



Braided motivations for Iceland's first wave of mass emigration to North America after the 1875 Askja eruption

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Received: 22 December 2023 / Accepted: 26 February 2024
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Abstract

More than 14,000 Icelanders emigrated to North America between 1870 and 1914 CE. Mass movement from Iceland accelerated the year after the explosive eruption of Askja in 1875, and both contemporary and recent commentators have linked the two circumstances. Despite an abundant scholarship on Icelandic emigration in this period, the direct and indirect roles of the eruption as a possible stimulus remain unclear. Here, we engage critically with a range of contemporary source materials as well as meteorological and climatological information to re-assess where Askja fits into the picture of Iceland's first wave of mass migration. We find that emigration was undoubtedly fuelled by the hardships of Icelanders and their growing contacts with countrymen already in the Americas, and that the highest proportions of emigrants came from counties most directly impacted by the Askja eruption. However, it also emerges that the eruption served as a lever for interested parties in Britain and Canada to persuade large numbers of desirable migrants to settle in North America. Our study highlights the opportunities that discrete episodes of volcanic activity present to probe the complex interrelationships of nature and society.

Keywords Climate variability · Historical climatology · Human migration · Iceland · Interdisciplinary research · Volcanism

Communicated by Wolfgang Cramer

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Introduction

Iceland has been described as ‘the most extreme inhospitable environment in which a European people has been able to survive and maintain its culture; none has been so persistently ravaged by natural calamities’ (Tomasson 1977, p. 405; see also Kamban 1918). For centuries following its settlement (*Landnám*) by Norse and Celtic peoples in the 870 s CE, the sub-Arctic climate and its variability made pastoralism and fishing challenging: hay production was vulnerable to heavy rains; fishing to extended sea ice that blocked fjords; agriculture to late frosts and water damage; and stock rearing to unreliable supplies of feed and severe winters. But people suffered, too, from political and economic mismanagement, and lack of technological innovation (Gunnarsson 1980). Repeatedly, the Icelandic population experienced severe food shortages and outbreaks of infectious disease, with bubonic plague claiming around a third of the island's population between 1402 and 1404 CE, as did smallpox in 1707 CE. Even by 1859–1860, life expectancy was just 31.9 years for men and 37.9 for women, explained in part by an infant mortality rate of more than 25% (Tomasson 1977; for comparison, it was around 15% in England

in the second half of the nineteenth century; Williams and Galley 1995).

Further exposing the vulnerability of Icelandic society has been the land's endemic volcanism, whose impacts on demography, as well as culture, have been profound. One of the most notorious cases is the 'haze famine' associated with the 1783–1784 Laki lava flood eruption in southern Iceland, which reduced the Icelandic population by around 20% within 2 years (Kleemann 2023; Wieners 2020). Such devastation arose from the prodigious emissions into the lower atmosphere of gaseous sulphur and halogen compounds from the erupting magma. Acid rain along with high levels of fluorine deposited to the ground with ash fall-out damaged and contaminated pasturage, leading to heavy losses of livestock and severe famine (Thorarinsson 1969). Hekla is another example for the abundance of fluorine in its emissions, which have repeatedly led to deaths of grazing animals (Grönvold et al. 1983; Thorarinsson 1950). Further Icelandic lava flood eruptions implicated in societal and cultural change include the Eldgjá ('fire gorge') eruption in 939/940 CE (Oppenheimer et al. 2018), and the earlier Hallmundarhraun eruption in western Iceland (Smith et al. 2021).

More explosive eruptions of intermediate and silicic magmas have also had enduring impacts in Iceland, notably the 1362 eruption of Örafajökull (Thorarinsson 1958; Thórhallsdóttir and Svavarsdóttir 2022), which melted large quantities of ice, generating flash floods. The settlement of Hérad was destroyed, likely with significant loss of life, and was abandoned for a long period afterwards, being renamed Öraefi, signifying 'wasteland' (Thorarinsson 1958).

While it claimed no lives directly, the explosive 1875 eruption of Askja volcano in central Iceland may have had even more significant long-term repercussions as it has been implicated in the emigration of nearly 1200 people, around 1.7% of the population, who left the island for North America in August 1876 CE (Kristinsson 1983). Most of them settled in a self-governing community known as Gimli in present-day Manitoba, Canada. This 'New Iceland', situated on the shore of Lake Winnipeg, had been founded a year earlier, by some 250 compatriots who had emigrated from Iceland in 1873. The exodus intensified over the following years such that by 1914, over 16,400 people had left the island (Kjartansson and Heiðarsson 2003; Eyford 2016). Of these, nearly 14,000 settled initially in Canada, then governed by the Dominion, the federation of colonies constituting British North America. These population movements had profound impacts both in the home country and the newly settled territory.

It has been argued in numerous sources that the 1875 Askja eruption catalysed this surge in emigration owing to devastation of farmland (Bertram 2010; Eyford 2010; Mackay 2017). Vanderhill and Christensen (1963), for example,

draw on personal testimony (presumably of a descendant of the colonists) in stating the 'The eruption of Mt. Askja ... was the prime factor in their emigration.', but these and other sources also emphasise additional underlying factors, not least the poverty of a great many in Iceland in this period, that made hopes of a better life in North America a tempting prospect. For example, Brydon (2001) attributes the migration to the 'terrors of nature, combined with many other hardships'.

The principal aim of this study is to evaluate the significance of the 1875 Askja eruption for understanding the mass emigration from Iceland that took place the following year. Re-visiting this key episode in Icelandic history, we identify a range of push and pull factors likely to have provoked the profound dispersal of Icelandic society and culture that took place in the 1870s, including economic and political, as well as environmental forces. We suggest that while the calamity of the Askja eruption was likely a motive for a significant number of Icelanders who boarded the steamships bound for North America, the volcanic event may have had an equal impact by providing a cover for those seeking to gain by populating North America with white Europeans.

Materials and methods

The 1875 Askja eruption

Interpretation of detailed contemporary sources along with extensive stratigraphic, sedimentologic, and petrologic studies of the pyroclastic rock record provides a detailed picture of the Askja eruption (*Öskju eldgos* in Icelandic). The paroxysmal eruption began in the evening of 28 March 1875 (Fig. 1A) (*Fréttir frá Íslandi* March/April 1876; Mohn 1877; Sparks et al. 1981; Thoroddsen 1914), and the whole episode lasted around 17 h, evolving in eruptive style from sub-plinian to phreatoplinian to plinian as groundwater gained and lost access to the erupting silicic magma (Lupi et al. 2011). The phreatoplinian stage was accompanied by the generation of pyroclastic density currents, deposition from which was mostly confined within the large early-Holocene Askja caldera (MacDonald et al. 1987). The main plinian phase of the eruption lasted 6 h and formed a coarse-grained, poorly bedded pumice-fall deposit that accounted for around 75% of the total ejecta (Sparks et al. 1981). The total eruptive volume as dense rock equivalent is estimated to exceed 0.3 km³ (Carey et al. 2010). Evacuation of the magma reservoir triggered initial stages of formation of the Öskjuvatn crater (Fig. 1A) (Hartley and Thordarson 2013).

Eruption plumes were dispersed to the east, dictating the pattern of fallout on the ground (Fig. 1B). Contemporary eyewitnesses reported ash fall on the east coast of Iceland, 80–100 km from Askja, beginning at 07.00 h (GMT) on 29

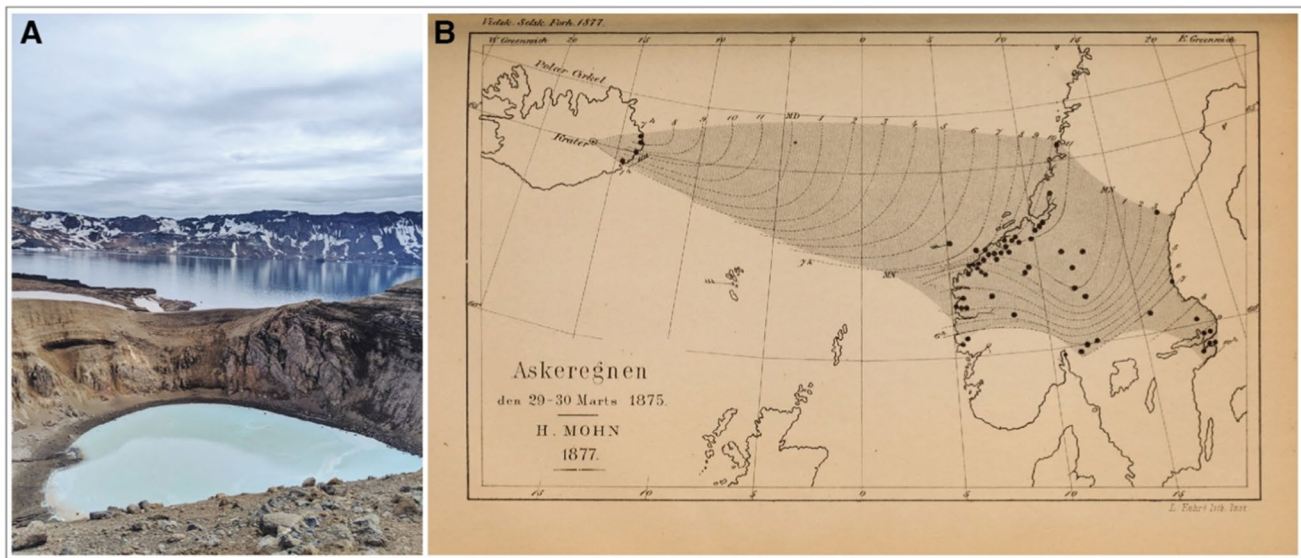


Fig. 1 **A** The Askja volcano complex in the Dyngjufjöll mountains in central-east Iceland (around 65°02' N, 16°47' W and reaching up to 1500 m asl), with the small explosive crater, Víti, in the foreground and Öskjuvatn lake, which fills most of the caldera from the 1875

Askja eruption, behind (photo by Yoad Shejtman). **B** First estimates of ash fallout (i.e. *askeregnen*) from the 1875 Askja eruption (Mohn 1877)

March; in western Norway at 21.00 h; and in Stockholm, Sweden, the following day (Mohn 1877; Thorarinsson 1981). Cryptotephra from the 1875 Askja eruption has been found in Finland (Kalliokoski et al. 2019), Poland (Kinder et al. 2021), and Latvia (Stivrins et al. 2016). The explosive eruption is associated with episodic basaltic fissure eruptions some 60 km to the north of Askja, which took place between February and October 1875 CE. These are believed to have tapped Askja's extended magmatic system and erupted a comparable volume of magma as the explosive phases (Hartley and Thordarson 2013).

Historical and natural sources for the 1870s

We reviewed a range of sources of climatological, ecological, agricultural, and societal evidence spanning the period of the 1875 Askja eruption and pertaining to the regional and wider geographical context. In addition to evaluation of synthetic works (e.g. Bergthorsson 1985; Eyford 2016; Gudmundsson et al. 2008; Kjartansson and Heiðarsson 2003; Kristinsson 1983; Mohn 1877; Sparks et al. 1981; Thorarinsson 1961, 1963), we investigated contemporary newspapers published in Canada (*Manitoba Free Press*, *Winnipeg Standard*), Iceland (*Norðanfari*, *Norðlingur*, *Ísafold*, and *Þjóðólfur*; provided through <https://timarit.is>), and the UK (several regional titles). These periodicals and pamphlets provided rich, if often biased, evidence for multiple stimuli influencing migration. Further details were drawn from online archives of the Canadian Government (<https://library-archives.canada.ca>), the Icelandic

Emigration Center in Hofsós (<https://www.hofsos.is/>), and the Vesturfarar archive in Kópavogur (<https://vesturfarar.is>). Documentary records of sea-ice extent and other climate and environmental conditions at the end of the Little Ice Age (LIA) were obtained from Ogilvie and Jónsdóttir (2000) and Ogilvie and Jónsson (2001), respectively.

Monthly temperature means were obtained from the three longest meteorological stations in Iceland that are freely available from the Icelandic Met Office (<https://en.vedur.is/>). The earliest continuous instrumental recording started in 1823 at the western station in Stykkishólmur (WMO No. 4013; 65°04' North, 22°44' West and 13 m asl), followed by first measurements in 1866 in Reykjavik (WMO No. 4030; 64°08' North, 21°54' West and 52 m asl), and 1873 in Teigarhorn (WMO No. 4184; 64°41' North, 14°21' West and 21 m asl). All temperature measurements were transformed into anomalies with respect to the 1961–1990 meteorological mean, and monthly differences between the three records were calculated to assess spatial variation in temperature changes before, during and after the Askja eruption.

Tree ring-based summer temperature reconstructions for the North Atlantic/European sector (Büntgen et al. 2020), northern and central Scandinavia (Esper et al. 2014; Linderholm and Gunnarson 2019), and the western Mediterranean (Büntgen et al. 2017) were used to assess possible large-scale cooling effects of the 1875 Askja eruption. Three central European tree-ring studies provided hydroclimatic insights into the period of interest (Büntgen et al. 2011; Büntgen et al. 2021; Tegel et al. 2020).

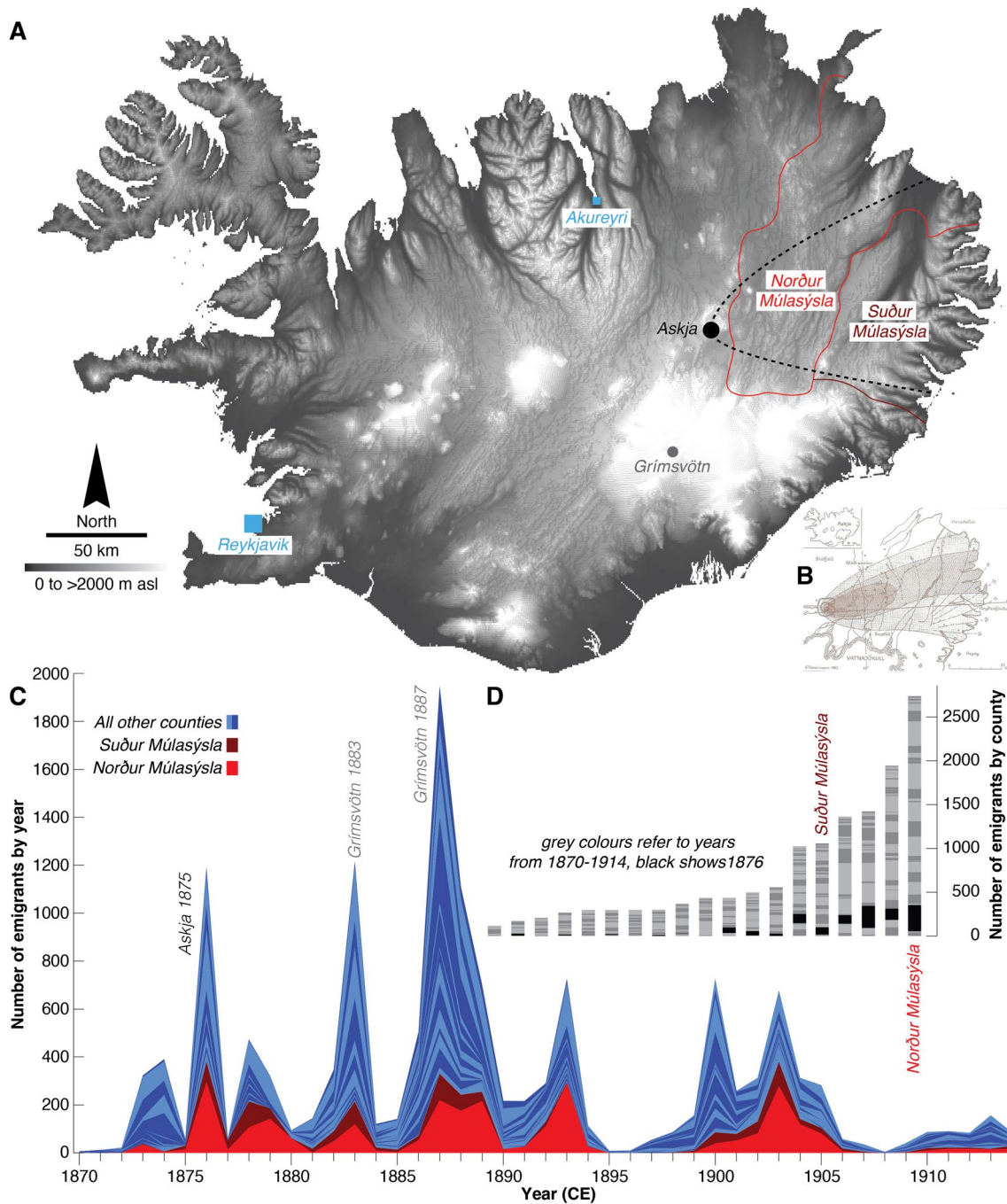


Fig. 2 **A** Location of Askja volcano in the centre of Iceland, together with its main ash fallout zone (black dashed line), and the most affected districts Norður and Suður (North and South) Múlasýsla from where most people emigrated to North America in 1876 CE (**C**, **D**). The map further shows the location of Grímsvötn volcano and Iceland's largest settlements, Reykjavik and Akureyri. **B** Calculations

of pumice and ash fallout from the 1875 Askja eruption extracted from Thorarinsson (1963). **C** Year-by-year numbers of emigrants from different districts in Iceland between 1870 and 1914 (Kristinsson 1983), and **D** the same data grouped by county, with the number of emigrants in 1876 shown in black

Results and discussion

Locations of a direct impact of the 1875 Askja eruption across eastern Iceland together with a high-resolution timeline of emigration between 1870 and 1914 are displayed in

Fig. 2. Two large groups of Icelanders arrived in Ottawa in August 1876. The first group of 741 people (170 families and 60 individuals) travelled via Scotland (Edinburgh Evening News, 7 July 1876, p. 3). Recruited by Canadian government agents, they included tenant farmers, fishermen,

and some twenty landowners, and were collected from three ports in the north of Iceland. One amongst the number had been born on the passage to Scotland. The second tranche of 402 people from the north and northeast of Iceland were deemed by a correspondent in the *Manitoba Free Press* to be of a 'far superior class' than the first contingent. A further 23 Icelanders arrived on 10 September 1876, most of whom travelled on to Gimli (New Iceland) within a week (*Manitoba Free Press*, 16 September 1876, p. 2).

In the following, we describe the interrelated economic, political, environmental, social, and cultural stimuli—both push and pull factors—that may help to explain Iceland's first emigration wave that followed the explosive eruption of Askja volcano in 1875 CE (Figs. 1 and 2).

Impacts of the eruption on farming and food security

Several contemporary sources suggest the 1875 Askja eruption was a trigger for emigration owing to vulnerability of the farming sector and its dependants, which in this period accounted for around 80% of the Icelandic workforce and three-quarters of the total population (Jónsson 1992, 1993a, b). An area of order 5000 km² was blanketed in ash more than 1 cm in thickness, extending across eastern Iceland, then said to have been one of the most prosperous parts of the island, reaching as far as the coast (Mohn 1877; Thoroddsen 1914; Thorarinsson 1963). At the time of the ashfall, the productive land was snow-free and the pasture plentiful. Collective memory of the 'haze famine' associated with the 1783–1784 Laki eruption surely stoked concern of impending food shortages.

A contemporary article (in *Fréttir frá Íslandi*, March/April 1876) records that 16 farms in Efra-Jökuldal (in the interior of North Múlasýsla county; Fig. 2A) were completely deserted, with nearly 200 others badly affected. Approximately 6–12 people relied on an average Icelandic farm in the second half of the nineteenth century, suggesting around 2000 people were directly impacted (Iceland's total population at this time was about 70,000). The situation on the ground is described in a letter written by Sigurður Gunnarsson, a priest from Hallormsstaður 90 km east of Askja. It was published in *Norðanfari* on 19 May 1875, and reprinted in *The Times* (London, 1 July 1875, p. 6) translated by Eiríkur Magnússon, sub-librarian at the University of Cambridge, UK. Sigurður's account sounds the alarm but also reveals the resilience and coping strategies of local communities:

Sigurður urged farmers not to abandon their holdings for good but rather to fight back by clearing away the ash and collecting sufficient hay from healthy pastures in summer to save some of the dairy stock. Extended abandonment would make it much more difficult to recover agricultural land, he

argued, and more pressingly, an exodus would surely overwhelm neighbouring areas thereby provoking a more severe and widespread famine. The suffering was widely reported beyond Iceland prompting fund-raising efforts in the UK, Denmark, and Norway. With lobbying led by Eiríkur and his friend, the poet and artist, William Morris, a relief committee was set up in London, led by the Lord Mayor. It collected a substantial sum sufficient to pay for a shipload of relief supplies (Harris 1978). The combined donations provided significant relief for many of the most affected and paid for fodder to help keep livestock alive over the winter of 1875/6.

The exhortations of Sigurður and others appear to have paid off as contemporary accounts indicate community resilience and effective coping strategies. *Fréttir frá Íslandi* (March/April 1876) reports that farmers in ash-free regions adjacent to the fallout zone accommodated refugees and helped to support their livestock while great efforts were made to restore less impaired farms at the first opportunity. Sheep, cattle, and horses were kept in ash-free areas, and many were led back as pastures recovered but grazing in the highlands remained very limited. Weather conditions were conducive to efforts to clear away the ash, with strong winds in spring and heavy rains in May. However, low summer rainfall reduced harvests and fodder. As a result, supplies were not sufficient to maintain herds through the winter and some livestock were slaughtered. While some of the most productive parts of the country were affected, the writer noted that had more impoverished regions been hit then they could not have coped with the disaster.

Overall livestock numbers declined only slightly following the eruption (*Heildarfjöldi búfjár eftir tegundum 1703–2020 CE*). The sheep population fell from 428,713 in 1874 to 424,121 (−1%) and to 415,339 (−2%) in 1875 and 1876, respectively, while the number of cattle dropped from 24,023 in 1874 to 22,540 (−6%) and 22,500 (−0.2%) in the successive 2 years (percentages as year-to-year changes). Some of these declines are explained by the export of animals by those who emigrated with their livestock. Despite food shortages, evidence for mass starvation following the eruption is lacking. How many of those impacted were clamouring to emigrate because of the eruption is uncertain but as a proportion of the population by district, emigration in 1876 was most pronounced in the district directly downwind of Askja, North Múlasýsla (Fig. 2).

Climatic factors

The instrumental record reveals the coldest and most unstable annual mean temperatures of the past two centuries between the 1860s and 1890s (Fig. 3). Seasonal temperature means confirm the timing of the Askja eruption at the end of the LIA (Büntgen and Hellmann 2014; Wanner et al. 2022), when interannual and decadal temperature

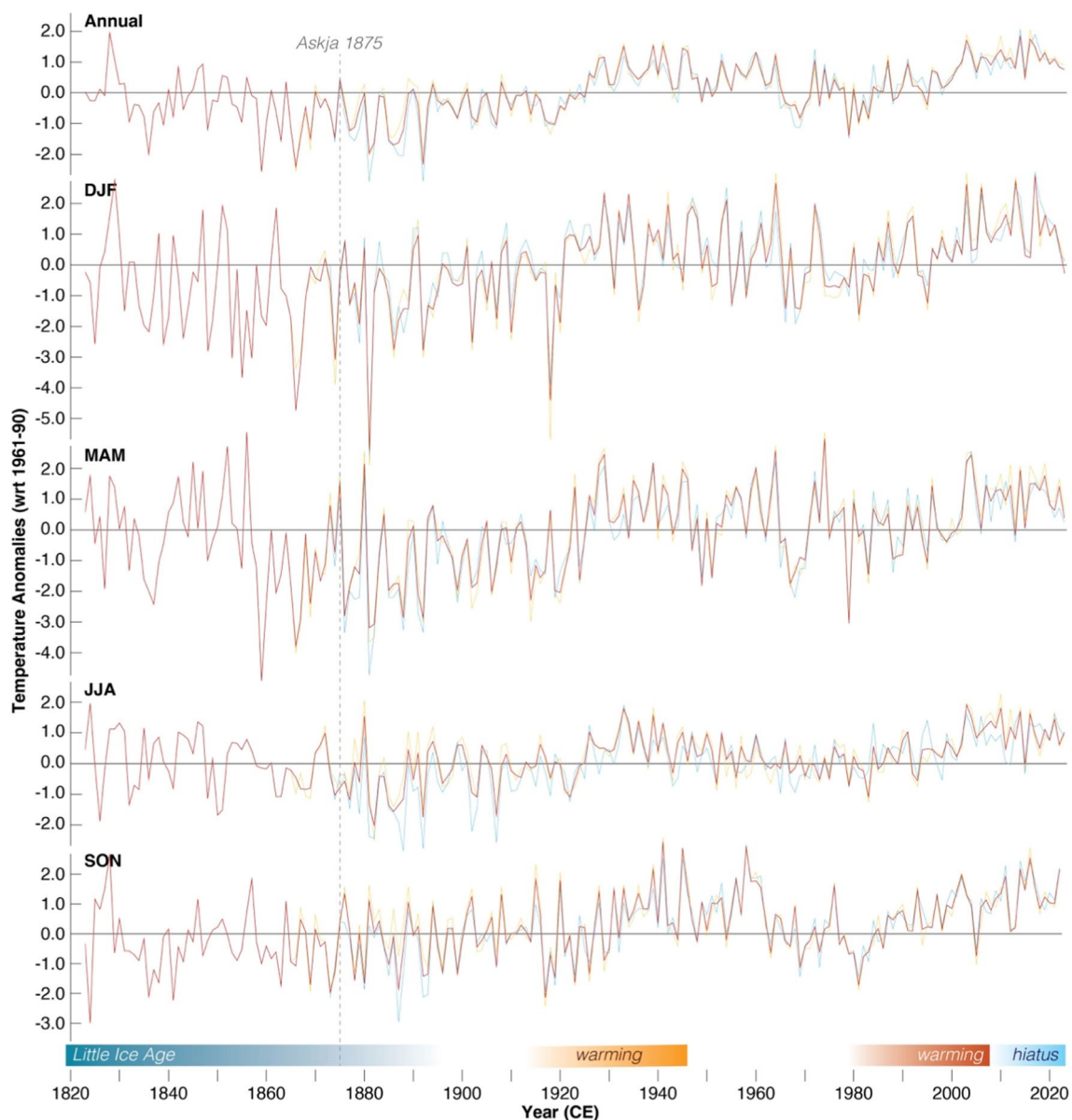


Fig. 3 Year-to-year changes in annual and seasonal mean temperature anomalies (with respect to 1961–1990) recorded at Iceland’s three longest meteorological stations (DJF=December–January–February; MAM=March, April, May; JJA=June, July, August; SON=September, October, November): Stykkishólmur in the west (orange),

Reykjavik in the southwest (green), and Teigarhorn in the east (blue), with their mean shown in red. The dashed grey line refers to the timing of the 1875 Askja eruption, and the lower colour bar denotes long-term temperature trends from the end of the Little Ice Age (LIA) to present

changes ranged well below the 1960–1991 mean climatology (Fig. 3). Multi-proxy evidence further suggests that the 1875 Askja eruption likely occurred during the coldest phase of the Holocene in the North Atlantic region (Geirsdóttir et al. 2020), where the LIA was characterised by increased year-to-year temperature and sea-ice variability that affected Iceland’s fisheries (Ogilvie and Jónsdóttir 2000; Ogilvie and Jónsson 2001). Several sources attest to disastrously low catches, the news being widely circulated.

For example, the *Manitoba Free Press* reports on 25 March 1876 that the community on the Westmann islands were starving on account of ‘unsuccessful’ fisheries. A similar note was published in the 8 October 1876 issue of *Lloyds Weekly London Newspaper*, noticeably eliding food security and migration:

The news coming from Iceland by private letters is very deplorable. The fishing season has been quite a failure, and no fewer than 1,800 Icelanders have

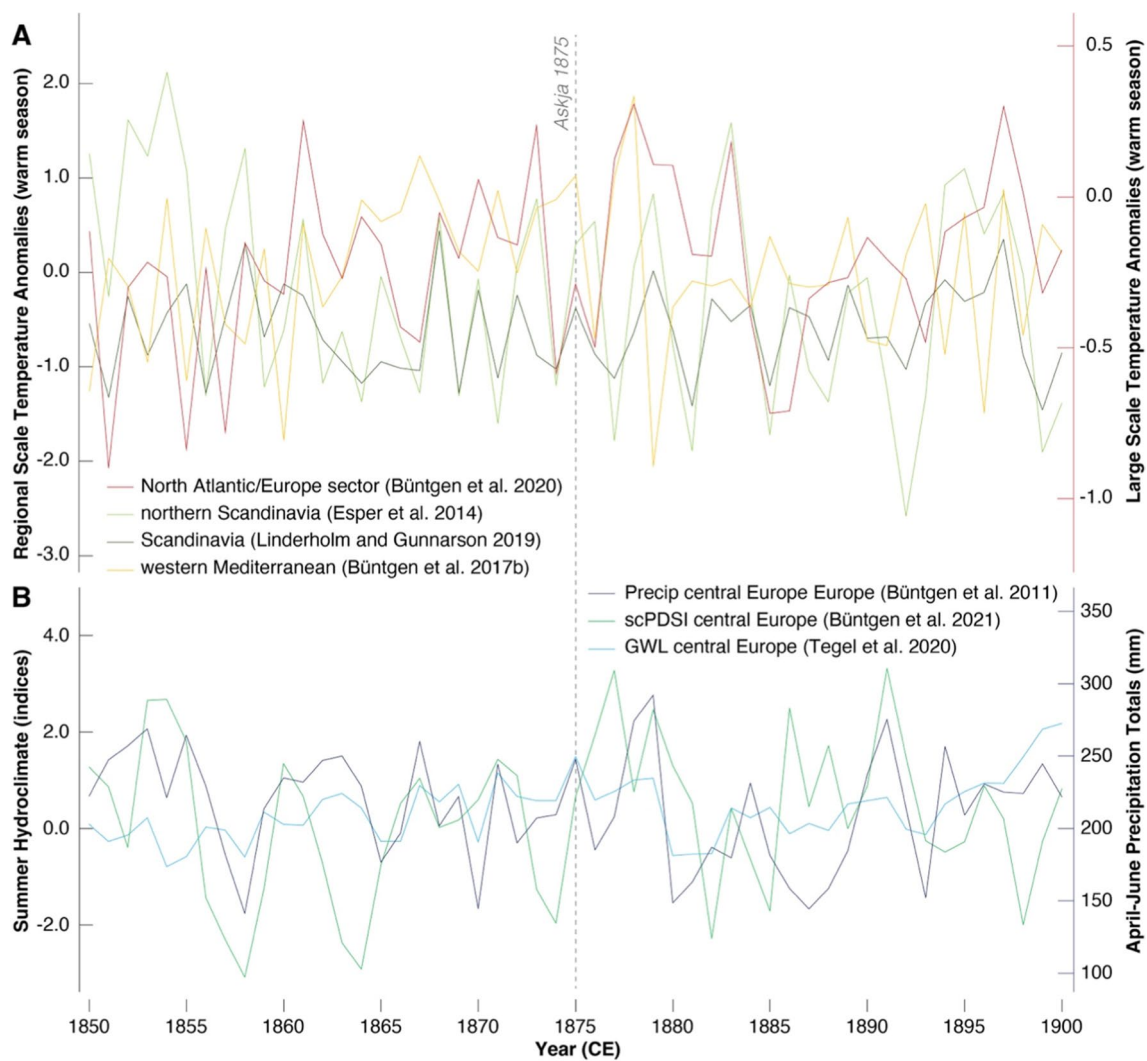


Fig. 4 **A** Warm season temperature variability over the North Atlantic/European sector derived from four tree ring-based reconstruction. **B** Warm season hydroclimate variability over central Europe derived from three tree ring-based reconstructions

emigrated to Canada. The privations of the labouring people are very great.

While the last phase of the LIA itself was likely amplified by global volcanic forcing in the nineteenth century (Brönnimann et al. 2019), there is no evidence in any of the three longest Icelandic meteorological stations in the west (Stykkishólmur), southwest (Reykjavik), and east (Teigarhorn) to suggest that the 1875 Askja eruption had any regional climate impact (Fig. 3). However, monthly means show that April temperatures of 1875 measured at the eastern Icelandic meteorological station of Teigarhorn (expressed as anomalies with respect to 1961–1990) were on average 1.5 °C cooler than those measured at the western and southwestern stations of Stykkishólmur and Reykjavik, respectively. Moreover, the coldest ever recorded April in eastern Iceland was in 1876, when the monthly mean temperature

was -3.5 °C (compared to average April temperatures at Teigarhorn of 2.0 ± 1.7 °C.) The exceptionally cold spring of 1876 has been explained by unusually strong northerlies that brought persistent sea-ice to the coast (Koch 1945; Ogilvie and Jónsdóttir 2000; Ogilvie and Jónsson 2001; Thoroddsen 1914).

Tree ring-based summer temperature and hydroclimate reconstructions for the North Atlantic/European sector show that the 1875 Askja eruption had no direct effect on regional and larger scale vegetation and climate dynamics (Fig. 4A). This is to be expected given the minor sulphur yield of the basalt-rhyolite eruption to the stratosphere, which has been estimated less than 1 Tg (Toohey and Sigl 2017). Neither anomalous changes in forest productivity nor cooling or warming occurred in the aftermath of the eruption at any of the sites between northern Scandinavia and the Iberian Peninsula. Moreover, no consistent changes in any of the three

dendro-based hydroclimate records from central Europe can be associated with the 1875 Askja eruption (Fig. 4B).

Lure of the new world

Some degree of emigration from Iceland was already underway prior to the 1875 Askja eruption. This movement was a topic of lively debate within the country since 1873 CE. Most people lived in the countryside and most of them were tenant farmers and labourers, living hard lives on low wages, many unable by law to marry. Opportunities for a better life would have been attractive. The spark came with a notice written by a Reykjavik merchant, Guðmundur Lambertsen, on 7 December 1872 and published in *Norðanfari* on 8 January 1873 (issue 1–2, p. 4–5), which announced the possibility of emigrating to North America with a steamship of the Allan line.

As reported in *Norðanfari* (1 March 1873, issue 13–14, p. 37), Páll Magnússon, a farmer from Kjarna in Eyjafjörður, chaired a committee investigating migration to America. He convened a meeting early in 1873 to discuss plans for ‘Westerners’ (‘Vesturfara’) to migrate to North America in the coming summer. Further meetings were held on 16 April and 23 May 1873 with representatives of migration agents, brokers and financiers (*Norðanfari* 19 April 1873, issue 21–22, p. 61; *Norðanfari* 17 June 1873, issue 35–36, p. 102). Páll was signatory to an advertisement dated 12 May 1873, calling emigrants to sign up for the passage (*Norðanfari* 16 May 1873, issue 25–26, p. 76). A subsequent commentary (*Norðanfari* 21 May 1873, issue 27–28, p. 80) even foretells the growing appetite for emigration:

... there is hardly any other topic of conversation in the north of the country, and perhaps throughout Iceland, than the matter of migration to the West. The promised land looms larger and larger before people’s eyes and is increasingly spoken of. Not a few have already taken the plunge; their number grows exponentially, and in a few more months the westbound migration will count in the thousands... Even grey-haired elders ... are happy to go and hunt as if they were young again ...

Advertisements in this same issue carried promotions for passage to North America, guidebooks, and English language classes. All this build-up culminated with 155 men, women, and children boarding the steamship *Queen* on 4 August 1873, Páll amongst them. He had turned up at the port with luggage and family, but promptly disembarked finding the conditions aboard inhuman. Those who travelled were bound first for Granton in Edinburgh, then Glasgow by train (*Norðanfari* 3 December 1873, issue 51–52, p. 133). Here, they were bundled on to another steamship, calling first to take many more migrants aboard at Liverpool, swelling the numbers to 600 on the trans-Atlantic voyage. They

arrived in Quebec on 25 August. The first sizeable group of Icelanders had landed in North America. Most of them settled in the city of Rosseau, Ontario. Another group sailed to Brazil the same year but suffered so greatly that many returned to their homeland.

The pioneers wrote home. A letter from one of the new residents of Rosseau, Björn Skagfjörð, dated 1 September 1873 and published in *Norðanfari* (3 December 1873, issue 51–52, p.133), describes the journey in detail. Páll Magnússon followed up with a pamphlet on 30 December 1873 titled *Amerika* with further dispatches from the *Vesturfara* and a guide to economic prospects, travel costs, etc., for those who might wish to migrate ‘for themselves and their descendants’. Stories had begun circulating in Iceland that migrants were being swindled, prompting advertisements such as one carried in (*Norðanfari* 3 December 1873, issue 51–52) from the Icelandic representative of the Norwegian line. It sought emigrants willing to travel in summer 1874 directly to New York. This, the advert claimed, would not only be more economical than transport with any English line, but would obviate encounters with ‘all kinds of drunkards and thieves’ that were only to be expected on any transit via England.

Another group did emigrate from Iceland in 1874, indeed by direct crossing but again with the Allan line, bringing 351 passengers. They settled in Kinmount, Ontario (Eyford 2010) soon found conditions harsh. Several perished over the winter. The government responded to petitions for support by providing a grant of \$5000 in September 1875 to assist with their relocation (RG2, Privy Council Office, Series A-1-a. For Order in Council see volume 337, Reel C-3313 Access Code 90). By this time, Askja had erupted, and panicked reports of impending famine were circulating widely. If the funds sought by the Kinmount deputation were not forthcoming, an opportunity to leverage on the misery in Iceland would be missed:

[the Kinmount Icelanders’] continued suffering would seriously check immigration and render nugatory the efforts now being made to attract as settlers to Canada a considerable portion of the inhabitants of Iceland, a very large part of which has been rendered uninhabitable by recent volcanic irruptions.

The record adds that a deputation from Kinmount had identified a suitable spot for the new settlement on the west shore of Lake Winnipeg, noting that:

...the removal of the Icelanders now in Ontario to the portion of the Country indicated by the deputation would make an important nucleus of Icelandic settlement and largely influence immigration from Iceland, and also probably attract the Icelanders now in the United States.

At this time, most of the immigrants to Canada came from England, Ireland, Scotland, and Scandinavia, but numbers were declining. Immigration into Quebec fell from 44,475 in 1870 to 16,038 in 1875. New sources were required to reverse the trend. Officials and businessmen were mindful not only of the financial rewards and human resource opportunities that stemmed from recruitment but also of the moral qualities of immigrants, their frugality, temperance, and work ethic. What was needed were hard workers able to build railways, log forests, dredge rivers, extract resources from the ground, and plant crops and raise cattle for a growing populace. In this respect, Icelanders were considered exemplary. A report in the *Winnipeg Standard* of 31 July 1875 commends their skills in fisheries and farming. Rearing cattle in Canada, it notes, could ‘retain in local circulation vast sums of money that are now being sent out to Minnesota for the purchase of cattle’.

The idea that a great wave of emigration might follow in the aftermath of the Askja eruption was widely promoted, and the *Manitoba Free Press* from 30 October 1875 wrote that a large proportion of Icelanders should consider finding new homes in Canada:

... it is to be hoped they will form such a favorable opinion of the country visited, as will result in bringing their countrymen here. It was at first proposed to select homes for about 30,000 of these people; but ... the question is now seriously being discussed as to the feasibility of removing the entire population of 68,000 souls to a more hospitable clime.

The financial aid and support given to recruitment and retainment of immigrants, and the favourable reporting of the Icelanders’ characteristics in the popular press, expose the political and commercial interests in populating large parts of British North America with white Europeans, heedless of the dispossession, displacement, and disease inflicted on indigenous peoples (Andrews 2019; Edwald 2012). Even the Icelandic deputation from Kinmount noted that as soon as they could settle the site beside Lake Winnipeg, ‘[the] few Indians will be located elsewhere’ (Jonasson and Jonasson 1875).

In due course, the ‘Icelandic reserve’ was set aside by the Department of the Interior and work on construction of a ‘New Iceland’ began on 21 October 1875. Björn Skagfjörð was amongst the pioneers of the new settlement, named Gimli. A correspondent in the *Manitoba Free Press* (30 October 1875, p. 7) wrote of them, ‘[they] are a fair-faced, fair-haired, blue-eyed people, of robust constitution, not afraid to work, and clean in their personal habits... It is certain, at least, that they are desirable settlers for the west shore of Lake Winnipeg’.

Contemporary accounts painted a rosy picture of the new settlement: ‘[the land] is reported exceedingly rich and

furnishes at the same time both wood and pasture; while the lake abounds in fish, which the Icelanders are very expert in taking’ (*Manitoba Free Press* 30 October 1875, p. 7). The founders of Gimli struggled from the outset, finding themselves in an unfamiliar wooded environment and lacking the knowledge and equipment for fishing in the lake. They lived ‘at or near the subsistence level’ (Vanderhill and Christensen 1963). In a letter dated 20 November 1875 and published in the *Manitoba Free Press* on 22 January 1876, a resident writes 4 weeks after the group arrived: ‘We were not successful in the fishing this fall as we were late for the season; this is a great drawback to us, as we were not well supplied with provisions for the winter’. The correspondent declared hope for another government loan to see them through, but support did not come in time and several of Gimli’s residents died from scurvy in the first spring.

Regardless of the situation on the ground, immigration agents promoted a rosy picture to kith and kin back in Iceland. The Canadian government had appointed William C. Krieger to act on behalf of its immigration efforts in Iceland (he received a 12-month salary of \$100 plus expenses). He spent several months there from November 1875, armed with maps of Canada and promotional pamphlets, getting people to sign up and put down a deposit. He also travelled in Britain to negotiate transportation costs and schemes by which the emigrants could raise money by selling their livestock in Scotland. A man of evident zeal, Krieger, spread his pamphlets in the south ‘as far as the incessant rains and short days would allow’ and spent 3 weeks walking from Akureyri to Reykjavik in the winter (Report of Icelandic Immigration, Reykjavik 25 March 1876; Sessional Papers).

The south of the country offered thin pickings for the agent. This reflected both political opposition (there were more nationalists there who denounced emigration) and the especial impoverishment of the people, meaning they lacked the goods and chattels that might be sold to pay for emigration. His target was then ‘to proceed east to the region of volcanoes, where I expected the largest number to go from’. By March of 1876, Krieger reckoned he had 500 people signed up—350 from north and east, 127 from west and south. His report reveals not only the would-be migrants’ manifold motivations for leaving Iceland but his belief in the cause of harvesting people for the good of British North America:

I am positive... when I say that the people now about to leave Iceland is only the avant-garde... For while it is not the climate that compels them to seek other habitations, there are other and not less urgent reasons. The frequent failure of the hay-crops in some parts of the country, the absence of the cod, that lately has become an alarming evil; the volcanic action, and the impossibility of ever acquiring even an independence,

no matter how much energy and labour is employed, has disheartened the people, and ripened them completely for a very heavy migration.

Krieger was joined in Akureyri on 31 December 1875 by an assistant, Sigurdur Jonassen. Krieger did not make it east, but Sigurdur headed there shortly, reaching the volcanic district on 21 January 1876. He traversed the ash-affected and adjacent areas over the following weeks, convening meetings to which people travelled from afar, and which were ‘invariably successful’. He joined the 752 passengers headed for Scotland on 2 July 1876, and accompanied them all the way to Gimli, arriving there on 20 August 1876. The emigrants from the eastern districts, numbering 392, travelled later but arrived in Gimli just a few days behind the others.

Each adult paid had paid £ 6 9 s (equivalent to around US \$ 750 today), a high sum for most, with costs covered by the sale of their livestock in Scotland. Additional costs were met by the Canadian Government, which naturally sought those of working age and younger for its investment. Of the 1876 immigrants, most were below 40 years of age (589 males and 601 females). The largest 4-year age group was the youngest, comprising 108 boys and 90 girls (0–4 years), the next with 76 boys and 76 girls (5–9 years). Very few older than 60 left Iceland. The Manitoba Free Press of 5 August 1876 (p. 1) crowed that the success of the Gimli pioneers ‘induced more than 1,000 of their countrymen to leave their homes for the dominion’, adding that they will ‘in all probability ... be more comfortable and successful in life in Canada than in the sterile country they are now leaving’. New Iceland became well known in the old country and more would come because of its reputation or personal connections.

Of all the counties, North Múlasýsla (Fig. 2A–D), which captured much of the fallout from the 1875 eruption clouds, contributed the largest number of migrants in 1876, amounting to 297, roughly a quarter of the total making the journey that year. This also represents by far the greatest depopulation per head by county, amounting to around 10% (based on a rough extrapolation of census data in Kristinsson 1973). This is the clearest evidence we have that the emigrants included significant numbers of people most directly impacted by the eruption.

Politics

The 1870s were a febrile period for Icelandic politics. 1874 marked the millennium since the nominal founding of the colony by Ingólfur Arnarson in 874 CE. Iceland came under Norwegian rule, in 1262, which led to union with Denmark in 1380, by way of the Kalmar Union. It was almost another six centuries until the Icelandic parliament, the *alþingi* was restored in 1854. This conceded some measure of legislative power, and when the Danish King (Christian IX) visited the

colony on the millennium celebrations in 1874, he granted that Iceland could write its first constitution. Despite these acts, nationalists in Iceland still dreamed of full autonomy. The emigration that began in the early 1870s quickly took on a political as well as demographic dimension.

Páll Magnússon, who had planned to travel with the steamship *Queen* to Scotland and on to North America in 1873, discussed western migration across three issues of *Norðanfari* in 1873 and 1874. Intriguingly, he explains the complex feelings of his compatriots concerning the political conditions of Iceland and aspirations for independence. In the first part of his essay, published in *Norðanfari* on 3 December 1873, he writes that while many people had justified emigrating on account of volcanic eruptions, ice and severe winters—‘the unkindness of nature’—others had argued that the greater justification is the subjugation of Icelandic people by the Danish crown, especially in matters of governance and economy.

In *Norðanfari* of 21 May 1873 (issue 27–28, p. 80), he ponders the symbolism of the impending millennium celebrations, their resonance with, as he foresaw, the destiny of the Icelandic people to migrate west as had the Vikings 1000 years earlier. While plagued with volcanic eruptions and ice, the productivity of the land and riches of the sea made up for it. The real problem was not nature but Iceland’s unfavourable trade relationships with Denmark. Furthermore, more recent emigration had done the English no harm and migration of the species was a biblical injunction (*Norðanfari*, issue 53–54, p. 117–118):

...even if they live east in India or west in Canada, they are English as much as at home, keep their thieving spirit and language, but no one can deny that their power has increased due to exports and development. Now if the Icelanders go west and establish a colony there, that colony is the property of the Icelandic people, and that spot, whether it is big or small, can be seen as an increase and not the abolition of Iceland, there the Icelanders can keep their nationality, language and customs, that to the extent that may apply to the customs of the country... migration has been, and will remain part of the human condition ... to obey the eternal and unbreakable commandment: “Be fruitful and multiply and fill the earth”.

Meanwhile, the government in Iceland took a dim view of emigration, especially once shipping and immigration agents came plying for customers. Its view was that people should stay so they could continue the struggle against colonial rule. A new Emigration Law nearly scuppered William Krieger’s recruitment drive in 1876. Before it was ratified in Denmark, officials in Iceland claimed it had already been passed and that it outlawed the kind of propagandising efforts he was engaged in. Krieger circumvented the problem by ensuring

that the Governor in Reykjavik received a deposit of 18,000 kronor on behalf of the ticket agent. When the law was later passed, it restricted Krieger's movements further in Iceland but not those of shipping agents, and Krieger ensured that they were appointed in each of the main districts sourcing emigrants. 'The movement has been set on foot', he wrote to the Minister of Agriculture in Ottawa, 'and with proper management from England, and occasional visits to the island, there is every prospect of a steady and good-proportioned flow' (Sessional Papers, 1877, p. 161–162).

During this period, Britain had been taking an increasing interest in Iceland owing to its rich fisheries and the waning trade monopoly exercised by the Danish (Brydon 2001). Having a hand in promoting and enabling emigration from Iceland likely further suited a British expansionist and economic agenda in the North Atlantic.

Smallpox

We have already seen how life was cut short for some of the emigrants in Kinmount. Worse was to come. Of the second batch of migrants in 1876 coming from eastern Iceland, ten had reportedly perished on the voyage, all but one of them children, and another 32 children were reportedly ill (19 August 1876, Manitoba Free Press). It was some time later in the year until the affliction was identified as smallpox and Gimli was promptly put under quarantine for months. More than 100 died in the winter of 1876/7, and the outbreak devastated First Nations communities around Lake Winnipeg (Manitoba Free Press, 2 December 1876, p.5; Brydon 2001). This calamity and the challenges of working the land prompted most to move on to other parts of North America over the following years. By 1881, the colony's population had fallen to 250. Today, a few thousand people of Icelandic descent live in Gimli. Vanderhill and Christensen (1963) note that it retains significance today as the 'cultural heart in the New World' for today's Icelandic Canadians, and for geographers 'it provided an early test of the agricultural potential of the forested lands'.

Krieger was very concerned that reports of the smallpox outbreak reaching Iceland 'will seriously affect future emigration' (Sessional Papers, No. 8; p. 122, 1877). In his end of year report dated 30 December 1876, he added that 'capital will be made out of it in Iceland', meaning that those opposed to emigration would have stronger arguments. This concern is reiterated in a report by the London agent, Mr. F.J. Dore, of 1 January 1877:

The Icelanders are well disposed to emigrate to Canada, and with judicious encouragement they will undoubtedly form a very useful class of emigrants, and the success of our future operations in Iceland, will depend entirely upon the reports the emigrants of this

year send home to their friends. If these are favourable, we may be prepared for an emigration en masse, but if on the contrary, they are unfavourable, then the emigration will cease altogether, and no efforts of our Agents would be likely to ensure its renewal.

The Canadian government's immigration agents need not have worried. After 1876, emigration from Iceland peaked again in 1883 (1215 people), 1887 (1947 people), and 1888 (1109 people) (Fig. 2C). The regional trend underway in 1876 continued, with the greatest net migration registered in North Múlasýsla (Fig. 2D). In Iceland, despite the emigration of more than 16,000 people within the space of a generation or two, the population increased from around 70,000 in 1870 to 85,000 by 1910. The only decade that saw population decline was the 1880s (Jonsson 1992).

Concluding remarks

Perhaps as many as a third of the emigrants who left Iceland for Canada in 1876, the 392 who travelled from the east had been particularly impacted by the eruption of Askja. Of these, 297 hailed from North Múlasýsla, directly under the volcanic plume trajectory (Fig. 2). This and subsequent emigration significantly depopulated the district. But there were clearly many other factors underlying the decisions made by individuals and families to leave or stay. In the case of North Múlasýsla, its remoteness from Reykjavik, the capital that grew rapidly at the end of the nineteenth century, may also have been an important factor. Passage was subsidised but not free and the poorest were neither wanted in Canada nor able to pay their way. A weaker sentiment towards nationalism in the north along with its greater prosperity compared with the south also biased recruitment efforts made by immigration and shipping agents.

The communities affected by the 1875 eruption of Askja were supported by those in adjacent areas and took effective steps to regenerate the land. They also received aid from overseas, enabling purchase of fodder to keep more livestock alive over the following winter(s). The crisis was largely contained, and fears of impending famine were evidently exaggerated or even manufactured. They served to garner overseas aid, but also fuelled a drive in Canada to recruit desirable Europeans to populate the plains, and join the workforce, thereby boosting the economy of British North America. The eruption served as a lever to advance commercial and political interests through amplifying the already present interest in mass emigration both within and beyond Iceland's shores. What emerges is that there was a well-oiled apparatus for conveying Icelanders from their home country to North America. This involved direct advertising campaigns, meetings, and vigorous recruitment in the face

of increasing legal obstacles in Iceland. Impacts of the Askja eruption were to an extent exaggerated to serve the political and commercial interests of Canada in recruiting desirable immigrants. At the same time, recruiting agents in Iceland made exceptional efforts to sign people up from the district most affected by tephra fallout. A combination of geographical and political circumstances together with the effects of a volcanic eruption put certain parts of the population more at risk than others (O’Keefe et al. 1976).

Likely also to have been persuasive in decisions of future would-be emigrants were the reports coming back to Iceland. These must have brought mixed messages—surely those who had left would have sought to swell their numbers but at the same time the mortality and morbidity rates amongst the pioneering communities were high, and likely higher than rates in the old country.

In the quest for relationships and feedback between environment, ecology, demography, and society, Iceland provides particularly fertile case studies, with Askja just being one of them. This reflects the centuries-long vulnerability, and resilience, of its people to volcanic episodes; external interactions including political relationships and introduction of infectious diseases; harsh and oscillating climate conditions that made the rewards of farming and fishing unreliable; and its rich documentary and literary traditions. As one of the pioneering geoscientists of the twentieth century, Sigurdur Thorarinsson argued decades ago, Iceland is an exceptional ‘laboratory’ for interdisciplinary investigations into the entanglements between humans and their environments.¹

Acknowledgements UB and CO were supported by the Centre for Interdisciplinary Research (ZiF), Bielefeld, Germany. Tatiana Bechuk kindly provided the Icelandic background map.

Author contribution UB and OE conceived the study. UB, OE, and CO performed the analysis. CO provided volcanological and historical expertise. UB and CO wrote the manuscript, with input from OE. CO and UB revised the manuscript. All authors contributed to discussion and interpretation.

¹ Thorarinsson himself came from a rural district in the north of Iceland (1911–1983), and like many Icelanders, his own heritage was entwined with volcanic events. His grandparents’ farm had to be abandoned following the 1875 Askja eruption, but not until Sigurdur’s father, Thorarinn, was born (Sigurdsson 1983). Thorarinsson is renowned for developing the field of tephrochronology in the 1940s but also made many contributions including those to historical climatology. His importance is underscored by the fact that the most prestigious distinction conferred by the International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI) is the ‘Thorarinsson Medal’. Moreover, the 1875 Askja eruption likely also contributed to the enrichment of philosophical discourse (Skúlason 2005), and possibly even resonates in the novel *Sjálfstætt folk* (or *Independent People*; Laxness 1934), which received the Nobel Prize for Literature in 1955.

Funding UB received funding from the ERC Advanced project Monostar (AdG 882727) and the Czech Science Foundation Grant No. 23-08049S (HYDR08).

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