MONITORING REPORT

REYNISFJARA BEACH

Report for measurements done on
15th of June 2026 by

Colorado Academy

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Reynisfjara Beach

Reynisfjara beach, often referred to as “the black sand beach”, is about a 3,5 km long beach on the south coast of Iceland. The beach is in between two headlands, Dyrhólaey and Reynisfjall mountains and can be divided into two parts, (1) the narrow cliff beach in front of Reynisfjall mountain and (2) the sand spit that closes off the wave dominated Dyrhólaós estuary behind it (figure 1). The spit closes the outlet of the estuary during prolong periods of south-eastern wave direction, causing raised water level in the estuary that can cause widespread flooding. In the last few decades, local farmers have dug out the spit in order to open the outlet and reduce the water level. The beach is supplied by sediment movement from the west to east and erosion of the headlands of Dyrhólaey and Reynisfjall. A small bypass is around the horn of Reynisfjall mountain where sediments can be transported west to east, but it is believed that there is no transport from east to west (DHI, 2022). The beach is therefore supplied with sediments during south-western waves, while erosion will occur during long periods of south-eastern waves.

Figure 1 shows the extent of Reynisfjara beach, along with the seven profiles on the eastern side of the beach, Dyrhólaey promontory, Dyrhólaós estuary, and Reynisfjall mountain.

Reynisfjall and Dyrhóley are both a tuff mountain (tuya) that were formed in a volcanic eruption under a glacier and/or in the sea. The lower part of Reynisfjall mountain is made from palagonite breccia, i.e., volcanic ash that has a lot of larger rock fragments within itself, interbedded with intrusions of fully crystallized basalt. The upper part of the mountain is then made of palagonite tuff and breccia, and finally several layers of lava cover the top of the mountain. During large storms and when the cliff beach is unusually short, there is wave undercutting of the cliff face. The undercutting causes regular rock collapses and has formed several small sea caves. There is a large intrusion of fully crystallized basalt at the western end of the cliff, and due to it being more resistant to erosion the columnar basalt protrudes further out than the rest of the cliff face. This causes increased erosion on the lee side of the columns during south-easterly waves.
The nearby Reynisdrangar sea stacks are a similar formation and used to be a part of the mountain, but wave erosion has eroded the weaker palagonite breccia that used to surround them. The palagonite can still be found high up on the stacks where the waves are unable to reach it.
The beach recently underwent a major erosional event which was caused mainly by an unusually long period with prevailing south-eastern wave direction and unusually high (wave height) from that direction as well. This period started at the end of November 2025 but reached its peak in late January and early February 2026. The wave direction caused erosion on the beach, meaning that the beach got much shorter and lower than it was before. The erosion also reached the long-term stable part of the upper beach and beach ridge (where the rocks and vegetation are located). In March, the wave direction changed to south and southwesterly, with several storms where the wave height reached above 5-6 meters. This caused more erosion of the long-term stable part of the beach causing damage to infrastructure close to the beach. The erosion also caused a considerable change in grain size of the beach. Before the erosion the beach was a mixed beach, with the main grain size being sand and gravel, but after the erosion the beach was a gravel beach. Erosion of this magnitude has not happened at Reynisfjara in the last few decades, but the beach has gradually been retreating since the early 1900's (Jónsdóttir and Sigurðarson, 2023).

Objectives of Monitoring Reynisfjara beach

The objective of the monitoring program for Reynisfjara beach is to document the morphological and environmental changes at Reynisfjara beach. Seven profiles are on the eastern part of the beach (figure 1 and 2) which monitor any changes to the beach width and volume. The profiles are measured monthly during spring tide. The profiles are measured by using GTS-6 TopCon GPS devices with accuracy of about ± 1 cm. Along with measuring the beach profiles, photos and drone photos are taken of the beach itself and the environment behind it.

The seven profiles cover the cliff beach and the easternmost part of the spit, which is the most dynamic part of the beach with the largest response to storms and other extreme events. This part of the beach is also the most popular part for tourists, due to its proximity to the basalt columns of Reynisfjall mountain and the nearby Reynisdrangar sea stacks, and it is therefore more important to monitor this part of the beach than others as large changes in morphology of the beach can increase the risk for visitors.

The aim of the drone and camera photos is to document changes on the beach and its surroundings, with a focus on the cliff face of Reynisfjara to monitor its slope stability.

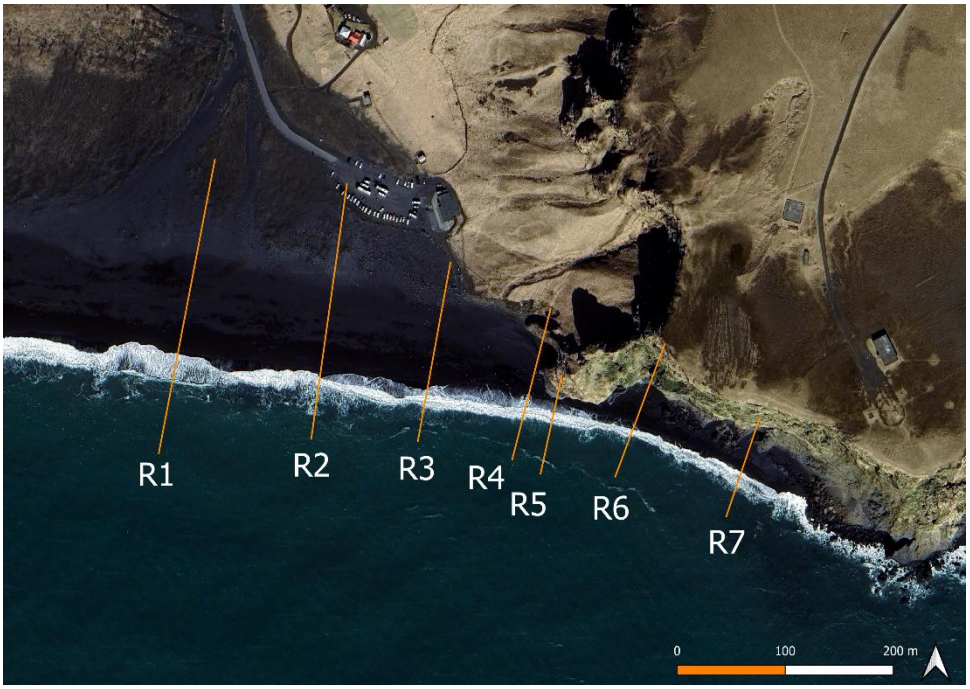

Figure 2 shows the seven profiles at Reynisfjara. Profiles 5-7 have not been accessible since the start of the erosional event in 2026 and were therefore not measured during the fieldwork on 15th of June.

Field work on the 15th of June 2026

A measurement of profiles R1-R4 were made on the 15th of June, along with drone footage of the beach and its surroundings and ground photos of the beach. Profiles R5-R7 were not measured as they are still inaccessible since the erosion of the beach in early 2026. The measurement was made by a student group and teachers from Colorado Academy. Participants from them were:

Akleema Abdullahi, Chad Akhavan, Dawson Craig, Oliver Dias, Holly Fergason, Matthew Gustavson, Vaughn Hvercrott-Miller, Jackson Hersch, Samantha Hodges, Dominic Lish, Beckett Maron, Thanh-Binh Nguyen, Hallie Solomon, and Layla Zisler. They were accompanied by Ann I. Peters from Katla Geopark and Dr. Ailsa Guild from Katla Centre for the fieldwork.

Figure 3 shows the participant from Colorado Academy that carried out the fieldwork at Reynisfjara beach on the 15th of June, 2026.

Results from field work on the 15th of January 2026

The results of the field measurements can be seen on the figures 4-6 and table 1-4, and the data collected during the fieldwork is available from here:

https://www.dropbox.com/scl/fo/0sk0qx8ar654ao27u9goy/ACzMdfOsHZRiPhLo_ufuNPY?rlkey=fbww2z319z6tlqwjeydk8pxev&st=3e9t819x&dl=0

On figure 4 the four profile measurements from the 15th of June can be seen along with the previous most recent measurement at Reynisfjara, which was done on the 15th of May 2026. Since the measurement in May, profiles R1, R2 and R3 have gotten wider and increased in volume (figure 4 and tables 1-3). The addition to the profiles is on the lower part of the beach face, where two ridges have been formed when material has been pushed up the beach face. Litle to no change was measured on the upper beach face and the beach ridge on the three profiles, as the uprush of waves has not been able to reach that part of the beach since earlier in the year. There is also little to no sand present on the lower part of the beach that can be transported by wind higher up the beach. On figure 5 the profile measurements in 2026 can be seen along with profile measurements from September 2022 and 2024. The change in beach width and volume for the same period can also be seen on figure 6 and tables 1-4. After the extensive erosion that the beach underwent during February and March 2026, the beach has slowly started to recover, especially in beach width. The volume has slowly been increasing as well, but growth of the upper beach face, creation of a berm, and the start of the beach ridge recovery has not started. Profile R4 seems to be behaving a bit differently than profiles R1-R3, as the profile lost a significant amount of volume and width between the measurements in May and June. The profile's proximity to the protruding columnar basalt plays a large role in how the profile evolves, as it amplifies the wave energy that the profile is exposed to, causing erosion there when the wave direction is from south-east. The profile therefore responds quicker than the other profiles to changes in wave direction. There were several periods between the last two measurements where the wave direction was from south-east and is the likeliest cause for the setback of the recovery of the profile.

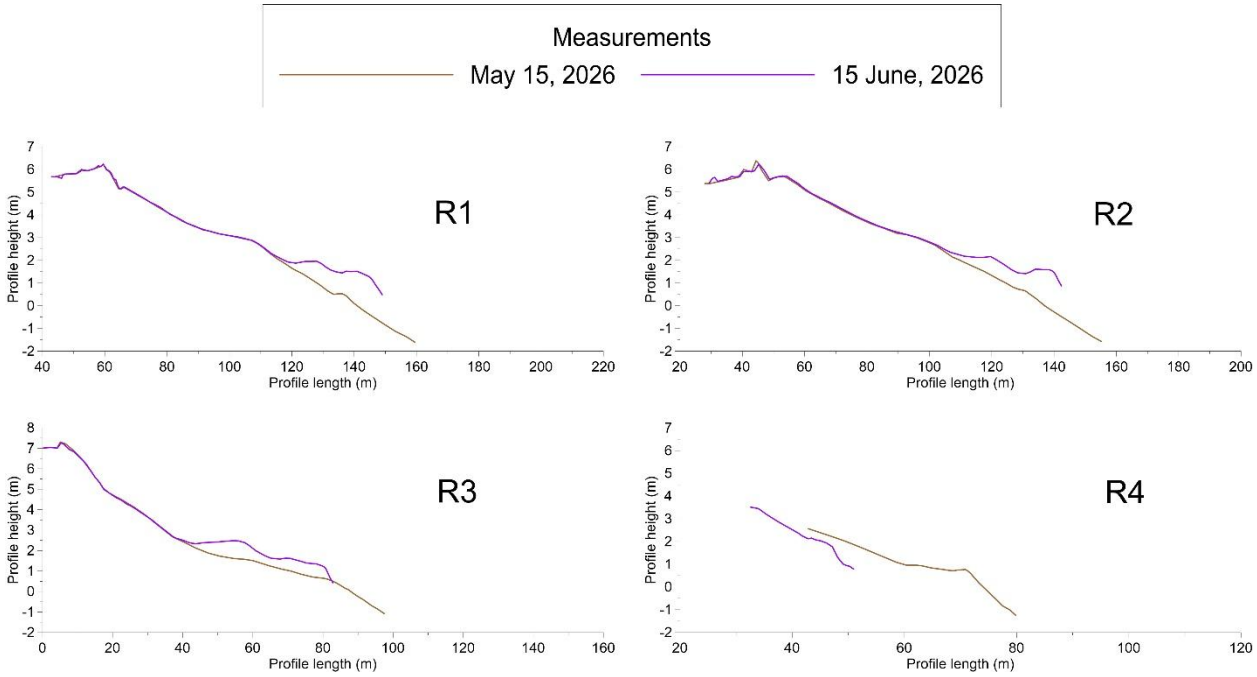

Figure 4 shows the results of the measurement on 15th of June (purple) and the previous measurement before that on the 15th of May (gold).

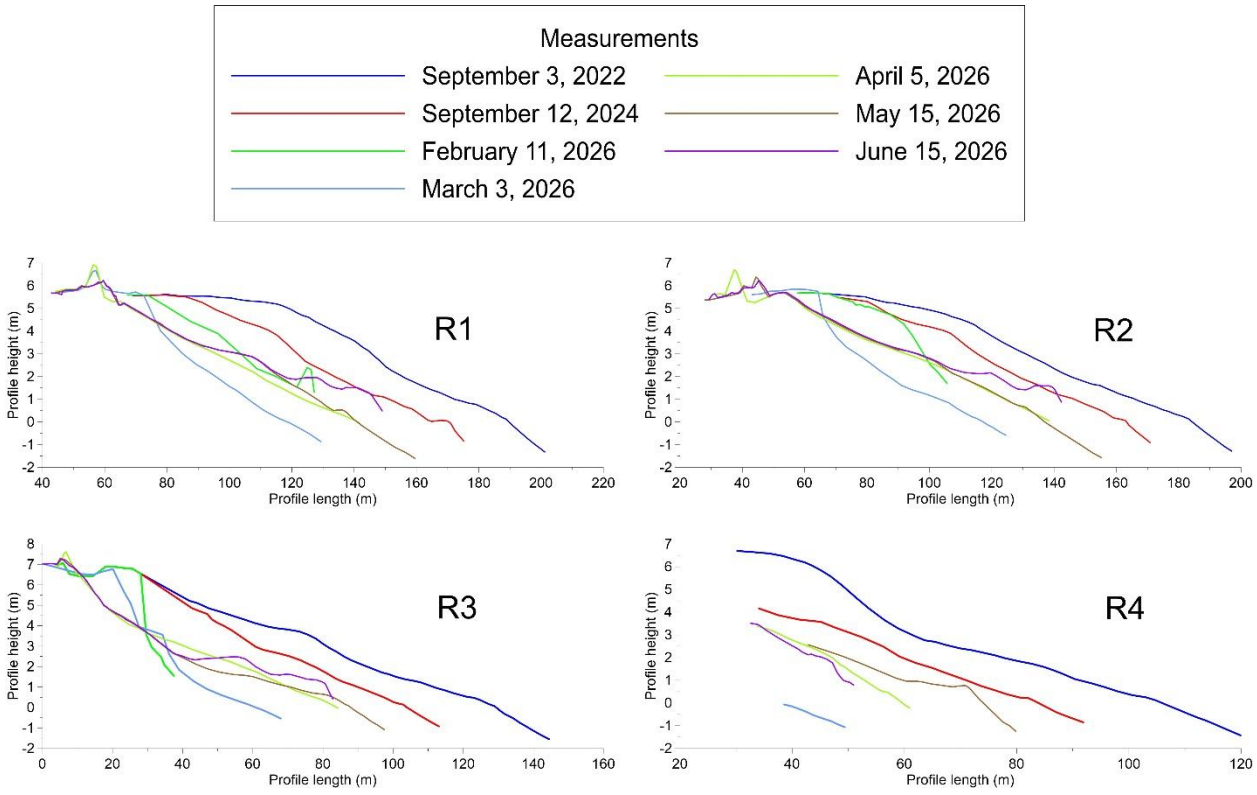

Figure 5 shows the results of measurements of the profiles at Reynisfjara beach, since 2022.

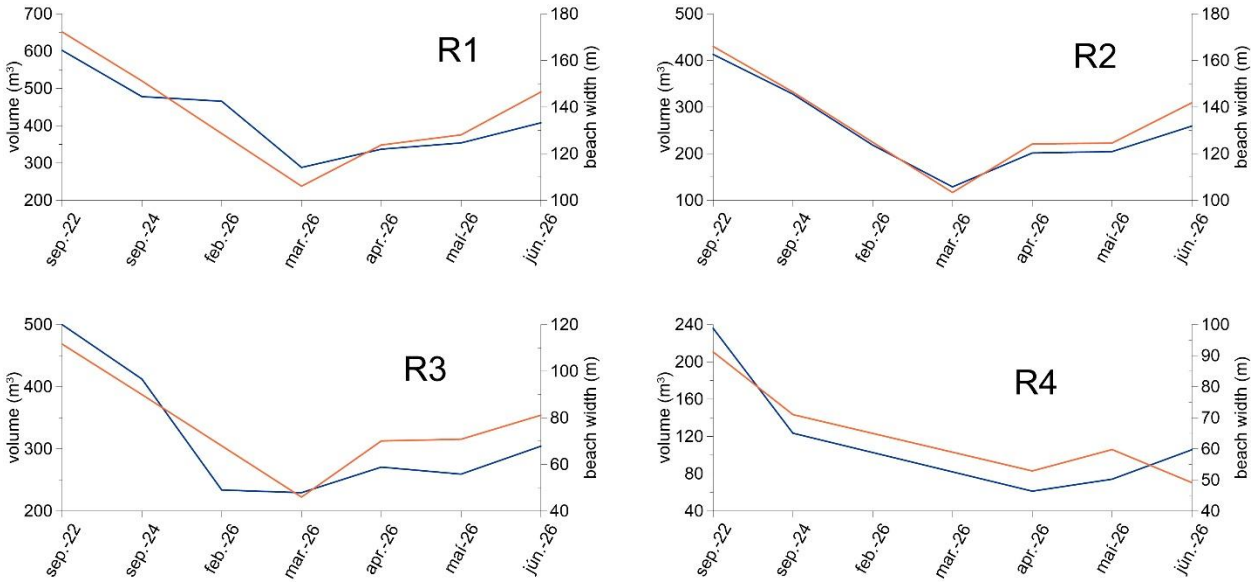

Figure 6 shows the changed in beach width (m) and volume (m3) of profiles R1-R4. The minimum in beach width and volume was reached in February and March 2026, but since then the beach has been slowly recovering.

Table 1-2 shows the changes in beach width (m) and volume (m3) for the four profiles that were measured on the 15th of June 2026. Beach width is calculated at 1m height, but during the measurements were that depth was not reached, the label reads NA.

Profile R1	Beach width (m)	Difference since sept 2022 (m)	Change between measurements (m)	Volume (m3)	Difference since sept 2022 (m3)	Change between measurements (m3)
sep.22	172,2			602		
sep.24	151,2	-21,0	-21,0	478	-124	-124
feb.26	NA	NA	NA	466	-137	-13
mar.26	106,1	-66,2	-45,2	288	-314	-177
apr.26	123,7	-48,5	17,7	337	-265	49
maí.26	128,1	-44,2	4,3	354	-248	17
jún.26	146,5	-25,8	18,4	408	-194	54

Profile R2	Beach width (m)	Difference since sept 2022 (m)	Change between measurements (m)	Volume (m3)	Difference since sept 2022 (m3)	Change between measurements (m3)
sep.22	166,0			413		
sep.24	146,5	-19,6	-19,6	328	-85	-85
feb.26	NA	NA	NA	218	-195	-109
mar.26	103,3	-62,7	-43,1	129	-284	-90
apr.26	124,2	-41,9	20,8	202	-212	73
maí.26	124,6	-41,5	0,4	204	-209	3
jún.26	141,9	-24,2	17,3	259	-154	55

Table 3-4 shows the changes in beach width (m) and volume (m3) for the four profiles that were measured on the 15th of June 2026. Beach width is calculated at 1m height, but during the measurements were that depth was not reached, the label reads NA.

Profile R3	Beach width (m)	Difference since sept 2022 (m)	Change between measurements (m)	Volume (m3)	Difference since sept 2022 (m3)	Change between measurements (m3)
sep.22	111,6			500		
sep.24	90,0	-21,7	-21,7	412	-88	-88
feb.26	NA	NA	NA	234	-266	-179
mar.26	46,0	-65,7	-44,0	229	-270	-4
apr.26	70,1	-41,6	24,1	271	-229	41
maí.26	70,8	-40,8	0,7	259	-241	-11
jún.26	81,1	-30,5	10,3	304	-196	45

Profile R4	Beach width (m)	Difference since sept 2022 (m)	Change between measurements (m)	Volume (m3)	Difference since sept 2022 (m3)	Change between measurements (m3)
sep.22	91,2			236		
sep.24	71,0	-20,2	-20,2	123	-113	-113
feb.26	NA	NA	NA	NA	NA	NA
mar.26	NA	NA	NA	NA	NA	NA
apr.26	52,9	-38,3	-18,1	61	-162	13
maí.26	59,8	-31,4	6,9	74	-130	32
jún.26	49,1	-42,1	-10,6	106	-236	-106

Drone and camera photos were taken during the measurement and can be accessed by the link mentioned above. Few of the photos were selected to be in the report as they show clearly the status of the beach and its surroundings.

On figure 7 the erosion scarp that formed at the base of Reynisfjall mountain in February and March can be seen. The scarp is still unstable and periodically there are small collapses from its side. A recent collapse was captured in the photo, seen as a darker material than its surroundings in the scarp. The basalt columns are still protruding into the sea, even at low tide, but before the erosion in early 2026 the beach extended well beyond them. Figure 8 shows the central and western part of Reynisfjara beach, with Dyrhólaey in the distance and the Dyrhólaós estuary on the right. The western part of the beach did not erode to the same extent as the eastern part did in early 2026 and has mostly recovered its beach width.

One of the objectives of the monitoring at Reynisfjara beach is to observe the slope stability of the cliff face of Reynisfjall mountain. There have been several rock collapses from the mountain in the last few decades, and the most recent one was in 2019 (MBL, 2019). These collapses occur due to wave undercutting of the cliff of Reynisfjall during severe storms, and erosional events like occurred earlier in 2026, which weaken the stability of the

Figure 7 shows the erosional scarp into Reynisfjall, the basalt columns and the cave, along with the beach itself. Before the erosion event in 2026, the beach extended well beyond the basalt columns and the eastern part of the beach was easily accessible.

Figure 8 shows the central and western part of Reynisfjara beach, with Dyrhólaey promontory in the distance.

overhanging rock. It is therefore likely that there will be several rock collapses in the coming years. At least three collapses have already happened in 2026 and one of them happened during the measurement of the beach on the 15th of June. That collapse happened between 10:37 and 10:55 on the 15th of June, as a drone photo that was taken at 10:37 (figure 9) shows no fresh debris on the beach, while a drone photo taken at 10:55 (figure 10) shows fresh debris on the beach and a small scar on the cliff face. The exact size of the collapse is not known, but it was not very large (figure 11) and seems to consist mostly out of smaller rocks and soil. Since then, however, there has been more collapse from the same ledge on the cliff face, and the entire ledge has collapsed. This collapse was much bigger (figure 12) and it was fortunate that that part of the beach has been inaccessible as the collapse would have

An older rock collapse was also discovered using the drone photos that were taken on the 15th of June (figures 13 and 14). A small ledge broke off from the middle of the cliff at Reynisfjall. The timing of this collapse is not known but occurred at some point between 11th of February and 15th of June.

Figure 9 shows the cliff face of Reynisfjall at 10:37 on the 15th of June. There is no fresh rock deposit on the beach at that moment.

Figure 10 shows the cliff face of Reynisfjall and the beach below. The photograph was taken at 10:55 on 15th of June. There is fresh debris on the beach and a new scar in the cliff can be seen as well.

Figure 11 shows the cliff face of Reynisfjall at 11:11 on the 15th of June. Fresh debris can be seen on the rocks on the left and the scar on the cliff can be seen as well.

Figure 12 shows the new rock collapse from Reynisfjall mountain. The photo was taken on the 3rd of July 2026.

Figure 13 is a photo taken on the 15th of June, where the ledge (upper white circle) has broken off from the cliff and there are three large rocks on the beach below (lower white circle).

Figure 14 is a drone photo that was taken on the 11th of February, where the ledge (upper white circle) is still attached to the cliff and there are no large rocks on the beach below (lower white circle).

References

DHI, 2022. *Littoral Processes in Vík*. Project No 11826653, Report for IRCA

Jónsdóttir, I. and Sigurðarson, S., 2023. *Strandlínubreytingar á Suðausturlandi frá 1903 til 2021*. https://wp-beta.vegagerdin.is/wp-content/uploads/2024/02/nr_1800_927_strandlinubreytingar-a-sudausturlandi-fra-1903-til-2021.pdf

MBL, 2019. "Stór skriða fell úr Reynisfjalli" mbl, 20. ágúst 2019, sótt 6. Júlí 2026, https://www.mbl.is/frettir/innlent/2019/08/20/stor_skrida_fell_ur_reynisfjalli/