MONITORING REPORT

KÖTLUJÖKULL OUTLET GLACIER

Report for measurements done on
6th of January 2026 by

The Architectural Association

KATLA GEOPARK ICELAND

unesco Global Geopark

Kötlujökull outlet glacier

Kötlujökull outlet glacier originates from the eastern side of Mýrdalsjökull Ice Cap, which is mainly confined on top of and within the caldera of Katla volcano. Ice from the south-eastern part of the Katla caldera supplies Kötlujökull, where it passes through a breach in the caldera between the peaks of Hábunga and Kötlukollar. After that the outlet glacier spreads and comes down to the lowland between the mountains Sandfell and Hafursey. The glacier is about 13-15 km long and originates at about 1200 m.a.s.l. and terminates at about 200 m.a.s.l.
Kötlujökull was formerly known as Höfðabrekkujökull but is now almost exclusively called Kötlujökull. The Höfðabrekkujökull name is now used for a large deposit of sand and gravel that formed southeast of the farm of Höfðabrekka in the glacial outburst floods from Katla in 1721 and 1755.
Like most glaciers in Iceland, Kötlujökull has retreated extensively in recent years, and the glacier snout is usually very dark due to sediments in the ice. The glacier is perhaps best known for the fact that most jökulhlaup that have come from Katla and Mýrdalsjökull glacier in the last 1100 years have passed through the glacier. The glacier is also known for its beautiful ice caves and the beautiful landscape near the glacial snout.

Objectives of Monitoring Kötlujökull outlet glacier

The objective of the monitoring program of Katla outlet glacier is to document the retreat rate of the glacier by doing measurements of the glacial snout. The measurements are carried out by using GTS-6 TopCon GPS devices with accuracy of ± 1 cm.

Along with measuring the glacier snout, photos and drone photos are taken of the glacier itself and the environment in front of it. Those photos are then used to monitor the environmental changes in front of a retreating glacier. The aerial photographs taken with a drone are used to map out parts of the glacier that were inaccessible during measurements.

Another objective is to map out the dead ice field in front of the glacial snout. The reason for the measurements is to increase the understanding of the evolution of a dead ice field in front of a rapidly retreating outlet glacier and to map out the large-scale environmental impact of the long-term melting of the dead ice in the field.

Field work on the 6th of January 2026

A measurement of the part of the Kötlujökull outlet glacier was made on the 6th of January 2026. The aim of the field work was to get a measurement of the south-eastern part of the glacial snout of Kötlujökull, along with aerial photographs and ground photographs of the forefield of the glacier.

The measurement was made by a student group and teachers from the Architectural Association School of Architecture. Participants from them were:

Noor Ibrahim, Hugo Ars, Oscar Goegar, Razi Khader, Maya Kutat, Seungju Lee, Dan Zhuyuan Liu, Nini Nino Margishvili, Daeun Min, Helena Schumcker, Jack Siyuan Shen, Mina Tabanlioglu, Elena Zannetou, Inigo Minns, Camille Dunlop (figure 1). They were accompanied by Ann I. Peters from Katla Geopark and Davíð Jónasson from GravelTravel.

Figure 1. The photograph shows the participants of the fieldwork from the Architectural Association School of Architecture

Results from field work on the 6th of January 2026

The results of the field measurements can be seen on the figures 2 and 3, and the data collected during the fieldwork is available from here: https://www.dropbox.com/scl/fo/0kbfu1gb6ytvxbrcpgzod/AGW_M1GMb0HYOmczYz55NBU?rlkey=lq05sgamsz8tun5geacftmrxw&e=1&st=bpvitc80&dl=0

On figures 2 and 3, the measurements from 6th of January 2026 can be seen. The winter of 2025-2026 had been relatively mild, with minimum snowfall near the glacier. This resulted in ideal conditions for measuring the glacial snout and photographing the forefield, as the terminus of the glacier and the landscape was relatively well visible due to limited snow cover. In the days leading up to the fieldwork and on the day itself, the temperature was below freezing, reducing the flow of water in the forefield and allowing easier and safer access to the terminus.

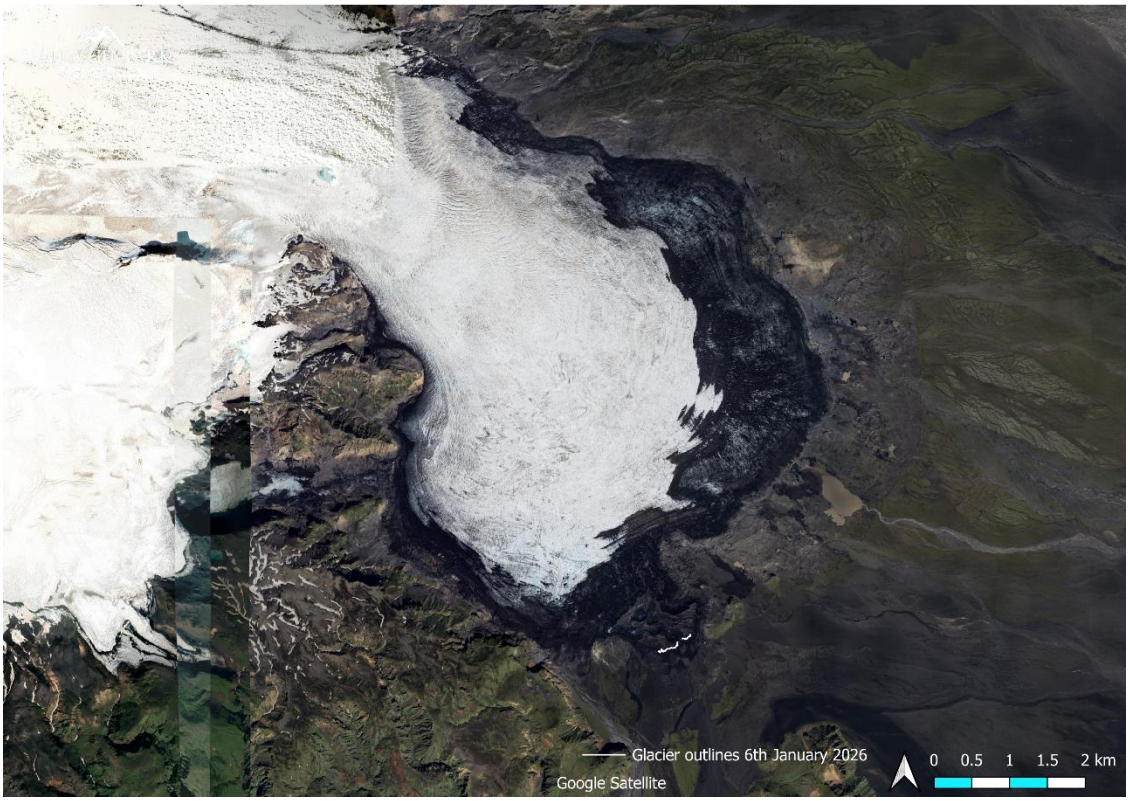

Figure 2. The map shows the measured line from 6th of January 2026 of the south-eastern part of Kötlujökull.

Figure 3. The map shows the measured line from 6th of January 2026 of the south-eastern part of Kötlujökull.

Modern glacial history of Kötlujökull

The Holocene glacial maximum in Iceland was reached during the end of the Little Ice Age in the late 19th/early 20th century. Since then, glaciers in Iceland have been retreating. The outlines of Icelandic glaciers, derived from aerial and later satellite photographs can be found on https://islenskirjoklar.is/# and the dataset from there is used to compare the changes of Kötlujökull outlet glacier since the end of the Little Ice Age and the measurement done on the 6th of January 2026.

The evolution of Kötlujökull from circa 1890 to about 1970/1980 can be seen on figure 4. During that time, the glacier retreated between about 500-1500 meters at the glacier terminus on the flood plain.

From 1965 to 1971, a period called the Sea Ice years in Iceland, the climate in Iceland and the sea temperature around the Island were considerably colder than normal. During that period, glacier thickness grew on the main Ice caps, including Mýrdalsjökull. This increase in glacial ice caused a small resurgence in many outlet glaciers. This results in a somewhat "stable" period of the glacier edge between 1970 and the late 1990's/early 2000's (figure 5).

After the late 1990's/early 2000's, the retreat of Kötlujökull started again and has continued until today (figure 6). The rate of retreat has also increased, and the glacier thickness has decreased drastically.

The area that was measured during the fieldwork on 6th of January (figures 7 and 8), is seemingly the last remaining part of the glacier that advanced after 1970. This part of the outlet glacier (marked by the light blue circle in figure. 7) is much thicker than the modern part of the outlet glacier and it is likely that it will be detached from the outlet glacier in the next few years. Once that happens, this part of the glacier will become a large dead ice field and as the dead ice field melts, the thickness of the overlying sediments will slowly increase, until they become so thick that they slow down the melting of the underlying ice. Due to the slow melt rate of the dead ice, it is likely that the dead ice field will remain in place for decades but slowly causing large environmental and fluvial changes in the forefield of the glacier. Once this part of the outlet glacier has become a dead ice field, the retreat of the glacier in that area will be around 800 meters, giving a total retreat since the end of the 19th century of about 1980 meters. The retreat rate per year depends on when this part will be detached from the outlet glacier, but currently the retreat rate per year is about 8,5 meters per year but could increase to about 14 meters per year.

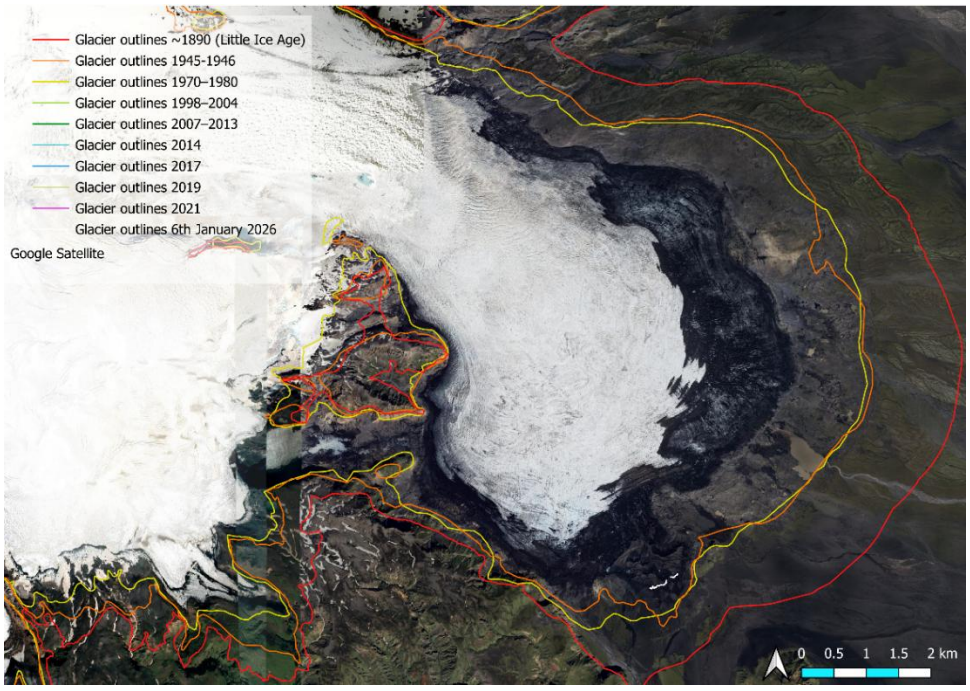

Figure 4. The map shows the evolution of Kötlujökull from circa 1890 to about 1970/1980. Data from https://islenskirjoklar.is/#

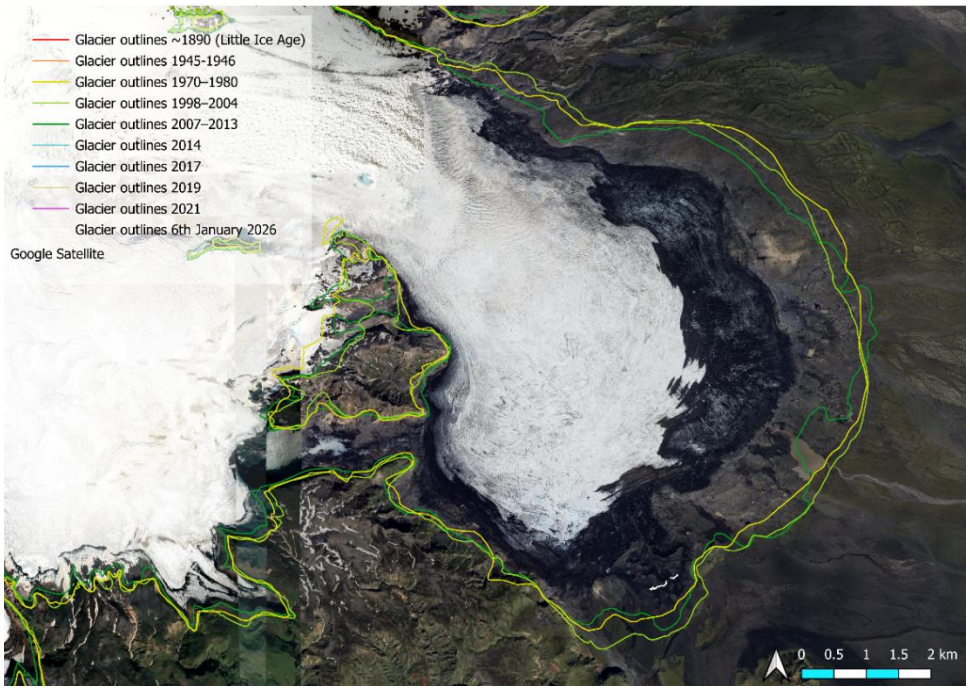

Figure 5. The map shows the outlines of Kötlujökull outlet glacier between about 1970 to the early 2000s.

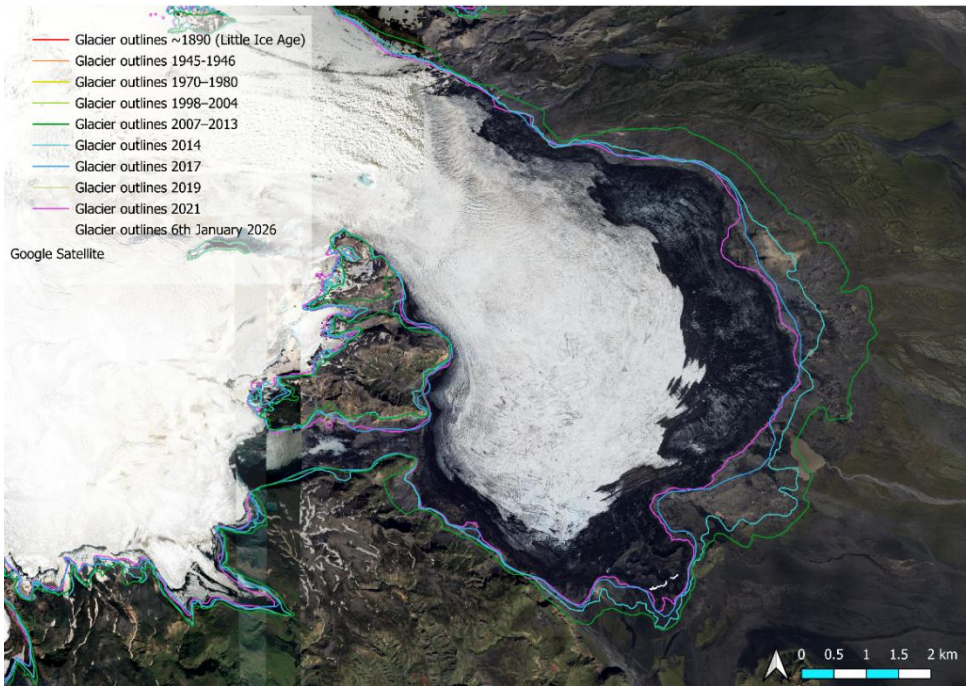

Figure 6. The map shows the outlines and the retreat of Kötlujökull from the early 2000s to 2021, with the measurement taken on the 6th of January2026 shown in white.

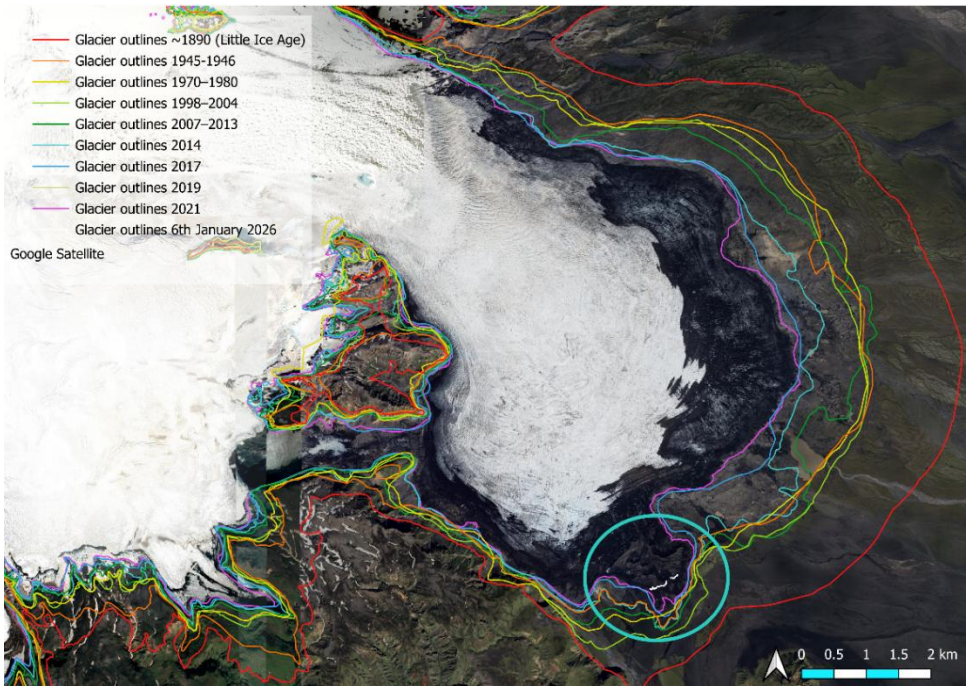

Figure 7. The map shows all the outlines available for Kötlujökull outlet glacier, including the measurement from 6th of January. The light blue circle marks the area where a part of the outlet glacier is about to detach itself from the main ice flow and a dead ice field will form.

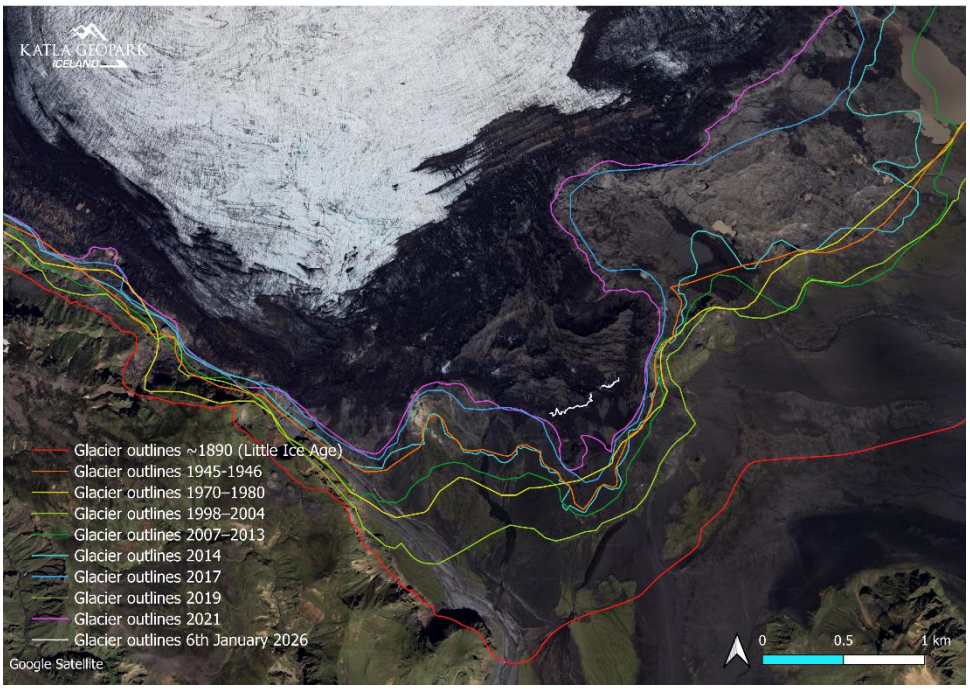

Figure 8. The map shows all the outlines available for Kötlujökull outlet glacier, including the measurement from 6th of January.

References

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