122	146	50	123	27	107	11
	CS2	197	305	108	206	9	176	-21	153	-44
	CS3	163	334	171	230	67	196	33	171	8
	CS4	208	234	26	162	-42	138	-70	121	-87
	CS5	136	188	52	121	-15	104	-32	93	-43
Patsio	LS	53	126	73	83	30	71	18	62	9
	CS1	37	128	91	91	54	79	42	68	31
	CS2	57	123	66	85	28	72	15	64	7
	CS3	105	243	138	161	56	138	33	120	15
Hamtah	Ablation	155	187	32	127	-28	108	-47	94	-61
	Intermediate	224	315	91	214	-10	184	-40	161	-63
	Accumulation	247	236	-11	160	-80	136	-111	120	-127

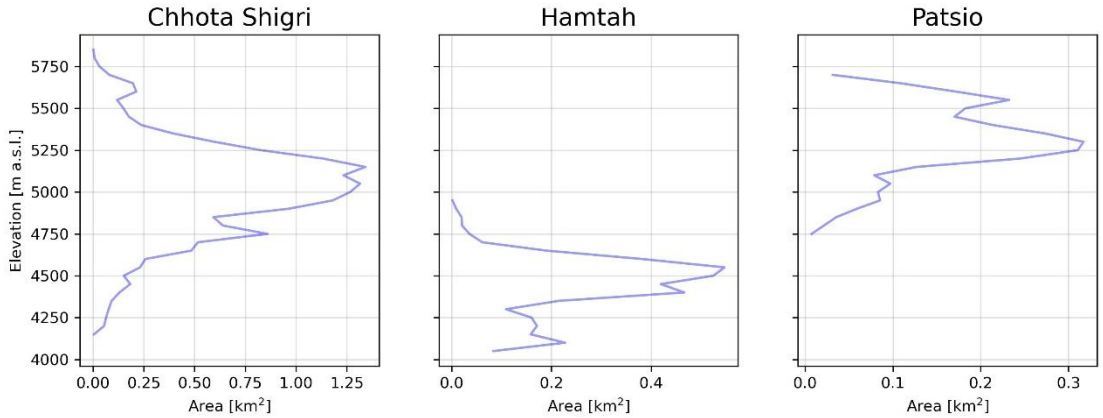

Fig. S1. Hypsometry of Chhota Shigri, Hamtah, and Patsio glaciers at 50 m interval.