Supplementary material

Table S1. Ground control points used as a check point and control point, Label, Easting, Northing, and Altitude for the processing of the year 1967 historical aerial photographs.

Label	Type	Easting	Northing	Altitude
GCP_1967_1	Check point	598368.55	754694.9	4029.97
GCP_1967_2	Check point	596816.12	749110.5	3846.81
GCP_1967_3	Control point	596187.02	756801.6	4131.03
GCP_1967_4	Check point	594921.91	754878.4	4104.48
GCP_1967_5	Control point	600347.06	749099.06	3705.05
GCP_1967_6	Control point	593618.79	748721.17	3850.38
GCP_1967_7	Control point	588322.145	756630.22	4104.03
GCP_1967_8	Control point	588276.14	749332.23	3863.99
GCP_1967_9	Control point	588731.69	752426.83	3979.02
GCP_1967_10	Control point	591254.14	756597.32	4140.01
GCP_1967_11	Check point	592437.99	753451.42	4097.39
GCP_1967_12	Control point	595409.14	752336.23	3996.01
GCP_1967_13	Check point	599079.5	756851.85	4078.31
GCP_1967_14	Control point	599331.13	752997.22	3978.01
GCP_1967_15	Control point	584805.15	756355.22	4102.07
GCP_1967_16	Check point	585022.91	748718.81	3811.54
GCP_1967_17	Control point	587441.3	748612.29	3848.27
GCP_1967_18	Check point	603160.13	756946.22	3718.66
GCP_1967_19	Control point	603436.13	749133.23	3548.28
GCP_1967_20	Check point	601703.42	754398.82	3821.53
GCP_1967_21	Check point	604684.33	754233.38	3257.49
GCP_1967_22	Check point	589444.14	749070.23	3864.74

Table S2. Ground control points used as a check point and control point, Label, Easting, Northing, and Altitude for the processing of the year 1984 historical aerial photographs.

Label	Type	X/Easting	Y/Northing	Z/Altitude
GCP_1984_1	Check point	598132.9	763068.9	3711.49
GCP_1984_2	Control point	598370.33	754695.7	4025.92
GCP_1984_3	Control point	601703.41	754398.6	3821.02
GCP_1984_4	Control point	600347.06	749099.06	3704.95
GCP_1984_5	Control point	593618.79	748721.2	3850.24
GCP_1984_6	Check point	590157.3	748199.8	3877.93
GCP_1984_7	Control point	590476.5	744498.2	3217.96
GCP_1984_8	Control point	587441.3	748612.29	3848
GCP_1984_9	Check point	596829.5	749114.56	3841.11
GCP_1984_10	Control point	596187.4	756801.59	4130.98
GCP_1984_11	Control point	584704.5	751605.23	3529.02

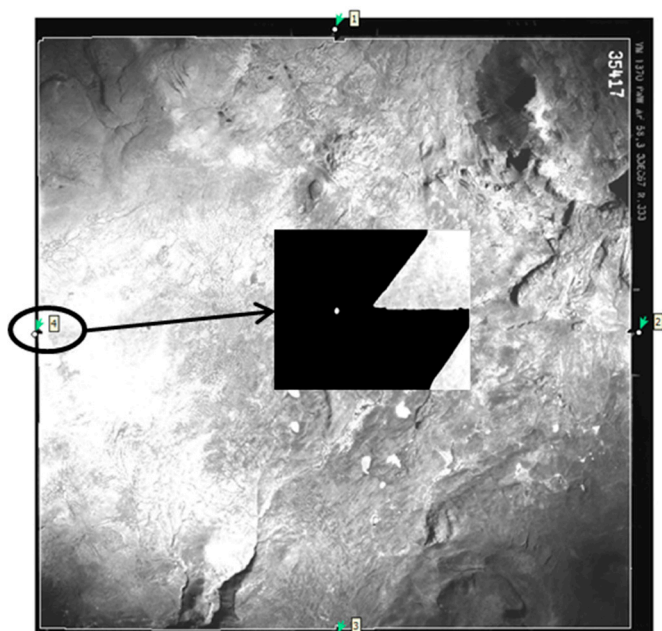|				
GCP_1984_12	Check point	588711.75	752422.9	3985.95
GCP_1984_13	Check point	592418.5	753444.8	4114.76
GCP_1984_14	Control point	595409.2	752336.23	3996.02
GCP_1984_15	Control point	599078.13	756844.22	4078
GCP_1984_16	Check point	599332.55	753016.6	3988.96
GCP_1984_17	Control point	604843.71	745305.629	3286.4
GCP_1984_18	Control point	595308.77	762895.69	3958.54
GCP_1984_19	Check point	592464.27	762621.25	4014.84
GCP_1984_20	Control point	590007.61	754371.54	4284.78
GCP_1984_21	Control point	594916.38	754885.69	4094.39
GCP_1984_22	Check point	604684.72	754233.83	3257.38
GCP_1984_23	Control point	603160.13	756946.29	3718.18
GCP_1984_24	Check point	585022.91	748718.81	3811.37
GCP_1984_25	Control point	589444.14	749070.23	3867-23
GCP_1984_26	Check point	603436.128	749133.22	3548.42
GCP_1984_27	Control point	604782.85	748797.72	3487.93
GCP_1984_28	Check point	584750.71	743716.64	3124.91
GCP_1984_29	Control point	598636.13	744769.23	3649.47
GCP_1984_30	Check point	602556.13	745568.26	3214.61

Figure S1. Fiducial mark type and it's orientation of KC-1(B) camera used to acquire the 1967 historical aerial photographs.

Table S3. Fiducial point coordinates of KC-1(B) camera used to acquire the 1967 historical aerial photographs, principal point, principal point symmetry, and principal point auto collimation (mm).

Point	X	Y
1	0.145	124.628
2	124.786	0.096
3	0.145	-124.628
4	-124.628	-0.096
Principal point	0.009	0.009
Principal point symmetry	0.020	0.006
Principal point auto collimation	0.015	0.023

Figure S2. Fiducial mark type and it's orientation of Wild RC 10 camera, UAG II 3045 used to acquire the 1984 historical aerial photographs.
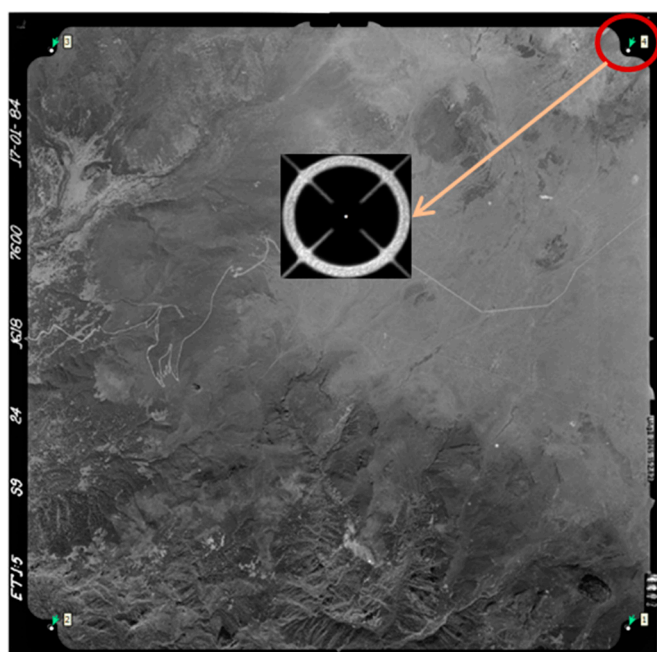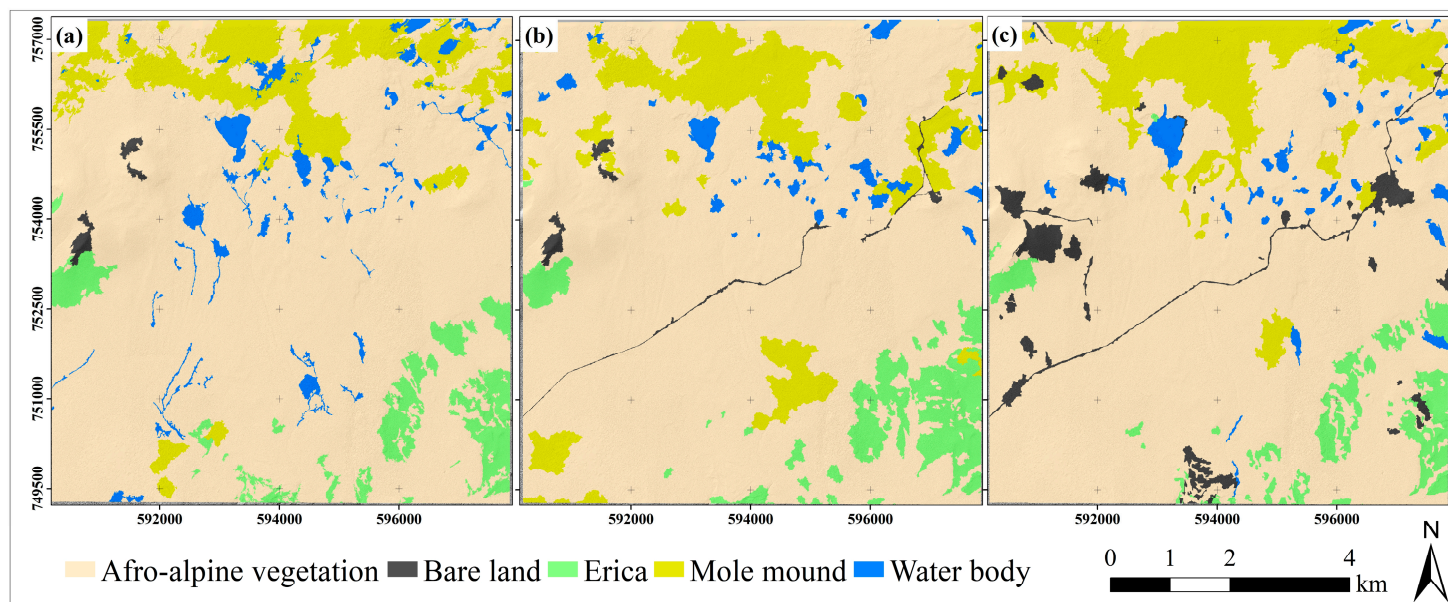
Table S4. Fiducial point coordinates of the Wild RC 10 camera used to acquire the 1984 historical aerial photographs, fiducial center, principal point symmetry, and principal point auto collimation (mm) (mm).

Point	X	Y
1	+106.005	-106.006
2	-106.001	-105.997
3	-105.997	+106.003
4	+105.994	+106.001
Fiducial center	0.000	0.000
Principal point symmetry	-0.013	+0.008
Principal point auto collimation	+0.012	-0.006

Afro-alpine vegetation ▪ Bare land ▪ Erica ▪ Mole mound ▪ Water body

Figure S3. Land use land cover map developed from reconstructed orthomoaics of the year 1967 **(a)** and 1984 **(b)** and from RapidEye 5m multispectral satellite imagery for the year 2023 **(c)** using ArcMap 10.8.2. Maximum Likelihood Classification algorithm was used to classify the images in to five major land cover classes as described below in the table (Table S5). (Source for RapidEye is from (Tyc et al. 2005) [76]).

Table S5. Description of Land use land covers and its areal coverage in 1967, 1984 and 2023 in Hectares (ha)

		Year		
		1967	**1984**	**2023**
Land use land cover	**Description**	Area (ha)		
Afro-alpine vegetation	Included species of Helichrysum (H. splendidum, H. citrispinum, H. cymosum, H. jormosissimum), species of Alchemilla, Festuca abyssinica, Grass lands, Artemisia, and Lobelia rhynchopetalum.	4967.6	4866.8	4814.2
Bare land	Included rocks, roads and excavated areas	27.2	50.7	217.7
Erica	Included both Erica trimera and Erica Arboria.	344.5	396.5	278.8
Mole Mound	exposed landscape created by giant root rat	648.4	759.6	744.1
Water Body	Included alpine lakes, rivers and wetlands	206.3	120.4	139.2

Reference

76. Tyc, G.; Tulip, J.; Schulten, D.; Krischke, M.; Oxfort, M. The RapidEye Mission Design. *Acta Astronautica* **2005**, *56*, 213–219, doi:10.1016/j.actaastro.2004.09.029.