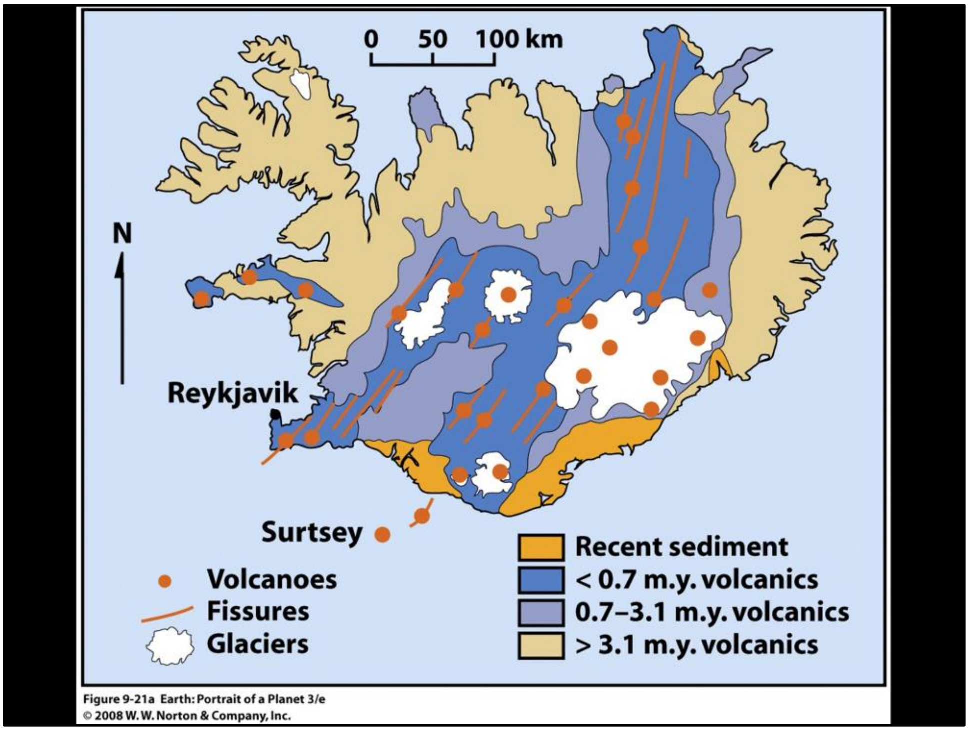
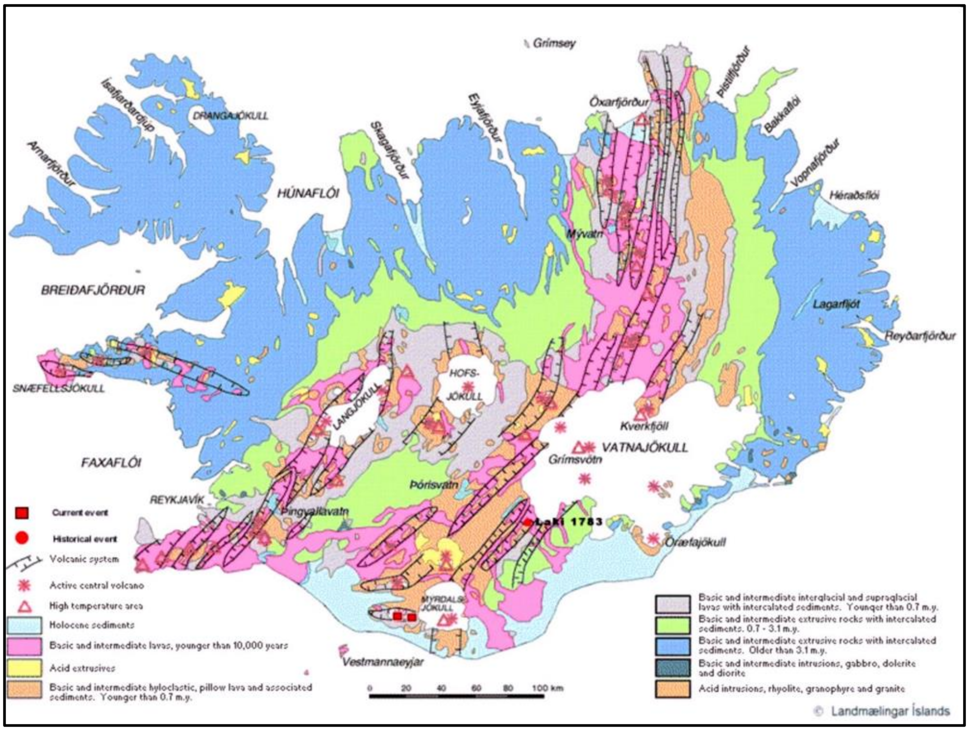


Simplified geologic map of Iceland. The oldest Tertiary rocks are shown in light brown. These are pre-Pleistocene flood basalts that were erupted over relatively featureless flat lava plains. The purple areas are older Pleistocene eruptives. Volcanics of the last ice age to recent are shown in blue, with major eruptive fissures and volcanoes shown. Holocene sediments, mostly sand plains on the south coast, are shown in orange.



This is a slightly more detailed map than the previous one, which shows extensive areas of felsic intrusive and extrusive rocks, in yellow.

Pre-Pleistocene volcanics, showing thick, continuous lavas suggestive of flow over rather featureless, flat lava plains. The layers are tilted because of later deformation.

Fissure eruptions under the glacial ice melted lakes. If the water depth was relatively shallow, the basalt fragmented into a mixture of glass, crystals, and partially hydrated glass called palagonite or, more generally, hyaloclastite. These irregular hyaloclastite ridges are common in the volcanic zones.

Hyaloclastite deposits on the east side of Miðfell, on the east side of Þingvallavatn. This volcanic edifice was produced as the ice was thinning, resulting in an episode of decompression-induced primitive (picritic) volcanism. This is a view looking up toward the ridge. The core of this hill is made of pillow lavas, shown below, and the hyaloclastites are the outer covering.

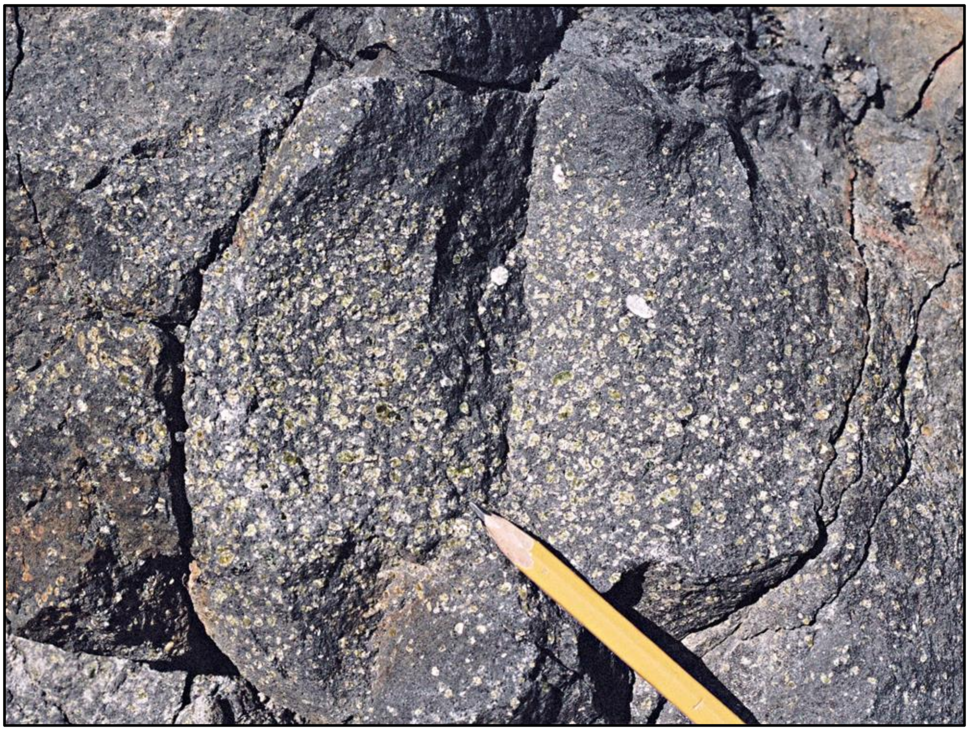
On the left is a hyaloclastite ridge on the west side of the Hengill high temperature hydrothermal field. View is to the north across Þingvallavatn. The pipe in the near ground carries hot water to Reykjavík for heating purposes. There is also a geothermal power plant just to the right of this picture. Miðfell is the dark hill across the lake on the extreme right of the photo.

A small spatter structure on the top of the Hengill hyaloclastite ridge in the photo above. This spatter structure suggests that this ridge was emergent from the water at this level during eruption, either because of draining of the intra-glacial volcanic meltwater lake, or because of thin ice at the time of eruption. Higher mountains in the Hengill region are visible in the back. Man is Reidar Trønnes of the Iceland Volcanological Institute, Reykjavík. He was leader of this trip in the summer of 2001.

Pillow lavas in hyaloclastite matrix. If the water depth is great enough, the lava tended not to fragment and instead formed pillow lavas. This outcrop on the quarry face at Stapafell on Reykjaness. Note that this photo was taken in 1975 and by 2001 this volcanic feature had been nearly quarried away . Don't worry, there are plenty of others and certainly more to come.

Pillow lavas on the southeastern side of Miðfell, east of Þingvallavatn. Hammer at the bottom of the photo is ~40 cm long, so the largest pillows shown here are ~1 m across. In this outcrop there is almost no fragmental material.

Closeup view of one of the Miðfell pillows in the photo above. The pencil crosses a horizontal boundary below which are large numbers of olivine phenocrysts that settled within the pillow while it was still hot, fluid liquid. The glassy rind of the pillow is just visible.



Closer view of the Miðfell pillow lavas. The boundary between the olivine-rich lower part of the pillow, and the olivine poor upper part, is visible ~3/4 of the way up the photo. Large white crystals are plagioclase, green crystals are olivine. Also present are gabbro xenoliths and mantle chrome diopside, presumably torn off of the magmatic conduit walls.

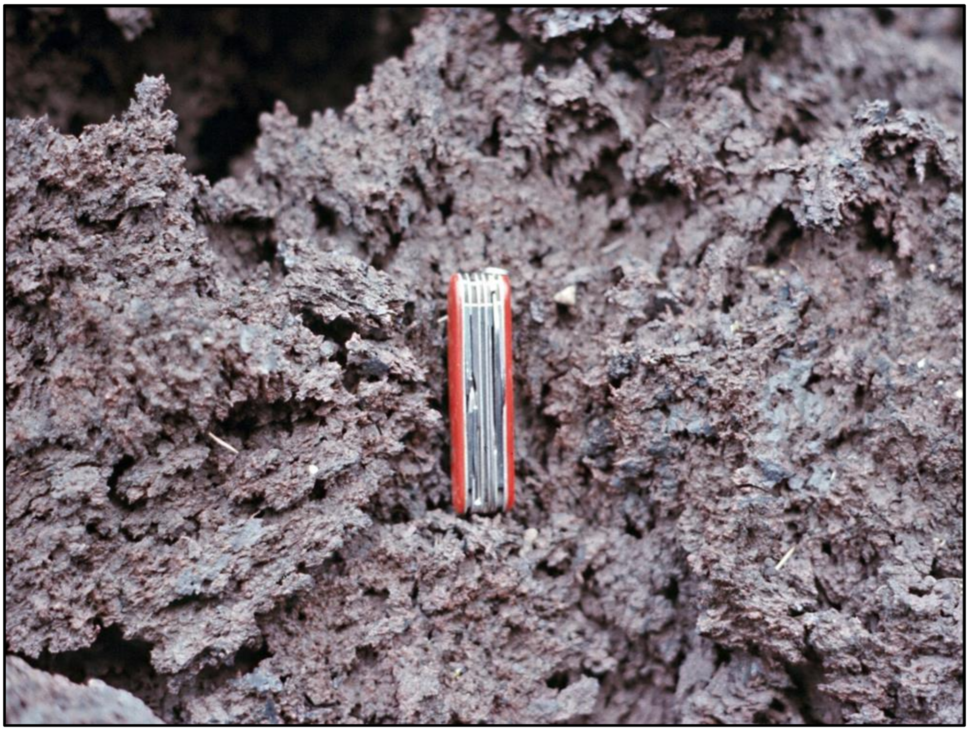
A cut section of pillow lave from Stapafell. The glassy pillow base is at the bottom, and you can see the olivine concentration increase rapidly upward. Olivine was concentrated in the lower liquid by crystal settling while it was still hot.

Shield volcano Ok, seen from the southwest. The shelf and steep slope on the right of the volcano is an ice contact slope produced during a late Pleistocene eruption on the flank of Ok. The top of the slope indicates ice thickness.

Surtsey lavas entering the sea, 1966. Commercial slide, firm unknown.

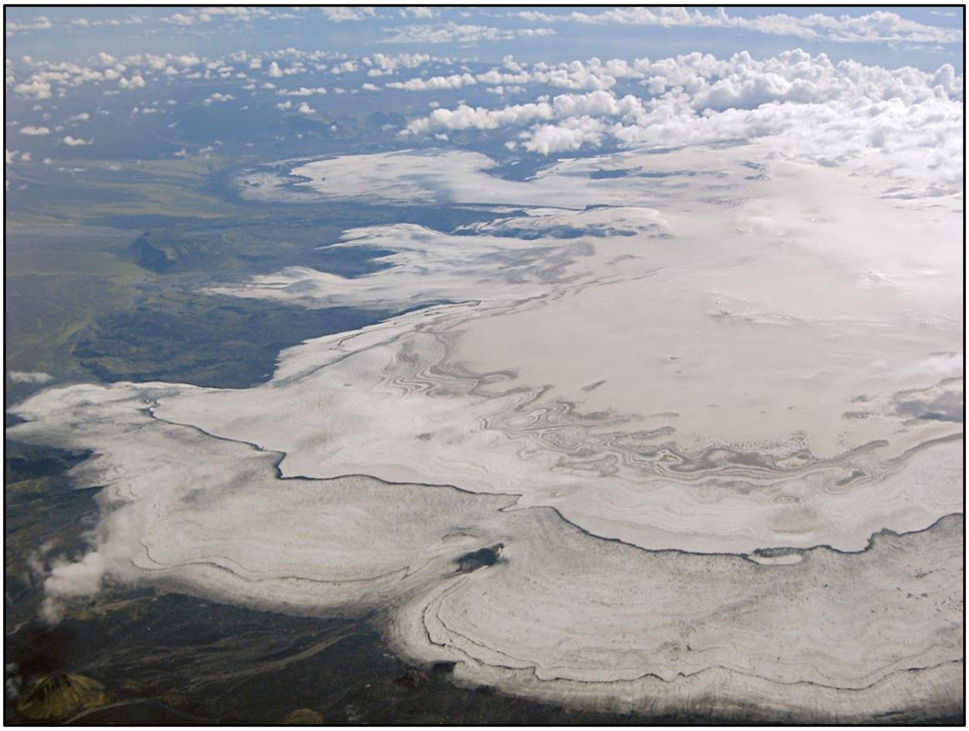
Lava flow front of the Hekla 1970 lava flow, photo taken in 2001. Hekla is enshrouded in clouds in the distance.

Flow front of the Hekla 1970 aa lava flow. Photo taken in 1973.



Pointy glass spines on the surface of an aa block in the Hekla 1970 aa lava flow.
Photo taken in 1973.

Silicic tephra erupted from Hekla.



Volcanic ash layers exposed on the ablating lower elevations of Vatnajökull, the largest glacier in Iceland.

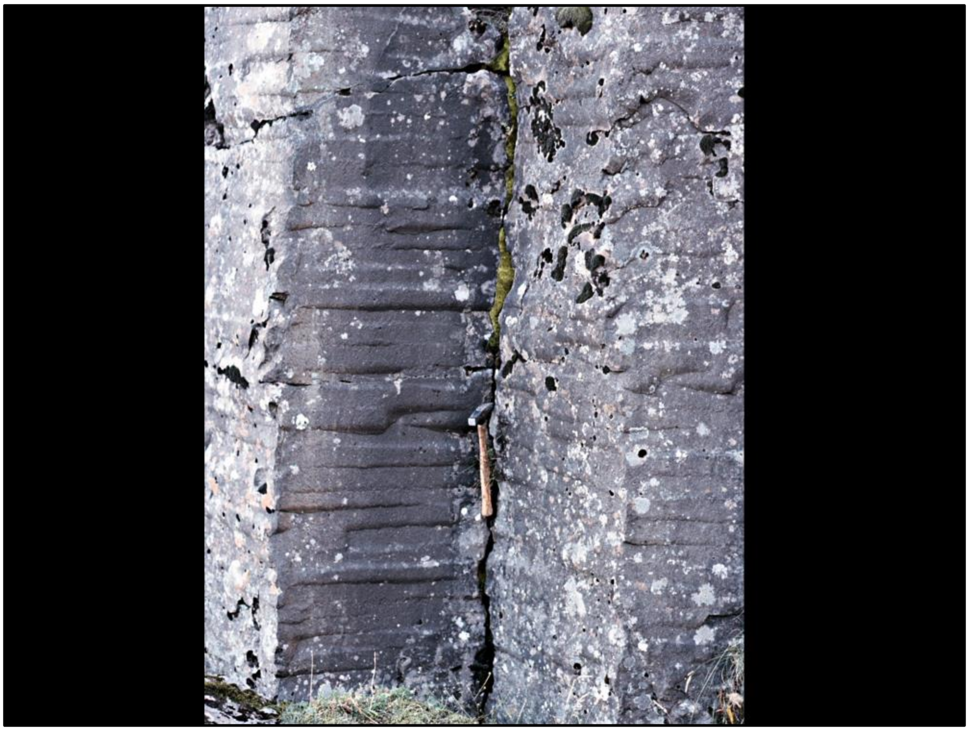
Pahoehoe lava flow front, Reykjaness.

View to the northeast from the top of the western cliffs of Þingvellir. Visible in the foreground is pahoehoe lava on the lava surface ~30 m above the Þingvellir graben floor. Faults on the east side of the Þingvellir graben are visible in the distance. The shield volcano Skjaldbreiður is visible on the skyline toward the top left.

"Tumulus"; an upwarped and broken section of solidified crust that formed on a still-flowing lava flow.

Lava tube, full of solidified lava with basalt columns that formed perpendicular to the local cooling front.

Columnar basalt in horizontal section on this glacially polished surface near Kirkubærkloister.



Columnar basalt not far to the east of Kirkubærkloister. Notice that the basalt columns formed by fracturing in rather regular steps ~5 cm high during cooling.

Troctolite xenoliths in basalt. Location not known precisely, but it is on the south coast of Reykjaness, possibly on Ogmundarhraun near Selatamgar.

View to the north along the great rift at Þingvellir. The lava plain surface is at the top of the cliff to the left, and the tilted blocks slope down to the graben floor to the right.

Spatter cone on a crater chain, looking southwest from a similar spatter cone. This crater chain is very near Reykjaness, on the very southwestern coast of the Reykjaness peninsula.

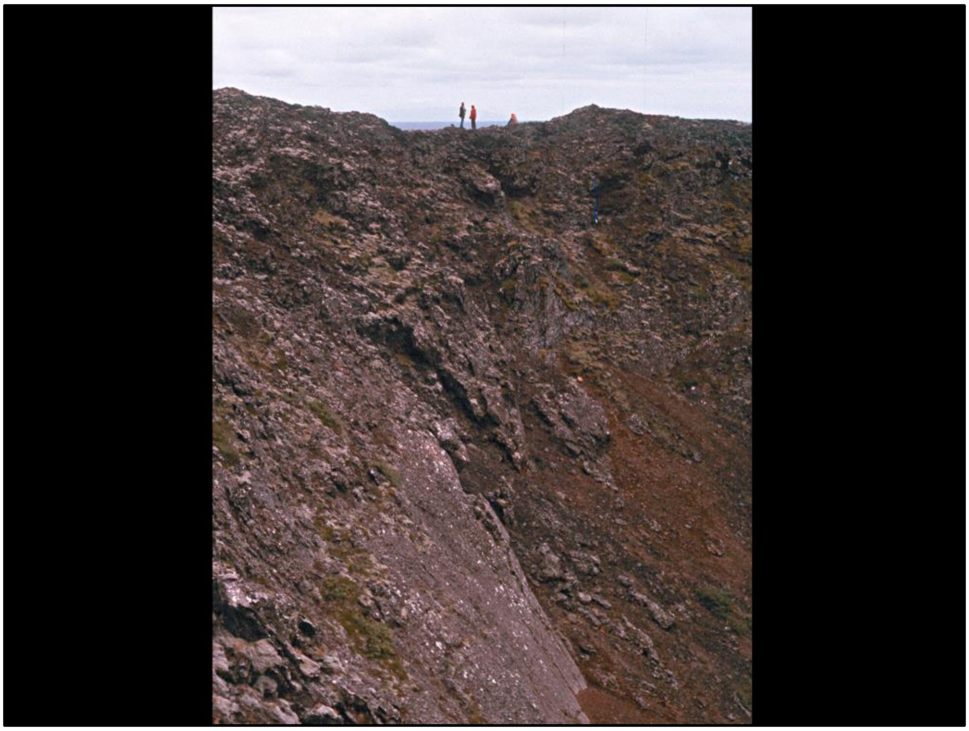
Hiking up one of the spatter cones in the crater chain of the photo, above.

Red oxidized spatter on the flank of the spatter cone pictured above.

Interior wall of the upper part of the Búrfell lava channel, just southeast of Hafnarfjörður. The lava that flowed through this channel underlies much of this city. The layering you see here was the result of successive surges of lava overwashing the channel margin, solidifying before the next wave.

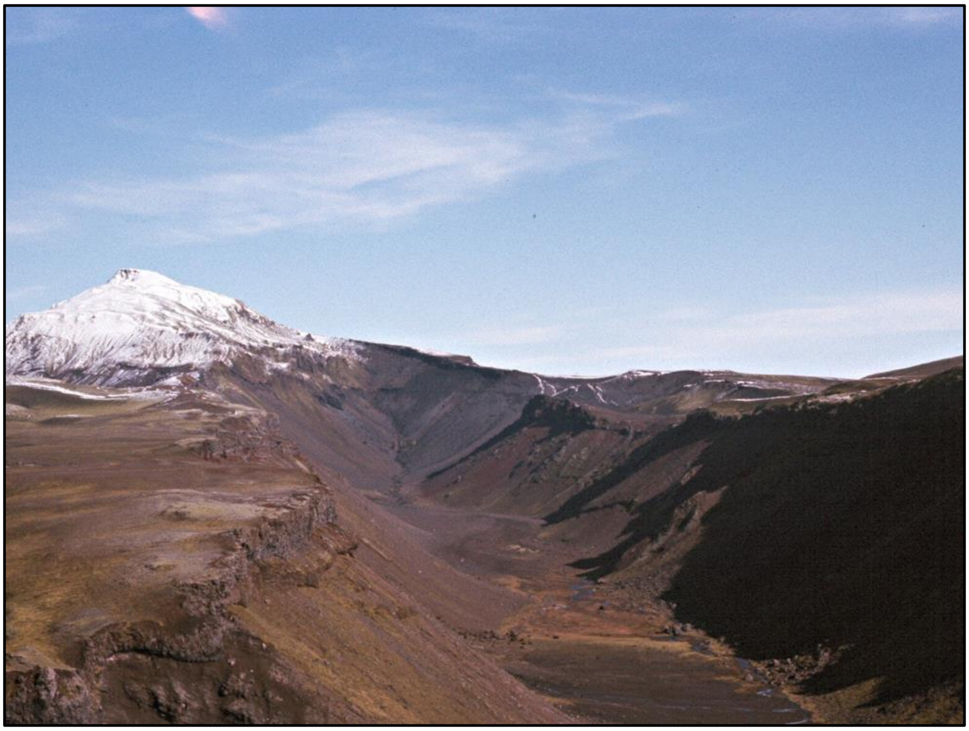
A view to the northwest from the upper part of the Búrfell lava channel, just below the source spatter cone. The steep part of the channel is in the foreground, then it turns to the right off the picture and meanders off into the distance.

Búðahraun spatter cone and lava flow on the south coast of Snæfellsnes.



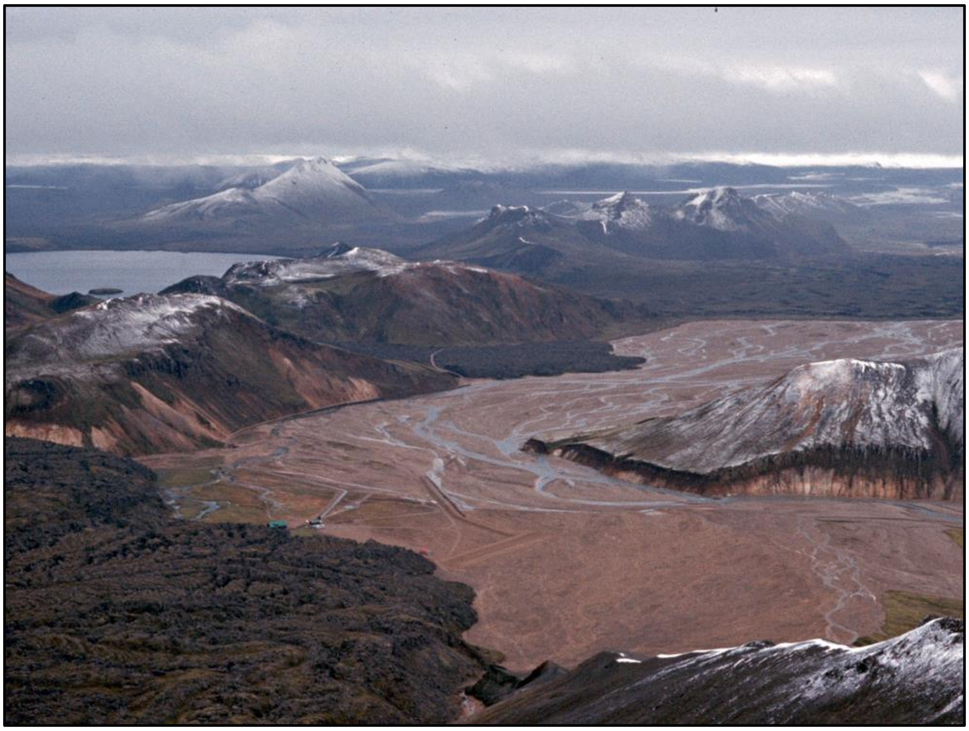
Interior rim of the Búðahraun spatter cone, with people for scale. The clear air of Iceland makes judging distances to and sizes of things difficult for people coming from hazy New England.

Small explosion crater, souteastern Iceland.



Eldgá, long explosion crater, one of many produced by the Laki 1783 fissure eruption.

Andesite cinder cone and surrounding lava flow on the northern margin of the Landmannalaugar caldara, just north of Torfajökull. This lava is supposedly a mixed magma of basaltic and rhyolitic end members, with two distinct phenocryst populations.



View to the north from the ridge just south of the Landmannalaugar campground, with the Landmannalaugar obsidian lava flow visible at the bottom left (50 m thick). Another obsidian flow is visible in the photo center, and the andesite flow is visible approximately 2/3 of the way up the photo from the photo center to the right margin. The older rocks of the ridges are hydrothermally altered.

Hydrothermally altered felsic rocks in the ridges above Landmannalaugar.

Krýsuvík hydrothermal field in 1968.

Geyser Strokkur, Haukadalur.