

ISSIK GLACIER, PAMIR-E KALAN, AFGHANISTAN; 1:25,000
(Terrestrial photogrammetric map)

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This map is a product of the research expedition "Exploration Pamir 75" which was a private scientific undertaking sponsored by the Austrian Alpine Club and the Austrian Council for the Promotion of Scientific Research. The aim of the expedition was to scientifically document and map an area of the Pamir-e Kalan (Great Pamir) which included the summits and the inhabited valley region of Wakhan-Darya in NE Afghanistan.

The terrestrial photogrammetry for this map of Northern and Southern Issik glaciers was carried out by R. Kosta and W. Kuschel between 1st and 18th August 1975. The trigonometrical starting point for the measurement of all positions and altitudes is P.6281 (Koh-e Helal) on the Afghan map 1:100,000. The photogrammetrically determined altitudes are accurate to within units of metres (Senarclens-Grancy and Kostka 1978). The cartography, carried out by G. Moser, Innsbruck, specifically emphasises glaciologically important details, and the rocky areas surrounding the glaciers are therefore only shown schematically in a homogeneous colour.

The Koh-e Kalan (Great Pamir) is the southern-most mountain chain of the Pamir range. The two Issik glaciers are situated on the southern side of the highest mountains in this chain (Koh-e Pamir 6320 m, Koh-e Helal 6281 m). They drain into the Wakhan Darya, eventually forming the Amu Darya which runs into the Aral Sea.

The Issik glaciers display the form of composite valley glaciers typical for the mountains of central Asia. Their accumulation areas lie near steep, exposed flanks, accumulation thus arising mainly via snow and ice avalanches. The tributary glaciers then flow through canyon-like, deeply cut valleys and meet in the flat, debris-covered glacier tongues. Consequently, the hypsometric distribution is as follows: 66% of the total area of Northern Issik glacier lies below the mean elevation of

the glacier; for Southern Issik glacier, the equivalent figure is 64% (EmE in Table 1).

By mapping the transient snow line and firn line from previous years, an estimation of the altitude of the firn edge could be made: from 4800 m on north-exposed slopes up to 5400 m on south-exposed slopes. This large difference (600 m) is characteristic for arid regions. The melting of ice is particularly slight due to the large amount of outgoing radiation which occurs at night, and the altitude. Daily readings for the net ablation were made at 8 ablation stakes on relatively cloud-free days; values between 4.2 cm and 3.5 cm were recorded. Significant melting only starts in the early hours of the afternoon. The penitentes forms in the snow and ice are indicators of the fact that evaporation is responsible for a large part of the ablation.

Lateral moraines and unweathered light-coloured debris show the positions of a glacial maximum of the Issik glaciers, which is thought to have occurred in the second half of the nineteenth century (coloured brown on the map). The area which has since then become ice-free constitutes only 5.6% of the total area of both glaciers today. This comparatively small reduction in area is a result of the debris cover at the glaciers' snouts; dead ice remains for a long time under such cover. The steep, active glacier snout of Southern Issik glacier is at an altitude of 4360 m, and that of Northern Issik glacier is at 4600 m.

The low values of ablation, ice velocity, mass loss and area loss indicate that the mass exchange is low for these glaciers which exist under cold-arid climatic conditions.

Table 1: General Information on Northern and Southern Issik Glaciers

Name	T	Emax (m)	EmA (m)	Emin (m)	EmE (m)	Lmax (km)	A (km ²)	AD (km ²)	AD %	AmE %
Northern Issik Gl.	6	6330	5230	4460	5400	11.3	28.62	4.72	16	66
Southern Issik Gl.	3	6070	5030	4200	5140	9.3	15.05	2.26	15	64

T: number of tributary glaciers

Emax: maximum elevation

EmA: mean elevation of glacier area

Emin: minimum elevation

EmE: mean elevation between Emax and Emin

Lmax: maximum length, longest flowline

A: total area of glacier

AD: glacier area, debris covered

AmE: glacier area below EmE.

REFERENCE

- R. Senarclens de Grancy and R. Kosta (Ed.), 1978: Grosser Pamir, Akademische Druck- und Verlagsanstalt, Graz 1978, 400 p., 5 maps included.