

August 29, 2024

News and notes

Before going on to discuss the geology and geopolitics of the Faroe Islands, here are some news items I thought were interesting.

Geopolitics

- Reference [Arnold Toynbee's](#) dominant minorities: ['End of Empire': Analyst Claims US Ruling Class Fatally Out of Touch](#).
- Video: [UK Protestants and Catholics Unite VS Illegal Muslim Immigrants](#).
- Mining and geopolitics: [Argentina to sign deal with US to boost metals mining](#).
- Geopolitical rivalry: [Biden Reportedly Approved New Nuclear Strategy Refocusing on 'Chinese Threat'](#).
- [Geopolitical discussion between Jeffery Sachs and Piers Morgan on X](#).
- Iceland: [How NATO Is Countering Russia in the Arctic](#).
- Related to [last week's](#) post: [From 'open hearts' to closed borders: behind Sweden's negative net immigration figures](#).
- China/U.S. rivalry: [The US-backed railway sparking a battle for African copper](#); related: [Scramble for critical minerals spurs an African rail revival](#).

Research and News

- Melting rocks in a lab, great fun: [Magma solidification effects during sill emplacement: Insights from laboratory experiments](#).
- More fun in the lab with molten rock: [Direct observation of degassing during decompression of basaltic magma](#); Phys.org summary [here](#).
- Mineralogy: [The helium and carbon isotopic signature of Ocean island basalts: Insights from Fogo volcano \(Cape Verde archipelago\)](#).
- [Snapshot of a Paleoproterozoic seafloor: Evidence from 3.43-3.35 Ga Strelley Pool chert-pebble conglomerate for deposition, silicification, and erosion of hydrothermal greenalite-apatite precipitates](#).
- Erosion research: [Extreme erosion and bulking in a giant submarine gravity flow](#); Phys.org summary [here](#).
- More erosion research: [Electrodeposition of calcareous cement from seawater in marine silica sands](#); Phys.org summary [here](#).
- [On the role of small estuaries in retaining buoyant particles](#).

- [The White Hills Gravel of central Victoria: an anomalous Paleogene very coarse-grained fluvial deposit.](#)
- Bad science: [The citation black market: schemes selling fake references alarm scientists; Sleuths spur cleanup at journal with nearly 140 retractions and counting.](#)
- Sedimentology, turbidite deposits: [Unconfined gravity current interactions with orthogonal topography: Implications for combined-flow processes and the depositional record.](#)
- X-ray fluorescence: [XRF Analysis of Village and Urban Basalt Architecture in the Hippos Territorium during the Roman Period](#); Haaretz summary [here](#).

Plate Tectonics

- [Plate tectonics: Crustal Structure of the Northeast South China Sea Rifted Margin.](#)
- [Exploring Uplift Mechanisms Across the Forearc of a Subduction System: Karpathos Island as a Natural Transect Across the Eastern Hellenic Margin.](#)
- [Nuna supercontinent assembly linked to carbon cycling in shear zones 1.9–1.7 billion years ago.](#)
- [Double subduction controls on long-lived continental tectonics and subcontinental mantle temperatures.](#)
- Failed rifts: [Aulacogens of the Neoproterozoic to Ordovician Laurentian Iapetan Margin.](#)

Geophysics

- Geophysics and plate tectonics: [The structure of a continental intraplate volcanic system and controls from shear zones: Insights into the central Hoggar Cenozoic volcanic province, Northwest Africa, from electrical resistivity images.](#)
- [A scaling relationship for the width of secondary deformation around strike-slip faults.](#)
- [Using a landscape fingerprint to identify changes in fault-slip behavior.](#)
- [Superionic iron hydride shapes ultralow-velocity zones at Earth's core–mantle boundary.](#)
- [Uncertainty and Spatial Correlation in Station Measurements for Magnitude Estimation.](#)
- Geomagnetic storms: [On the uncertain intensity estimate of the 1859 Carrington storm.](#)

Paleontology

- [Priapulid neotechnology, ecosystem engineering, and the Ediacaran–Cambrian transition.](#)
- [This Beautiful “Plant” Trapped In Amber Turned Out To Be A Dinosaur Tail.](#)
- [A new theropod dinosaur from the Callovian Balabansai Formation of Kyrgyzstan](#); Sci News summary [here](#).

- [*Caletodraco cottardi*: A New Furileusaurian Abelisaurid \(Dinosauria: Theropoda\) from the Cenomanian Chalk of Normandy \(North-Western France\).](#)
- [A new lungfish from the Upper Triassic of the Mid-Zambezi Basin, Zimbabwe](#); Sci News summary [here](#).

Mining and Energy

- Ooh, shiny: [Botswana says a huge 2,492-carat diamond has been uncovered at a mine.](#)
- [Navajo, Arizona attorney general question safety of newly reopened uranium mine.](#)
- [Investors rush into uranium miners on Kazakh production outlook.](#)
- Mine safety research: [Unraveling time-dependent roof stability dynamics in Iran's coal mines through laboratory-based rock displacement testing.](#)
- [Lithium mining is slowly sinking Chile's Atacama salt flat, study shows.](#)
- [Top Alberta Court allows appeal of coal miner's exploration applications.](#)
- When your biggest customer just stops buying: ['Collapsing': Inside Australia's iron ore disaster amid huge China announcement](#); related, from The Economist: [Welcome to the end of the biggest commodity boom.](#)
- [Against all odds, an asteroid mining company appears to be making headway.](#)
- [Lithium in SK, Part 30: Hub City Lithium completes pilot, changes ownership structure, and is drilling near Stoughton.](#)
- Critical minerals: [U.S. military announces \\$20M US grant to build cobalt refinery in Ontario.](#)
- [US buys nearly 2.5 million barrels of oil for Strategic Petroleum Reserve.](#)
- [China Greenlights Record-Breaking Nuclear Expansion.](#)
- Research: [Genesis of Deep Abiogenic Hydrocarbon Systems](#); sorry behind a paywall.
- [Niger Aims to Become Major Oil Exporter.](#)
- [Barrick Gold on way to becoming major copper producer.](#)
- Hydrogen: [Scotland finds the most sought-after underwater treasure in history: The world is wondering how they will get it out.](#)
- [First American sodium-ion battery factory will make cells with lifespan of 50,000 cycles that charge in 10 minutes.](#)
- Will need 1 kg of silver for each vehicle battery pack: [Samsung's upcoming solid-state EV batteries promise 9-minute charging and 600 mile range.](#)

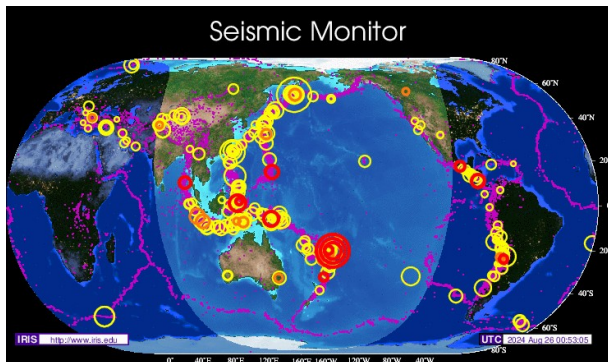
Environmental Geology and Hydrogeology

- Debunking a conspiracy theory: [Investigating the impact of anthropogenic radiofrequency electromagnetic fields on animals and plants in the environment: analysis from a systematic map](#); Phys.org summary [here](#).
- Remediation: [Nanoplastics Extraction from Water by Hydrophobic Deep Eutectic Solvents](#); Science Alert summary [here](#).
- More remediation: [Cleanup of historical mines in Nova Scotia to begin next year](#).
- From the US EPA: [PFAS Explained](#).

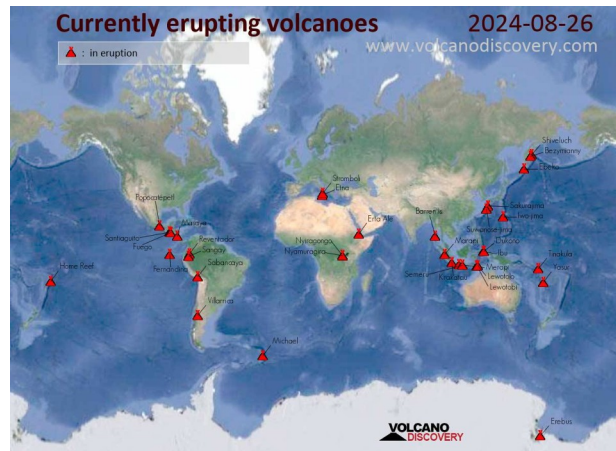
Glaciers and Climate Change

- [Mercury export from a glacier-fed river of Mt. Meili, southeastern Tibetan Plateau](#); Phys.org summary [here](#).
- [Thwaites Glacier won't collapse like dominoes as feared, study finds, but that doesn't mean the 'Doomsday Glacier' is stable](#).
- Shrinking glaciers: [Global Glacier Casualty List](#).
- Melting glaciers: [Svalbard Melts](#).
- Geoengineering climate, thinking about what could go wrong: [Research criteria towards an interdisciplinary Stratospheric Aerosol Intervention assessment](#); Phys.org summary [here](#).

Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

Volcanoes

- United States Geological Survey (USGS) Volcano Watch: [Volcanic tremor or distant earthquake? Distinguishing seismic signals](#).

- USGS Yellowstone Volcano Observatory: [Yellowstone thermal features, from Apollinaris to Zomar](#).
- [Smithsonian / USGS Weekly Volcanic Activity Report](#).
- Volcanoes and mountains: [The disappearing mountains and hungry volcano: Researching the evolution of the Teton Range](#).
- Almost 1/2 million people live in the vicinity of the Bay of Naples: [Europe's most dangerous volcano rumbles, and Italians weigh the risk](#).
- Iceland: [Emergency declared after volcano erupts in Iceland creating major fissure and fast moving lava flows](#); related video: [Massive Eruption produces unusually large Earthquakes still – Hot water Pipes at risk #Iceland](#).

Earthquakes

- [Euro-Mediterranean Seismological Centre](#)
- [Earthquakes Monitoring Live Worldwide](#).
- Earthquake research: [Inverse analysis of seismic activity rate changes for severely incomplete sequences: comparison of aftershock activity patterns immediately following the 2023 M6.5 and 2024 M7.6 Noto Peninsula earthquakes](#).
- More on the Noto earthquake: [Dual-initiation ruptures in the 2024 Noto earthquake encircling a fault asperity at a swarm edge](#); Phys.org summary [here](#).
- [Seismologist Sounds Alarm Over Southern California Earthquake Activity](#).
- [Integrated seismotectonic model of the 2013 Mw 6.6 and 2022 Mw 5.8 earthquake sequences in the southwestern section of the Longmenshan Fault Zone, China, and its implication](#).

Geohazards

- Landslide research: [A dual-base station constraint method to improve deformation monitoring precision consistency in strip regions](#); Phys.org summary [here](#).

Upcoming Events

- [Lloydminster Heavy Oil Show September 11-12](#); Pipeline Online summary [here](#).
- [NGWA's Hydrogeology of States Webinar Series: Louisiana, September 18, 2024. Online 1-2 p.m. ET](#).
- [GeoFutures: Planetary Geoscience Conference](#), 14-15 November 2024, hybrid meeting.
- [Groundwater Week 2024](#), December 10-12 in Las Vegas, Nevada.
- [Copper to the World Conference, Tuesday 26 – Wednesday 27 August 2025](#), in Adelaide, Australia; report on 2024 conference [here](#).
- [List of geoscience events in 2025 from the International Union of Geological Sciences](#).

August 26, 2024

Geology and the Fate of Societies – Faroe Islands



Figure 1 – Faroe Islands

Credit: [CIA World Factbook](#), public domain



Figure 2 – Atlantic Seafloor around the Faroe Islands

Credit (extracted): [Tom Patterson](#), public domain

This week we'll take a look at the [Faroe Islands](#), an [autonomous territory](#) within the [Danish Realm](#). Unlike mainland [Denmark](#), and like [Greenland](#), the Faroe Islands are not part of the [European Union](#). The Faroe Islands are located in the [North Atlantic](#), about equidistant between [Norway](#), [Iceland](#) and the [Shetland Islands](#) of the [United Kingdom](#).

Like the rest of the Danish Realm, the Faroe Islands are part of a [Constitutional Monarchy](#). Their King is [Frederik X](#) and the Danish Prime Minister is [Mette Frederiksen](#). The Faroe Islands sends two delegates to the Danish Parliament or [Folketing](#). The local legislature is the [Løgting](#) and the Faroese Premier is [Aksel V. Johannesen](#); the representative of the Danish Crown in the Faroe Islands is [Rigsombudsmand](#) (High Commissioner) [Lene Moyell Johansen](#). The Capital city of the Faroe Islands is [Torshavn](#), (pop. 23,194).

According to the [Central Intelligence Agency](#) (CIA) [World Factbook](#) on the Faroe Islands, the islands have a combined total area of 1,393 square kilometres with no significant fresh water bodies. Also, according to the World Factbook, 52,933 people live on the Faroe Islands, 40% of whom live on the island of [Streymoy](#). Almost all people on the Faroe Islands, 83.8%, are ethnic [Faroese](#). Of the remaining, 8.3% are [Danish](#), 1.2% are [Filipino](#) (mostly Filipina), 0.9% are other [Nordic](#), and 4.5% are some other ethnicity. 93.8% of the population speak [Faroese](#), a language derived from [Old Norse](#) and related to [Icelandic](#). Of the rest, 3.2% speak [Danish](#), and 3% speak something other. 87% of Faroese are [Christian](#), predominantly members of the Lutheran [Church of the Faroe Islands](#). Among the rest 9.8% are something other or unspecified and 3.7% have no religion. In terms of their economy, the per capita [GDP](#) is US\$58,585, the [Gini coefficient](#) is 22.71, and the [Human Development Index](#) is pretty high at 0.950.

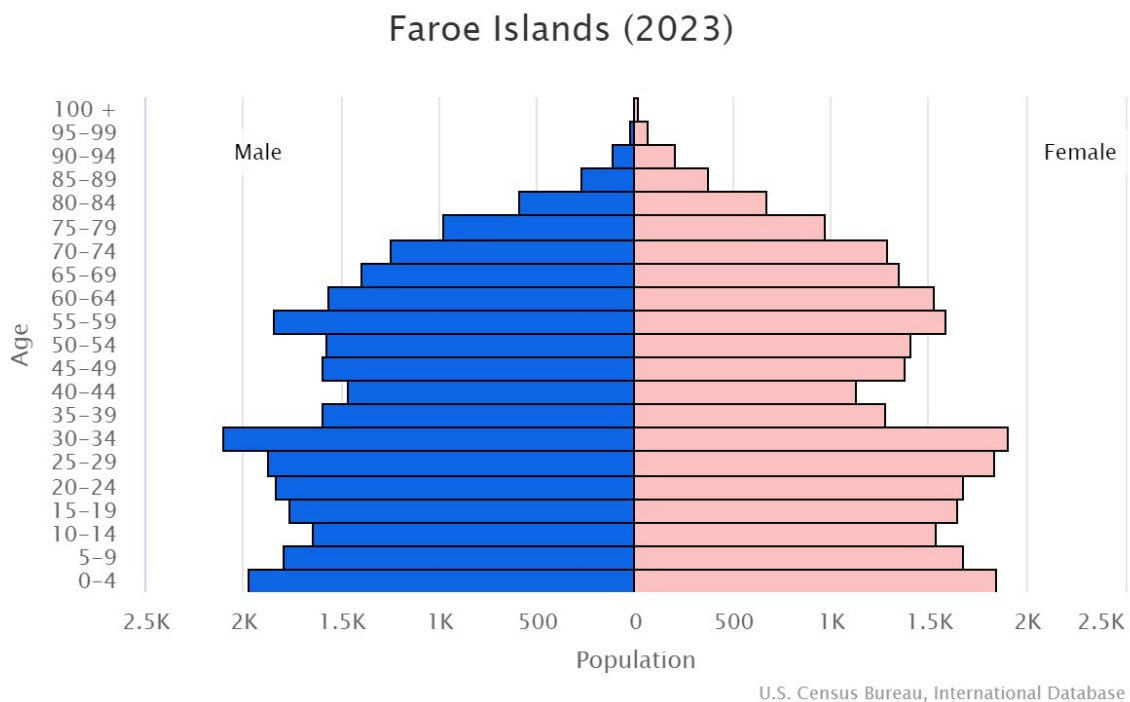


Figure 3 – Demographic Profile, Faroe Islands
Credit – U.S. Census Bureau, International Database, public domain

The [demographic profile](#) of the Faroe Islands shows a fairly stable population. Median age is 36.8 years and 61.5% of the population is between 15 and 64 years old. Migration has skewed the population, with many more young women leaving than men. Thus the Faroe Islands has more men than women. Some men on the Faroe Islands have married women from the [Philippines](#) and [Thailand](#). The total fertility rate is 2.28 births per woman; the annual growth rate is 0.6%; and the life expectancy at birth for both sexes is 81.5.

Geology

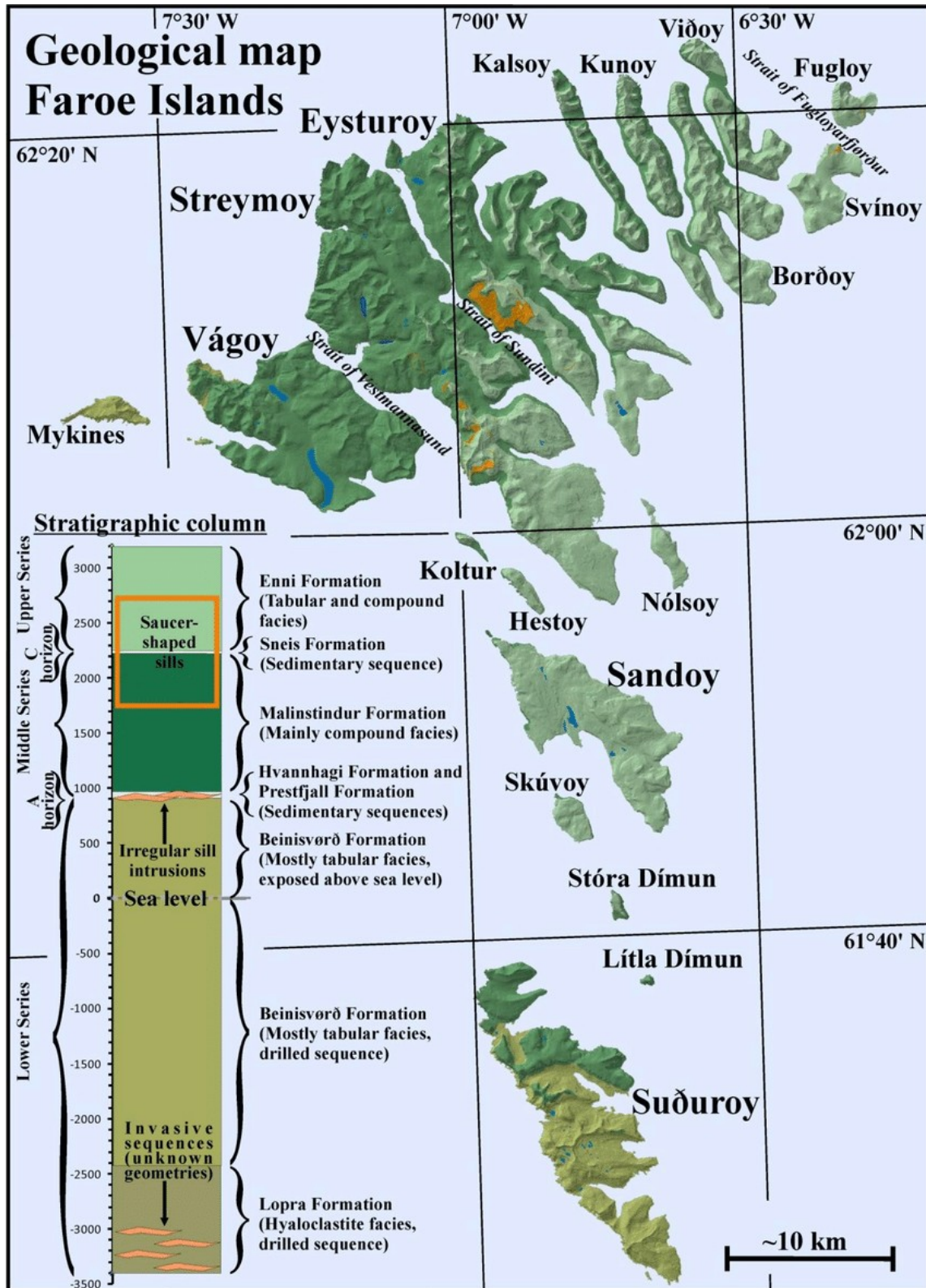


Figure 4 – Geology of the Faroe Islands
 Credit: Figure 3.2 in [Hansen, 2011](#)

The [geology of the Faroe Islands](#) has its origin in the deposition of the [North Atlantic Igneous Province](#) (NAIP). The [NAIP](#) itself was deposited in the [opening of the North Atlantic Ocean](#) approximately 60.5 and 54.5 Mya (million years ago) – these dates correspond with the [middle Paleocene](#) and early [Eocene](#). The geological formations of the Faroe Islands are generally called the [Faroe Islands Basalt Group](#), and consist of mostly volcanic rocks with some sedimentary deposits. As shown in Figure 4, these formations, from youngest to oldest are:

- The Enni Formation, approximately 700 m thick, it is primarily flow [basalts](#), interbedded with [volcaniclastic](#) rocks.
- The Sneis Formation contains a laterally extensive, maximum 30 m thick [sandstone](#) and [conglomerate](#) sequence, the base of which marks a major hiatus in the volcanic activity. Within this formation is also a distinct series of basalt lava flows with a maximum combined thickness of 50 m.
- The Malinstindur Formation is 1,400 m thick and is mainly composed of numerous compound lava flows with only minor [intercalated](#) sedimentary units.
- The Hvannahagi Formation is up to 50 m thick, and is composed of basaltic [tuffs](#) and different volcaniclastic sediments.
- The Prestfjall Formation is the only non-volcanic sedimentary formation of the islands; up to 15 m thick, it was previously termed the coal-bearing sequence.
- The Beinisdvørð Formation approximately 2,300 m thick in the [Lopra-1 well](#), the uppermost 900 m is exposed on the islands of Suðuroy, Mykines, and Vágoy; the formation constitutes basalt sheet flows with intercalated sediments, including small coal seams.
- The oldest formation, the Lopra Formation, is only known from the lowermost 1,100 m of the Lopra well and is a mixture of various volcaniclastic rocks, lavas and sills.

More information on the geology of the Faroe Islands can be found in these publications:

Hansen, Jogvan; 2011; *Petrogenetic Evolution, Geometries and Intrusive Styles of the Early Cenozoic Saucer-Shaped Sills of the Faroe Islands*. Doctoral thesis, Durham University. Available at Durham E-Theses Online: <http://etheses.dur.ac.uk/3631/>

Ólavsdóttir, J.; Eidesgaard O.R.; Stoker, M.S.; 2017; *The stratigraphy and structure of the Faroese continental margin*, Geological Society, London, Special Publications, Volume 447, pages 339-356 <https://doi.org/10.1144/SP447.4>

Resources

Food Production

Usually at this point in examining a country, we look at the agricultural resources of the country. In the case of the Faroe Islands, land use statistics, as published in the CIA World Factbook, indicate that agriculture is a minor activity, only 2.1% of the country is agricultural land, mostly small scale kitchen and market gardens. Of the remainder, 0.1% is forest, and 97.8% is something other such as wild land or

urban areas. Many of the wild areas are used for pasture. The main food production activity in the Faroe Islands is fishing.



Figure 5 – Harbour in Borðoy, Faroe Islands

Credit: Vincent van Zeijst, [Creative Commons Attribution-Share Alike 3.0 Unported](#) license

Per capita, the Faroe Islands are by far the [largest producer of seafood](#) in the world. Fishing in the Faroe Islands consists of open water (wild) and farmed fishing. Species of fish caught for export include [Cod](#), [Saithe](#), [Haddock](#), [Mackerel](#), [Herring](#), [Blue Whiting](#), [Greenland Halibut](#), and [Atlantic Salmon](#). The main [fish farm product](#) is Atlantic Salmon. With a total production from both wild fisheries and aquaculture of well over 500,000 tonnes annually, seafood products account for about [95 percent of Faroese exports](#).

There has been [some criticism of the governance](#) of the Faroe Islands' fishery; conservation seems to take a backseat to economic opportunity. As a geopolitical reality, the Faroe Islands has had to accommodate the interests of the nearby United Kingdom, whose fishermen fish the waters within the [Faeroe Islands Exclusive Economic Zone](#). In March 2024, an [agreement was signed](#) to allow United Kingdom's fishing industry access to over 2,200 metric tons (MT) of fishing opportunities in Faroese waters this year. The Faroe Islands are also party to the following international organizations and regional bodies:

- [UN Food and Agriculture Organization \(FAO\)](#);
- [UN International Maritime Organization \(IMO\)](#);
- [Northeast Atlantic Fisheries Commission \(NEAFC\)](#);
- [Northwest Atlantic Fisheries Organization \(NAFO\)](#);
- [North Atlantic Salmon Conservation Organization \(NASCO\)](#);
- [North Atlantic Marine Mammal Commission \(NAMMCO\)](#); and
- [South Pacific Regional Fisheries Management Organization \(SPRFMO\)](#).

There is also a [sports fishery in the Faroe Islands](#) to cater to tourists who want to catch fish in a new location. It looks like fun.



A controversial aspect of the traditional maritime economy of the Faroe Islands is the [harvesting of pilot whales](#) when the whales become accidentally stranded. Some people, unaccustomed to seeing how animals are butchered, are horrified by the sight of whales being cut up for food, one commentator called the harvest a [blood sport](#). Ultimately, it shows the clash of cultures between urban folk accustomed to getting their food neatly packaged in a supermarket, and those who go out and do the hard work of bringing home food. My personal sympathies are with the Faroe Islanders in this issue.

Figure 6 – Pilot Whale Hunt, Faroe Islands
Credit: Erik Christensen, Creative Commons Attribution-Share Alike 3.0 Unported license

Mineral Resources



Figure 7 – Former Coal Mine, Fámjin, Suðuroy, Faroe Islands
Credit: Erik Christensen, Creative Commons Attribution-Share Alike 3.0 Unported license

[According to the USGS](#) “The (Faroe) Islands had no significant identified mineral resources, and no commercially viable petroleum reservoirs had been discovered”. However, it is a bit more complex than that.

As in most places in the world, local rocks are quarried for [aggregate](#); one reference that I found on the net was for the Litlahorn aggregate [quarry near Stokksnes](#). Also, as noted above in the section on

geology, the Faroe Islands have [many coal deposits](#), one of which, in the Prestfjall Formation, continues to be mined. Tourism advocates [advertise the old coal mines](#) as a sight-seeing destination. Figure 8. below, links to an interactive mineral occurrence map for the Faroe Islands.

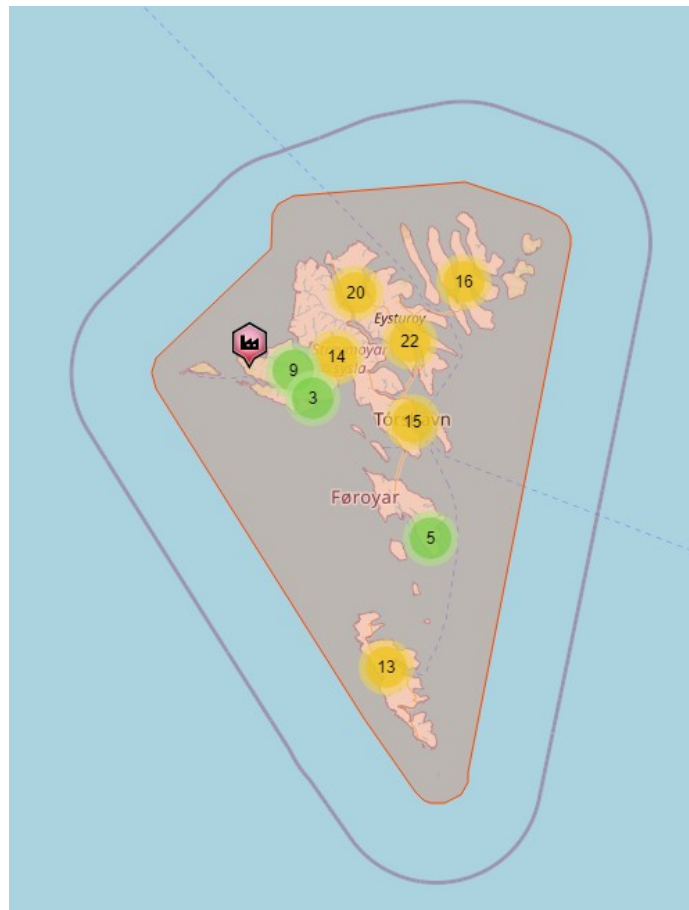


Figure 8 – Interactive Mineral Occurrence Map, Faroe Islands
[Credit: ©Mindat.org](#)

Climate

The Faroe Islands have a [subpolar oceanic climate](#); Cfc in the [Köppen climate classification](#). Some areas have a [tundra climate](#), especially in the mountains, although some coastal or low-lying areas may have very mild-winter versions of the tundra climate. Overall, the climate of the islands is controlled by the strong warming influence of the [North Atlantic Current](#) in the Atlantic Ocean.

The Faroe Islands look like a pleasant place to visit and the Faroe Islands government [encourages tourism](#). If you are a single woman looking for a partner, the Faroe Islands might be just the destination since there are more single men than women on the islands. I could only find one travel advisory specific to the Faroe Islands, [from Ireland](#), reminding people that the islands are not part of the [Schengen zone](#) for free travel. Other than that, if you go you should take reasonable precautions and dress for the weather. The [Lonely Planet](#) and [Climates to Travel](#) websites are worth checking out. The [North Atlantic Travel](#) site also has a good summary of the islands.

History and Geopolitics

History – A Rock in the Ocean



Figure 9 – Viking Sailors

Credit: [Dwight Franklin \(1888–1971\)](#), public domain

The [Faroe Islands](#) were uninhabited until the beginning of the Christian era, the so-called [Dark Ages](#). If we are to believe [Farley Mowat](#) in his book, [The Farfarers](#), the earliest visitors to the Faroe Islands, and later Iceland, were [Pictish](#) walrus hunters. The next visitor was a Christian monk, [St. Brendan](#) who noted the place in his travels. Also, Christian monks during the Dark Ages took their vows of poverty and chastity seriously and some of these ascetics sought out places like the Faroe Islands to spend their lives praying and worshipping God.

According to the [Færeyinga Saga](#), [Norsemen](#) from Norway and the [Norse settlements in Ireland](#) arrived in the 8th and 9th Centuries AD. In the year 1000, Christian missionaries converted the [Faroese to Christianity](#) with the aid of a brutal warlord, [Sigmundur Breiðsson](#).

In 1035, the Faroe Islands became a part of the [Kingdom of Norway](#). Norwegian Kings ruled the islands until 1380, when the islands became part of the dual [Denmark-Norway kingdom](#), under [King Olaf II of Denmark](#).

In 1814, under the [Treaty of Kiel](#), the dual Denmark-Norway kingdom was broken up and the Faroe Islands became part of the Danish Realm. The [British occupied the islands during WW2](#) to keep them out of the hands of [Nazi Germany](#), who had occupied Denmark. The Faroese held a [referendum on independence](#) in 1946 following which the Danish King granted the Faroese self-government within the Danish Realm under the [Home Rule Act of the Faroe Islands](#).

In the period since 1948, the main issues have been economic. Essentially, any thought of independence flies in the face of their dependence on Denmark for supporting generous welfare programs.

You can find more information of the history of the Faroe Islands [here](#), and [here](#).

Geopolitics, a Distant Land

Internally, the Faroe Islands appear to be a prosperous country. However, the prosperity is limited and very much a function of the health of the fishing and tourist industries. While in the past, many Faroese found it advantageous to move to Denmark, and elsewhere, to find better opportunities, that [particular trend seems to be playing out](#). Overall, one of the most important challenges for the Faroese is to negotiate their relationship with Denmark to maintain both their autonomy and their prosperity.

Another significant concern for the Faroe Islands is their economic relationship with nearby countries, such as the United Kingdom (UK). In 2019, the Faroe Islands [signed a free trade pact with the UK](#) and the two [continue an economic relationship](#). The disparity between a small country of 53,000 people, the Faroe Islands, and a major state like the UK, with ~ 68 million people suggests that the Faroese need to tread lightly in their relationship the UK.



Figure 10 – NATO Naval Exercise in 2019

Credit: LPhot Kyle Heller/MOD, [Open Government Licence version 1.0](#)

Although not part of the European Union, as part of the Danish Realm, the Faroe Islands are part of the [North Atlantic Treaty Organization](#). A geopolitical reality is that the Faroese must make their contribution to [collective security](#) through Denmark's membership in NATO. In practical terms, if there are any confrontations between NATO and other powers, such as [Russia](#), the Faroe Islands would almost certainly become host some NATO ships and warplanes. They would also have a front row seat to any new [battle in the Atlantic](#). Adding to the potential conflicts, Russia [maintains ambitions for power projection](#) in the North Atlantic, mostly out of their own sense of self defence but also as a possible action in any great power conflict with NATO and the [United States](#).

That winds up this short look at the Faroe Islands. They look like a pleasant place and they have every right to be optimistic about the future. Follow up links if any of this interests you.

Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.