

September 9, 2024

News and notes

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

Free Geology Books

Free geology books can be downloaded from these sites:

- [OreZone Readers and Experts Telegram Channel](#); the Ore Zone channel also shows employment opportunities for geologists.
- [The Groundwater Project](#).

I'll add more sites when I find them.

Geopolitics

- Ukraine war: [Russia's Primary Objective is To Capture Donbas, Putin Says](#).
- Chinese influence in Africa: [Senegal among new members of China's ILRS moon base project](#).
- From the United Kingdom: [All of the countries currently on the Foreign Office 'do not travel' list](#).
- [Turkey seeks Chinese partnership on rare earth elements for EVs](#).
- [Russia Claims to Be Complying With Its OPEC+ Oil Production Obligations](#).
- [Kyle Bass Says 'Green' War To Blackball Oil Was Doomed To Fail](#).
- Antimony: [Global supply chains can't skirt China rare earths crackdown](#).

Research and News

- Sedimentology: [Organic matter binding detrital grains contributing to ooid formation and small shelly fossil preservation, a case from the middle Cambrian, southern North China](#).
- Core–Mantle Boundary: [\$P_{diff}\$ Postcursors from the Base of the Hawaiian ULVZ](#).
- Behind a paywall but interesting: [The use of X-ray micro-computed tomography to visualize and quantify lithium-bearing silicate minerals in pegmatites: examples from the Tanco pegmatite, Manitoba, Canada](#).
- [The Earth's inner core is a total mystery – here's how we're starting to solve it](#).
- [Stratigraphy and dating of Middle Pleistocene sediments from Rodderberg, Germany](#).
- Video: [Michigan Geology | The Michigan Basin](#).

- [Recognition of a cryptic maximum flooding surface in shallow marine carbonate sequences using geochemical \(Y/Ho\) proxy data.](#)

Impacts and **Earth Shattering Kabooms**

- [He saw a suspicious pit on Google Maps. Experts say it could be a crater from an ancient space rock.](#)
- [Clues on the Australasian impact crater site inferred from detailed mineralogical study of a monazite inclusion in a Muong Nong tektite.](#)
- Planetary geology: [Giant impact on early Ganymede and its subsequent reorientation](#); Eureka Alert summary [here](#).

Plate Tectonics

- [Shallow crustal structure of eastern trans-Mexican volcanic belt: Gravity and magnetic constraints.](#)
- [The Origin of the Lehmann Discontinuity Beneath the Ancient Craton: Insight From the High Pressure-Temperature Elasticity Measurements of Topaz.](#)
- [Detectable Continental Crust in the Earth's Deep Interior Inferred From Thermodynamic Modeling.](#)
- [Craton deformation from flat-slab subduction and rollback.](#)
- Interview: [A journey to the centre of plate tectonics and mantle convection](#); the book reviewed can be found [here](#).
- [Graphite preserved in ancient mountain belts linked to supercontinent assembly.](#)
- [Earth's tectonic and plate boundary evolution over 1.8 billion years](#); summary in [The Conversation](#).

Paleontology

- [Experience: we discovered a rare T rex fossil.](#)
- [A Spanish saltasauroid titanosaur reveals Europe as a melting pot of endemic and immigrant sauropods in the Late Cretaceous.](#)
- Microfossils: [The palaeobiological significance of clustering in acritarchs: a case study from the early Cambrian of North Greenland.](#)
- Amphibians: [Impact of environmental barriers on temnospondyl biogeography and dispersal during the Middle–Late Triassic.](#)
- [Redox changes in the Iapetus Ocean during the Late Ordovician extinction crises.](#)
- [The Youngest European Record of the Chelonian Family Trionychidae \(Calabrian, Central Italy\) Offers New Clues on the Quaternary Extirpation History of the Softshell Turtles.](#)

Mining and Energy

- [Saudi Arabia Cuts Oil Prices.](#)
- [U.S. Refiner Warns of Looming Capacity Shortage.](#)
- [Massive helium reservoir in Minnesota could solve US shortage.](#)
- Seeley's Bay ON: [A sprinkle of crushed wollastonite helps crops and captures carbon, company says.](#)
- Graphic: [The world's oil biggest reserves.](#)
- Saskatchewan: [Jansen potash mine ahead of schedule, more growth planned.](#)
- Demand for silver exceeds supply: [Miners are dumping every single ounce they produce.](#)
- [Some want a robust gold industry in Nova Scotia. Others say good riddance.](#)
- Heavy oil: [More drilling going on near Lloydminster than there has been in years.](#)
- [Codelco bids \\$500 million for stake in key Chile copper mine.](#)
- [How the 'shale revolution' provides leverage for geothermal energy.](#)
- [Lithium prices have crashed this year, squeezing margins at Australian miners.](#)
- [Africa's Top Refinery Could Soon Upend Global Gasoline Markets.](#)
- [Los Angeles: A Megacity of 12 Million People Living Over the World's Richest Oil Field.](#)

Mineral Deposits Geology

- Mineral exploration, from Ore Geology Reviews: [Overcoming survival bias in targeting mineral deposits of the future: Towards null and negative tests of the exploration search space, accounting for lack of visibility.](#)
- [The orientation of intra-arc crustal fault systems influences the copper budget of magmatic-hydrothermal fluids.](#)
- [Gold nugget formation from earthquake-induced piezoelectricity in quartz;](#) behind a paywall, Live Science summary [here](#).
- [New Porphyry Copper–Molybdenum Ore Occurrence in Arganaty Granites of the Eastern Balkhash \(Kazakhstan\): Geology, Geochemistry, and Mineralogy.](#)
- [The Permian Watershed tungsten deposit \(northeast Queensland, Australia\): fluid inclusion and stable isotope constraints.](#)

Environmental Geology and Hydrogeology

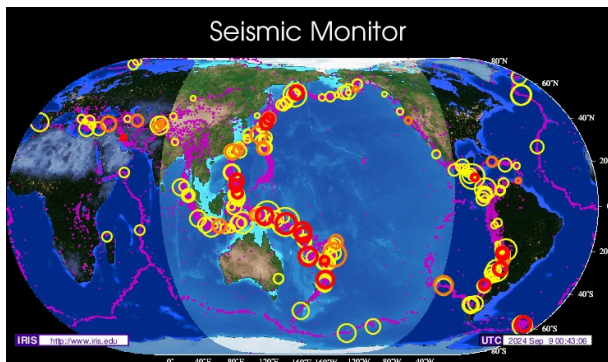
- [Groundwater flow paths using combined self-potential, electrical resistivity, and induced polarization signals.](#)

- [A review of the major chemical and isotopic characteristics of groundwater in crystalline rocks of the Canadian Shield.](#)
- Remediation is expensive: [Yukon gold mine disaster sparks fears of soaring taxpayer bill.](#)
- [Bottled water, tap water and household-treated tap water—insight into potential health risks and aesthetic concerns in drinking water;](#) Phys.org summary [here.](#)
- Bad waste management: [Woman Drops AirTag in Recycling to See if Plastics Are Actually Recycled.](#)
- More bad waste management: [‘Queen of trash’ among 11 on trial in Sweden’s largest environmental crime case.](#)
- Nuclear waste storage, related to today’s post: [Finland Unveils World's First Deep-Earth Repository To Bury Nuclear Waste.](#)

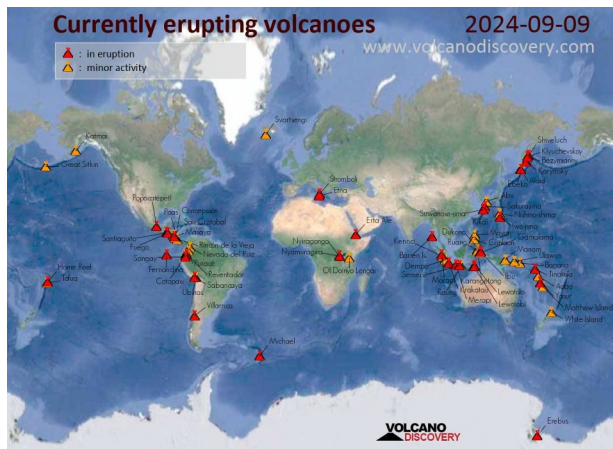
Glaciers and Climate Change

- [A climate threshold for ocean deoxygenation during the Early Cretaceous;](#) Phys.org summary [here.](#)
- [This glacier was featured on a postcard in 1900. A camera captured where it is today.](#)
- Sampling glaciers: [Why I love drilling in the mountains early in the morning.](#)
- Glacial Lake Agassiz: [Scientists reveal the majesty of North America’s 6th Great Lake.](#)

Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

Volcanoes

- United States Geological Survey (USGS) Volcano Watch: [Webcam upgrades keep a sharp eye on Hawaiian volcanoes.](#)

- USGS Yellowstone Volcano Observatory: [Quartz crystals record cooling of deposits from super eruptions](#).
- [Smithsonian / USGS Weekly Volcanic Activity Report](#).
- Volcanoes on a moon of Jupiter: [JIRAM Observations of Volcanic Flux on Io: Distribution and Comparison to Tidal Heat Flow Models](#).
- Philippines, video: [Live Now: 24/7 Mayon Volcano Eruption](#).

Earthquakes

- [Euro-Mediterranean Seismological Centre \(EMSC\)](#).
- [Earthquakes Monitoring Live Worldwide](#).
- Earthquake research: [Low-Viscosity Zones Beneath the Coso Volcanic Field Revealed by Postseismic Deformations Following the 2019 Ridgecrest Earthquake](#).
- [Mw5 aftershock occurs near epicenter of 2023 M7.8 Turkey-Syria earthquake](#); EMSC summary [here](#).
- [M6.2 earthquake shakes Papua New Guinea](#); USGS summary [here](#).
- Earthquake research: [Surface Rupture of the 2008 Mw 6.6 Nura Earthquake: Triggered Flexural-Slip Faulting in the Pamir-Tien Shan Collision Zone](#).
- More earthquake research: [Synthetic ground motions in heterogeneous geologies from various sources: the HEMEWS-3D database](#).

Geologists in the News

- [Wyoming Geologist Gets Millions Of Views As YouTube Rock Star](#); added to the You Tube Channels and Neat Videos on the [Home Page](#).

Upcoming Events

- This week: [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](#).
- [39th General Assembly of the European Seismological Commission](#) to be held in Corfu (Greece) from 22 to 27 September.
- [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](#).

September 9, 2024

Geology and the Fate of Societies – Finland



Figure 1a – Finland

Credit: CIA World Factbook, public domain



Figure 1b – Location of Finland

Credit: CIA World Factbook, public domain

This week we will look the [Nordic country](#) of [Finland](#). Located in [northern Europe](#), Finland is bordered by: [Russia](#), to the east, [Norway](#) to the north, and [Sweden](#) to the west. Also, separating Finland and

Sweden, is the [Gulf of Bothnia](#) of the [Baltic Sea](#); and to the south is the [Gulf of Finland](#), across which is [Estonia](#).

The Republic of [Finland](#) is a [unitary parliamentary republic](#). The President is [Alexander Stubb](#) and the Prime Minister is [Petteri Orpo](#). The legislature is called the [Suomen eduskunta](#) (Parliament) and the Speaker of the Suomen eduskunta is [Jussi Halla-aho](#). The capital and largest city is [Helsinki](#) (pop. 1,582,452 in the metropolitan area).

According to the [Central Intelligence Agency](#) (CIA) [World Factbook on Finland](#), the country has a total area of 338,145 square kilometres (km²), of which 303,815 km² is land and 34,330 km² is water (Finland has more than [180,000 recorded lakes](#)). Also according to the CIA World Factbook, 5,626,414 people live in Finland, mostly in the southern part of the country, 85.8% of whom live in urban areas. Of the approximately 5.63 million people in Finland, almost 90% are ethnic [Finns](#). Other ethnic groups in the country include [Swedes](#), [Russians](#), [Estonians](#), [Romani](#), and [Sámi](#). [Finnish](#) and [Swedish](#) are the two official languages; [Sámi](#), [Karelian](#), and [Finnish Kalo](#), as well, [Finnish Sign Language](#) and [Finnish-Swedish Sign Language](#) have official recognition. In terms of religion, 66.6% of Finns are [Lutheran](#); of the remainder, 30.6% have no religion, 1.1% are [Eastern Orthodox](#) and 1.7% are something other.



Although they often poke fun at themselves for being dull, Finns are a well educated bunch; the median educational achievement for Finns is 19 years in school. The Finnish [Human Development Index](#) is very high at 0.942 and the [Gini coefficient of inequality](#) is low at 26.6. The per capita [GDP](#) in Finland is \$59,869. Finland also has a well organized [social welfare program](#).

Figure 3 – Humorous Coffee Mug
Credit: ©[Touch of Finland](#)

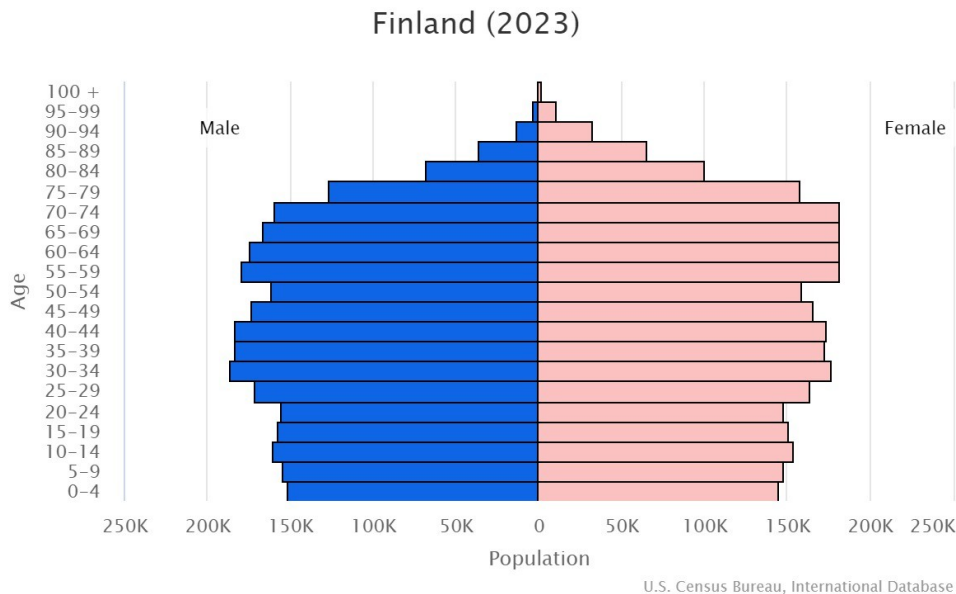


Figure 3 – Demographic Profile of Finland
Credit: [U.S. Census Bureau, International Database, public domain](#)

The demographic profile of Finland shows an aging population where the median age is 43.3 years and 60.3% of the population is between 15 and 64 years of age. The total fertility rate is 1.74 births per woman (below replacement rate of 2.1) and the annual growth rate is 0.2%. Life expectancy at birth for both sexes is 82.0 years.

Geology

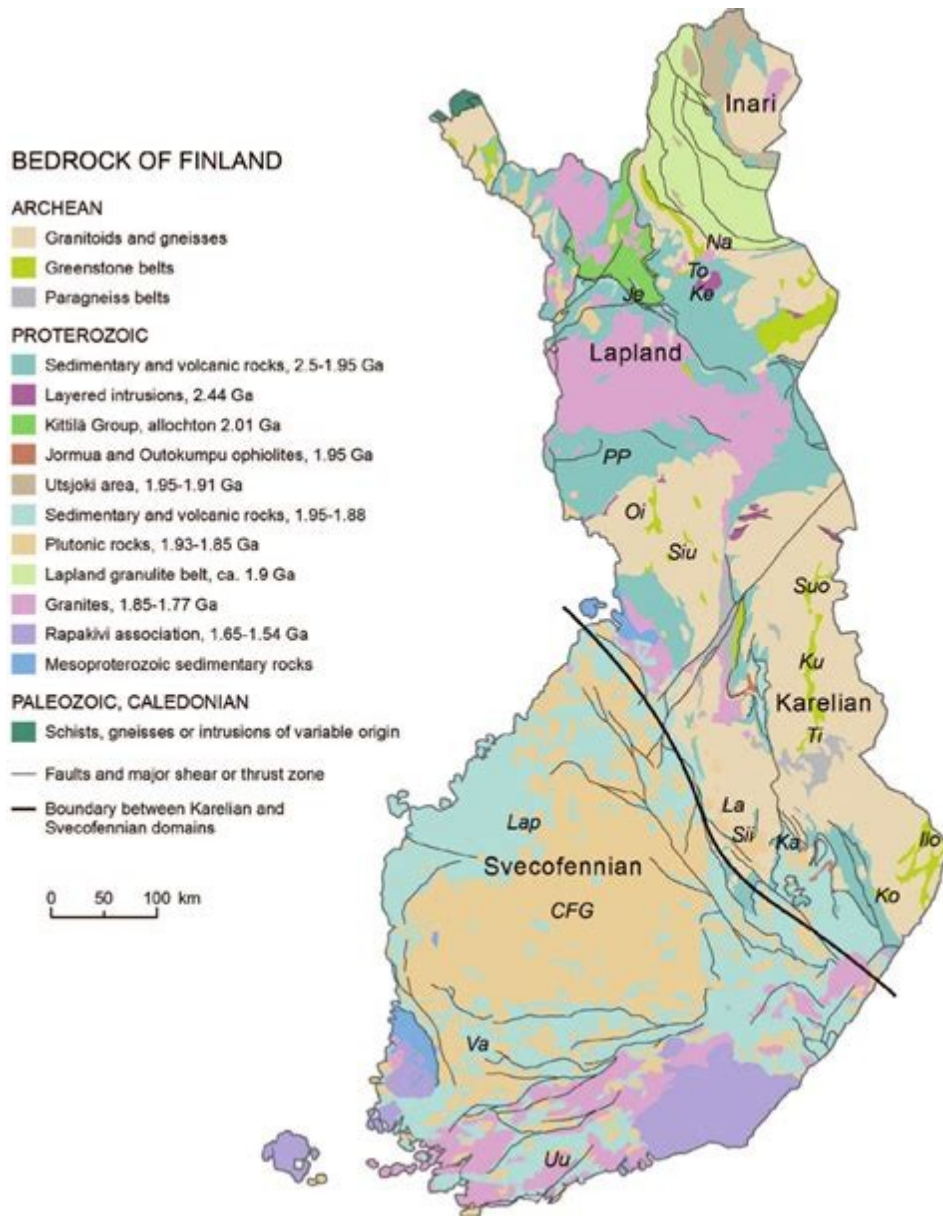


Figure 4 – Geological Map of Finland
 Credit: Figure 4 in [Huhma et al, 2011](#)

The [geology of Finland](#) is primarily composed of [Precambrian](#) rocks of the [Fennoscandian Shield](#) with some younger [Paleozoic](#) deposits in the northwest. The major geological domains in Finland, from north to south, are:

- In the extreme northwest of Finland are the Paleozoic rocks of the [Scandinavian Caledonides](#); these rocks were assembled during the [Caledonian orogeny](#) and consist of mostly [schist](#) and [gneiss](#).
- In the northeast is the [Archean](#) aged [Kola Domain](#) which includes the [Lapland Granulite Belt](#) and the [Inari Complex](#); the Lapland Belt consists mainly of [migmatized greywacke](#) and [argillites](#); and the Inari Complex is made up of [amphibolite](#), [paragneiss](#), [orthogneiss](#) and [greenstone belts](#).
- In the east of Finland are the Archean to [Paleoproterozoic](#) aged [Karelian Domain](#); this domain includes a wide variety of rocks including greenstone belts, many types of [plutonic](#) rocks such as [granite](#), together with [sedimentary](#) and [volcanic](#) rocks.
- To the south of Finland is the [Proterozoic](#) aged [Svecofennian Orogen](#) composed of a variety of granites, [granitoid](#), [mafic](#), and [intermediate](#) rocks.
- Also in the south of Finland are the [Rapakivi granite](#) and [Jotnian sediments](#).

This is, of course, a gross simplification of the complex geology of Finland. Like many areas with a long geological history, Finland's geology gets more complex the closer you look at it. Detailed geological information from the [Geological Survey of Finland GTK](#) can be found [here](#).

Resources

Agriculture



Figure 5 – Pasture on Haltiala Farm, Vantaa, Finland

Credit: [Abc10](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

According to the CIA World Factbook, agricultural land takes up 7.5% of the total area of Finland (7.4% [arable land](#), 0% [permanent crops](#), 0.1% permanent [pasture](#)). Of the remainder 72.9% is forest and 19.6% is other, such as lakes and urban areas.

A northern country, Finland is unique in that most of its agricultural land is between the 60th and 65th parallel; this gives them long summer days – good for crops, and long winter nights – good for [alcohol consumption](#). Major crops include: [barley](#), [oats](#), [potatoes](#), [wheat](#), [sugar beet](#), [rapeseed](#), [carrots](#), [cucumbers](#), [rye](#), and [tomatoes](#). Livestock production in Finland includes [cattle](#), [sheep](#), [pigs](#), and in the Sami territory, [reindeer](#). The local variety of sheep, called [Finnsheep](#), is considered part of their national heritage. Statistics on agricultural production in Finland from the [United Nations Food and Agriculture](#)

[Organization](#) (FAO) can be found [here](#). The select indicators on agriculture for Finland from the FAO can be found [here](#).



Figure 6 – The Fishing Village of Kiviniemi, Haukipudas, Finland
Credit: [Estormiz](#), public domain

[Commercial fishing](#) remains an important source of food production in Finland. The commercial fishery includes: salt water fishing, in [the Baltic Sea](#); fresh water fishing, in the [many lakes and rivers](#) of the country; and [aquaculture](#). Here are the links to statistics on commercial [salt water fishing](#), [freshwater fishing](#), and [aquaculture](#). There is also a [lively sport fishery](#) in Finland.

As part of the [European Union](#), Finland is part of the [Common Agricultural Policy](#) and [Common Fisheries Policy](#) that subsidizes and regulates food production. One result is a low, 12.6%, rate of moderate to severe [food insecurity](#).

Forestry

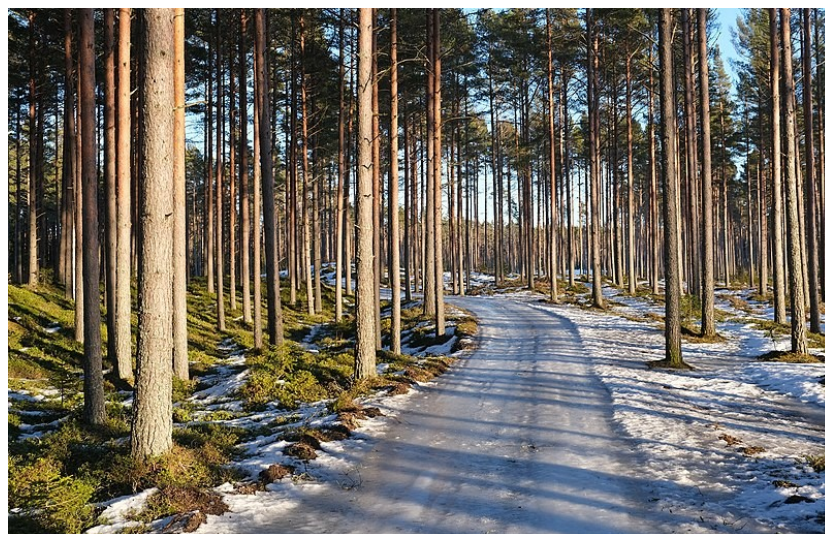


Figure 7 – Late Winter Forest, Yteri, Finland
Credit: [kallerna](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

As indicated above, forests cover about 72.9% of the land in Finland. The [forests in Finland](#) are part of the circumpolar [taiga](#) forests. The Finnish taiga consists mostly of coniferous forest: [pines](#), [spruces](#), and [larches](#) interspersed with [peat bogs, fens and mires](#).

The [forest industry in Finland](#) is a significant part of the country's culture and economy. About 160,000 Finns work in the forest industry and the sector accounts for 18% of all industrial production, 15% of industrial workers and approximately 20 per cent of all Finnish exports. Statistics on forestry production from the FAO can be found [here](#).

Mineral Resources



Figure 8 – Kittila, Finland, Open Pit Gold Mine

Credit: [Agnico-Eagle Mines Limited](#), [Creative Commons CC0 1.0 Universal Public Domain Dedication](#)

Mining is a [major industry in Finland](#). The country has major metallic mineral deposits include [chromite](#), [cobalt](#), [copper](#), [iron](#), [lead](#), [nickel](#), and [zinc](#) together with industrial minerals such as [apatite](#), [dolomite](#), [feldspar](#), [limestone](#), [silica](#), [talc](#) and [wollastonite](#). Finnish production of talc accounts for 4% of total world production. Another product quarried in Finland is [peat](#), used for both [energy production and as an agricultural soil amendment](#). Statistics on mineral production in Finland, from the USGS, can be found [here](#). Operational mines in Finland include:

- The [Kemi](#) mine, operated by [Outokumpu](#), produces chromite.
- The [Kevitsa Mine](#), operated by the [Boliden Group](#), produces cobalt, copper, gold, nickel, platinum, and palladium.
- The [Talvivaara mine](#), operated by [Terraframe](#), produces cobalt, copper, nickel, and zinc.
- The [Pyhäsalmi Mine](#), owned by [First Quantum Minerals Ltd.](#), produces copper and zinc as well as pyrite and sulphur for fertilizers.

- The [Kimito mine](#), operated by [Sibelco](#), produces feldspar and silica, Sibelco also mines silica sand at [Nilsia](#) and [Karvia](#).
- The [Kittila mine](#), operated by [Agnico-Eagle Mines Limited](#), produces gold.
- [Dragon Mining Ltd.](#) mines at [Jokisivu](#), [Kaapelinkulma](#), and [Orivesi](#) produce gold.
- [Endomines](#) operates a gold mine at [Pampalo](#) and plans to open a gold mine at [Hosko](#) this year.
- [Yara International ASA](#) produces apatite (calcium phosphate) and mica at the [Siilinjärvi Mine](#).
- [Sotkamo Silver AB](#) mines silver at their mine in [Sotkamo](#).
- [Juuan Dolomiittikalkki Oy](#) quarries dolomite at [Paltamo](#).
- [SMA Mineral AB](#) quarries dolomite, limestone and silica at quarries in [Pieksamaki](#) and [Tornio](#).
- Talc is mined at Sotkamo by [Elementis Finland](#); [Nordic Talc](#) is developing a talc mine near [Suomussalmi](#).
- Nordkalk mines wollastonite at [Lappeenranta](#).

Recently closed mines include:

- The [Kyllylahti Mine](#), also operated by Boliden, produced cobalt, copper, gold, nickel, and zinc, closed in 2023
- The [Pahtavaara mine](#), operated by [Rupert Resources](#), produced gold 2006 to 2014.

Figure 9 links to an interactive mineral occurrence map of Finland.

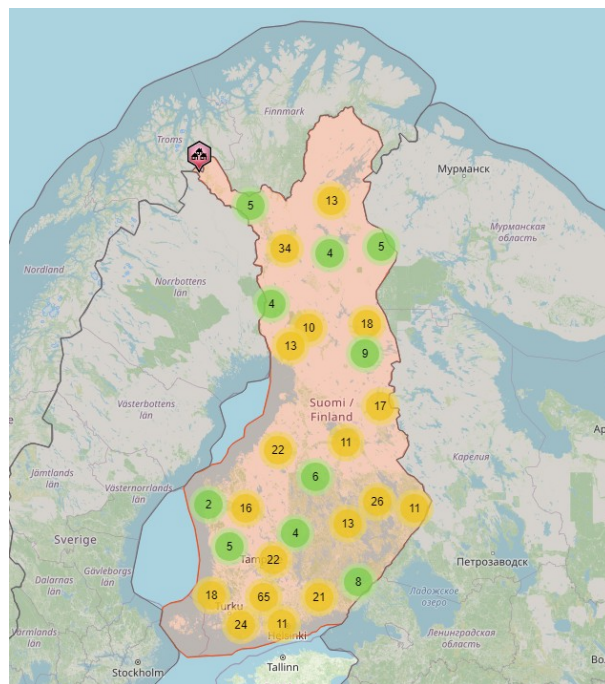
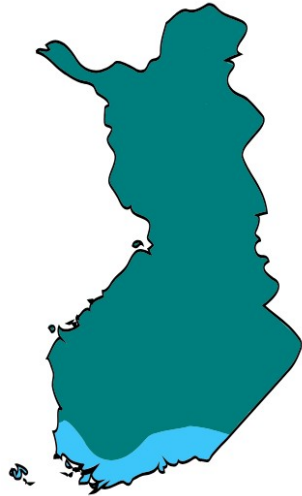


Figure 9 – Interactive Mineral Occurrence Map, Finland
 Credit: [©Mindat.org](#)

Climate



- Cool continental climate/
Subarctic climate (Dfc)
- Temperate continental climate/
Humid continental climate (Dfb)

The climate of Finland is primarily cool continental / subarctic climate ([Dfc](#)) with an area of temperate continental / humid continental climate ([Dfb](#)). It has cold, snowy winters with warm summers.

Finland looks like a great place to visit, the travel advisories ([here](#) and [here](#)) suggest normal precautions. If you plan to visit, check out [Lonely Planet](#) and [Climates to Travel](#). It's an advanced country, so check the news before you go and dress for the weather. The [official tourism information site for Finland](#) calls it the "The happiest country in the world".

Figure 10 – Koppen Climate Classification Map, Finland

Credit: [Ali Zifan, Creative Commons Attribution-Share Alike 4.0 International license](#)

History and Geopolitics

History of a Northern Country

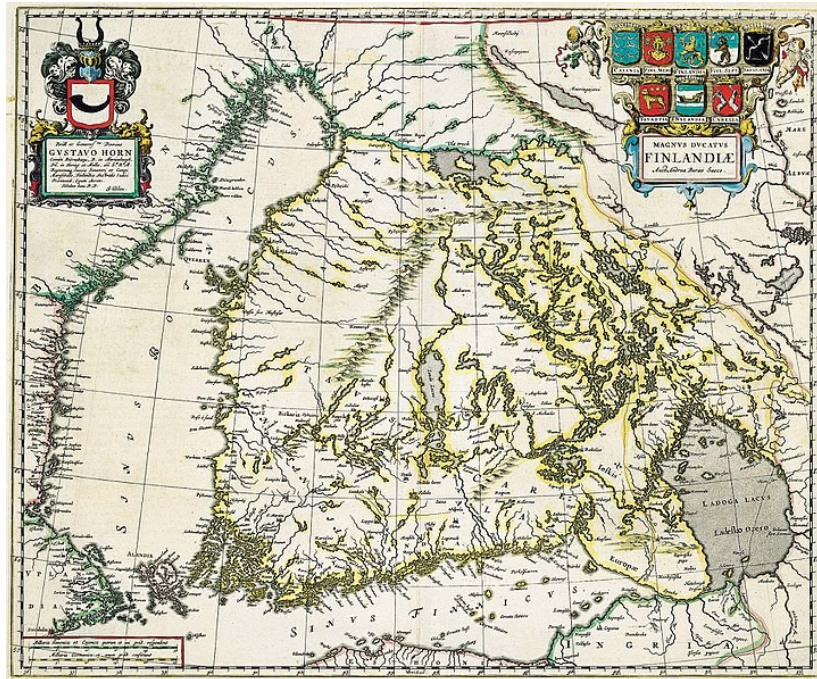


Figure 11 – Grand Duchy of Finland 1662

Credit: [Joan Blaeu Atlas Maior, Magnvs Dvcatvs Finlandiæ, Amsterdam 1662, public domain](#)

The [history of Finland](#) goes back to the retreat of the [continental glaciers](#) at the end of the [Last Glacial Period](#). Once the land became inhabitable, hunter-gatherer peoples, possibly [Finnic](#) speaking peoples, moved in and made a living off the land.

During the [Middle Ages](#), [Swedish Vikings](#) began settlements on the Finnish coastline for plundering and trading with the Finnish tribes. This began a long period of Swedish influence and rule in Finland. Swedish adventurers, continuing their traditions of plunder and conquest, embarked on crusades to take over Finland, beginning with the [First Swedish Crusade](#) in 1150. By the 13th Century, Christianity was established in the Finland, [Bishop Thomas](#) being recorded as the first bishop of the land. A [Second Swedish Crusade](#) in 1236 was followed by a [Third Swedish Crusade](#) in 1293. In 1389, a bloody power struggle among the Nordic nations resulted in the founding of the [Kalmar Union](#) of Sweden, Denmark and Norway with [Queen Margaret I of Denmark](#); the Finnish holdings of Sweden were thus incorporated into Queen Margaret's realm.

The Kalmar Union broke up in [bloodshed](#) in 1523, but Finland remained a part of the Swedish realm. Finland was frequently fought over in [wars between Sweden and Russia](#). In 1808, following the [Finnish War](#), Finland was incorporated in the [Russian Empire](#) as the [Grand Duchy of Finland](#). Under Russian rule, Finland was a [semi-autonomous](#) principality of the Russian Empire, left to practice the Lutheran Christianity they [adopted along with Sweden](#) in the 16th Century.

Finland remained under the Russian Tsars until the end of the Russian Empire in the [February Revolution](#) and [October Revolution](#) of 1917. Declaring [independence in December 1917](#), the Finns descended into their own [civil war](#). The “[white guard](#)” anti-communist side won the war over the “[Finnish Socialist Workers Republic](#)”, the “reds”. Finland then tried to settle down to build a peaceful democratic republic, with [mixed success](#).



Figure 12- A Finnish [Maxim M-32 Machine Gun](#) Nest During the Winter War
Credit: [finna.fi](#), [Finnish Wartime Photograph Archive](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

In August 1939, [Nazi Germany](#) and the [Soviet Union](#) signed the [Molotov-Ribbentrop Pact](#), a protocol of which gave over Finland to the Soviet sphere of influence. In November 1939, the Soviets attempted to enforce the pact by invading Finland sparking the [Winter War](#).

Initially, it did not go well for the Soviets, i.e. ~~the Soviets got their ass kicked~~. The Finns fought skillfully behind prepared defensive positions, the [Mannerheim Line](#), and also defeated Russian mobile incursions into Central Finland at the [Battle of Suomussalmi](#). Despite heavy losses, the Soviet displayed their usual disdain for human life and pressed on with their attacks on Finland. Although they [incurred heavy losses](#), the Soviets eventually wore down the Finns and forced them to negotiate a settlement. The [Moscow Peace Treaty](#) was signed in March 1940. When [Germany invaded the Soviet Union](#) in 1941, the Finns took the opportunity to take back the land they lost to the Soviets in the Moscow Peace Treaty, a conflict the Finns call the [Continuation War](#). When it was clear that the German cause was lost, the Finns made a [separate peace with the Soviets in 1944](#).

Despite Finland essentially losing the Continuation War to the Soviet Union, the heavy casualties of the Winter and Continuation War left the Soviets with no appetite to swallow up Finland in 1944. The peace agreement did require Finland to remain [neutral](#); as they did until the [fall of the Soviet Union](#) in 1989.

[Postwar Finland](#) was marked by fairly peaceful internal affairs, with the usual democratic churn, and a growth in both prosperity and the welfare state. In the years since 1989, Finland grew increasingly closer to Western Europe, [joining the European Union in 1995](#) and [NATO](#) in 2023.

Geopolitics – Living Next to the Bear



Figure 13 – Two American F-15 Operating out of Prikkala Air Base, June 1, 2023
[Credit: U.S. Air Force, public domain](#)

Finland's harsh experience in the Winter War and Continuation War some 80 years ago had the effect of uniting the country and toning down the internal political disputes. The experience of neutrality during the [Cold War](#) put Finland into the position of being in a precarious relationship with their Soviet neighbours; this also encouraged the Finns to stick together. The fall of the Soviet Union gave Finland an opportunity to reorder their foreign relations, and they made the choice to join the Western commercial and military alliances.

With regards to their [relations with NATO](#) and the [European Union](#), Finland has aligned itself with countries that it shares cultural and economic ties, i.e. the other Nordic countries. By default, this led Finland into alliance with NATO and the [United States](#) and into the European Union commercial alliance. This can be seen as a natural outcome based upon common cultures and interests. It is difficult to see how Finland could have made a different choice.

Unfortunately for [Finland's relationship with Russia](#), the Finnish move to integration into NATO and the EU has triggered deep fears among the Russians as it is part of a [larger encroachment by NATO upon their borders](#). The Russians haven't forgotten Finland's aid to Nazi Germany during the Continuation War nor have they forgotten the [many invasions of Russia](#) including by western powers such as [Sweden](#), [France](#) and [Germany](#). For their part, the Finns haven't forgotten the years of Russian occupation of Finland nor have they forgotten the conflicts with Russia during the 20th Century. History makes both Finland and Russia wary of each other and makes Russia suspicious of Finland's friends in NATO. The current [war in the Ukraine](#) can be seen in the light of [Russia's fears](#) of foreigners. For Finland, this means living next to a fearful, and well armed, neighbour who has interfered with Finland in the past. It will be a continuous challenge for the Finns, and their NATO allies.

The current wide spread movement of [migrants from Africa and the Middle East into Europe](#) has not left Finland out. One of the issues in the movement of migrants has been Russia [aiding migrants seeking entry to the EU through Finland](#). Finland has recently [passed a law](#) to block migrants crossing from Russia. The migrants will probably find another way to get to places like Finland that have generous social welfare systems – the problem will not go away easily and we can expect further [action](#) on this front.

That kind of wraps up this look at Finland. I am fairly optimistic for them and think that they will rise to the many challenges they face.

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.