

September 16, 2024

## News and notes

Before going on to discuss the geology and geopolitics of [France](#), 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

- [LIVE: FBI investigating new Trump assassination attempt near his golf course; suspect detained](#).
- [Three US citizens sentenced to death in Congo over role in failed coup](#).
- From Gail Tverberg: [Peak Oil: A Looming Threat to Economic Stability](#).
- Video: [Armageddon in Africa: How Sudan Became the World's Worst Crisis](#).
- [Arms Manufacturers Catching Up with World's Insatiable Need for 155mm Rounds](#).
- Opinion on X: [Douglas Macgregor telling some truths about the war in Ukraine](#).
- War and mineral supply chains: [Kazatomprom warns Ukraine war makes it harder to supply west](#).
- I suggested ([here](#) and [here](#)) keeping an eye on this one: [Ethiopia hits out at Egypt as Nile dam row escalates](#).

## Research and News

- Sedimentology: [Sediment flux variation as a record of climate change in the Late Quaternary deep-water active Corinth Rift, Greece](#).
- [A field-based thickness measurement dataset of fallout pyroclastic deposits in the peri-volcanic areas of Campania \(Italy\): statistical combination of different predictions for spatial estimation of thickness](#).
- The **2024 Ig Nobel Prizes** were awarded at the 34th First Annual Ig Nobel Prize ceremony, on Thursday evening, September 12, 2024, [this year's Ig Noble Awards](#).
- **If you love pegmatites**, read this one: [A review of lithochemical dispersion haloes of LCT pegmatites, and their application to rare metal exploration, with special reference to lithium in an Australian context](#).

- [Unravelling tectonic and lithological effects on transient landscapes in the Gulf of Corinth, Greece.](#)
- Petrology: [Enclaves as mushy magma strain archives: New perspectives on composite magmatic fabrics in plutons.](#)
- Geo tourism do's and don'ts: [Police issue warning over exploring Scotland's only gold mine.](#)

## Plate Tectonics

- [Mineralogy and plate tectonics: Detrital K-feldspar as a novel archive of continental crustal evolution using coupled in situ Rb-Sr dating and Pb isotope analysis.](#)
- [Evolution of rift faulting in incipient, magma-poor divergent plate boundaries: New insights from the Okavango-Makgadikgadi Rift Zone, Botswana.](#)
- [Kinematics of rift linkage between the Eastern and Ethiopian rifts in the Turkana Depression, Africa.](#)
- [GPlates, software to reconstruct past positions of the Earth's cratons.](#)

## Impacts and Earth Shattering Kabooms

- [Geochemical evidence for a chondritic impactor in altered impact glass from the Stac Fada Member impactite, NW Scotland.](#)
- [On the Sensitivity of Apophis's 2029 Earth Approach to Small Asteroid Impacts;](#) Phys.org summary [here](#).

## Paleontology

- [First Evidence of Reproductive Strategies in Cephalopods Preserved in Phosphate and Siderite Nodules from the Devonian of Uruguay.](#)
- [9 Million Year Old Ancient Marine Fossils Discovered Beneath California High School During Construction.](#)
- [Mega El Niño instigated the end-Permian mass extinction;](#) Live Science summary [here](#).
- [New evidence for five cephalic appendages in trilobites and implications for segmentation of the trilobite head;](#) Phys.org summary [here](#).
- Fossil deer skulls: [A Craniometric Analysis of the Subfamily Cervinae \(Cervidae, Mammalia\).](#)
- [An earliest Triassic riparian ecosystem from the Bulgo Sandstone \(Sydney Basin\), Australia: palynofloral evidence of a high-latitude terrestrial vertebrate habitat after the end-Permian mass extinction.](#)
- Evolution: [The emerging view on the origin and early evolution of eukaryotic cells.](#)

- [Direct evidence of frugivory in the Mesozoic bird \*Longipteryx\* contradicts morphological proxies for diet](#); Phys.org summary [here](#).
- [First report of \*Sansabaina acicula\*, an organic-cemented siliceous agglutinated foraminifera from the Early Permian glaciomarine Pebbly Beach Formation, Southern Sydney Basin, southeastern Australia](#).
- [Polar dinosaur tracks of the Wonthaggi Formation \(Lower Cretaceous\), Victoria, Australia and their palaeontological significance](#); Earth.com summary [here](#).
- [A new neoceratopsian \(\*Ornithischia\*, \*Ceratopsia\*\) from the Lower Cretaceous Ohyamashimo Formation \(Albian\), southwestern Japan](#); Earth.com summary [here](#).
- [The Palaeobiology of Two Crown Group Cnidarians: \*Haootia quadriformis\* and \*Mamsetia manunis\* gen. et sp. nov. from the Ediacaran of Newfoundland, Canada](#); CBC report [here](#).
- Advice on reconstructing ancient life from fossils: [Don't Build a Magdeburg Unicorn With Your Data](#).

## Mining and Energy

- Making jet fuel from trees: [Irish company planning to produce jet fuel in Goldboro, N.S., at former LNG site](#).
- [Nearly 30% of US Gulf of Mexico oil output offline after storm](#).
- [Nickel flowing to Europe shows Indonesia's grip on global supply](#).
- [Ghana anxious lithium price slump will derail maiden project](#).
- [Geothermal energy could outperform nuclear power](#).
- Related to today's posting: [France deploys its army to cover the country with solar panels: No one expected where they started from](#).
- [Uncertainty rattles global crude prices, puts spotlight on Alberta oil revenues](#).
- [Lithium miner stocks soar as CATL adjusts output at key mine](#).
- [Red Lake's Great Bear project could be a beast of a mine](#).
- [US Antimony looks to ramp up antimony smelting facility](#).
- Estimates: [World Copper counts near 1 billion lb. resource at Zonia project in Arizona](#).
- Mine reopening: [Northern B.C. coal mine comes back to life after 24 years](#).
- Mine closure: [Sudbury mine heading for care and maintenance](#).
- Lithium crash: [Arcadium Lithium suspends Mt. Cattlin in Australia](#).

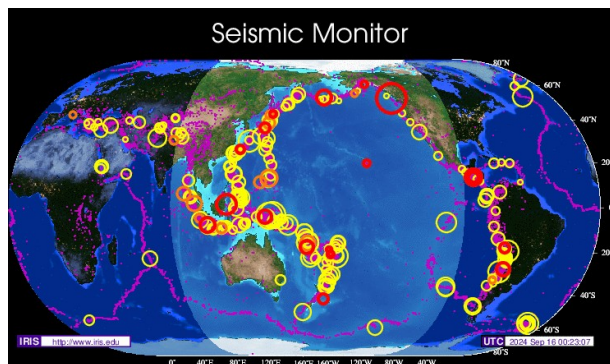
## Environmental Geology and Hydrogeology

- [Abandoned Shasta County mine releasing 'pure acid' water now an EPA Superfund cleanup site.](#)
- Recycling research: [Assessment of transport phenomena in catalyst effectiveness for chemical polyolefin recycling](#); Phys.org summary [here](#).

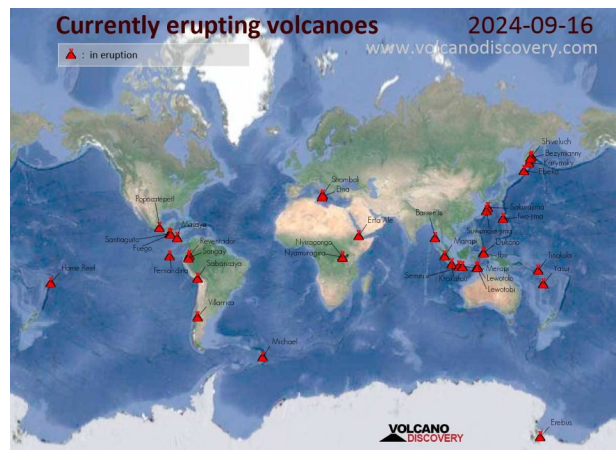
## Glaciers and Climate Change

- [Rising Extreme Meltwater Trends in Greenland Ice Sheet \(1950–2022\): Surface Energy Balance and Large-Scale Circulation Changes](#); Phys.org summary [here](#).
- Data set on the Greenland Ice Cap: [Climate and ablation observations from automatic ablation and weather stations at A. P. Olsen Ice Cap transect, northeast Greenland, for May 2008 through May 2022.](#)
- [The UK and Ireland's climate was tropical 26 million years ago – here's why that matters now.](#)
- Video: [How Milankovitch Cycles Are Causing Earth's Climate To Change.](#)
- Calling Nostradamus: [Evolution of the Antarctic Ice Sheet Over the Next Three Centuries From an ISMIP6 Model Ensemble](#); Phys.org summary [here](#).
- From the Utah Geological Survey: [Rock Glaciers: Reminders of a Glacial Past and Dynamic Landforms in a Warming Future.](#)

## Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

## Volcanoes

- United States Geological Survey (USGS) Volcano Watch: [Recent intrusions follow pattern of previous events.](#)
- USGS Yellowstone Volcano Observatory: [New study seeks to shed light on earthquake hazards in the Gallatin Range.](#)

- [Smithsonian / USGS Weekly Volcanic Activity Report](#).
- [Detecting Transient Uplift at the Active Volcano Ol Doinyo Lengai in Tanzania With the TZVOLCANO Network](#); Phys.org summary [here](#).

### *Earthquakes and Tsunami*

- [Euro-Mediterranean Seismological Centre\(EMSC\)](#)
- [Earthquakes Monitoring Live Worldwide](#).
- [Magnitude 6.5 quake strikes off British Columbia, Canada, USGS says](#).
- [M5.4 earthquake shakes northern Pakistan](#); EMSC summary [here](#).
- [M4.7 strikes near Malibu, California](#); USGS summary [here](#).
- Research: [A rockslide-generated tsunami in a Greenland fjord rang Earth for 9 days](#); Phys.org summary [here](#); related research: [The 16 September 2023 Greenland Megatsunami: Analysis and Modeling of the Source and a Week-Long, Monochromatic Seismic Signal](#); SciTechDaily summary [here](#).
- More earthquake research: [Recurrent partial resetting of quartz OSL signal by earthquakes: a thermochronological study on fault gouges from the Atotsugawa Fault, Japan](#).
- Even more earthquake research: [Hot springs reflect the flooding of slab-derived water as a trigger of earthquakes](#); Phys.org summary [here](#).

### *Landslides and Floods*

- [Death toll in Myanmar from Typhoon Yagi reaches 74. Dozens of other people are missing](#); related video [here](#).
- Making a bad situation worse: [Reflection of Storm Surge and Tides in Convergent Estuaries With Dams, the Case of Charleston, USA](#); Phys.org summary [here](#).

### **Upcoming Events**

- This week: [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](#).
- [Society of Petroleum Engineers Distinguished Lecturer Schedule](#).

September 16, 2024

## Geology and the Fate of Societies – France



**Figure 1a – France**

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



This week we'll look at the [Republic of France](#), an advanced industrial country, a [nuclear power](#), and a founding member of the [European Union](#) (EU). Located in [Western Europe](#), France is bordered to the northwest by the [English Channel](#) and the [North Sea](#), across which is the [United Kingdom](#); to the north, [Belgium](#) and [Luxembourg](#); to the northeast and east, [Germany](#) and [Switzerland](#); to the southeast, [Italy](#) and [Monaco](#); to the south, the [Mediterranean Sea](#); to the south and southwest, [Andorra](#) and [Spain](#); and to the west, the [Atlantic Ocean](#). France [overseas territories](#) includes [French Guiana](#), [Saint Pierre and Miquelon](#), the [French West Indies](#), and many islands in [Oceania](#) and the [Indian Ocean](#). This posting will focus on [Metropolitan France](#).

**Figure 1b – Location of France**

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

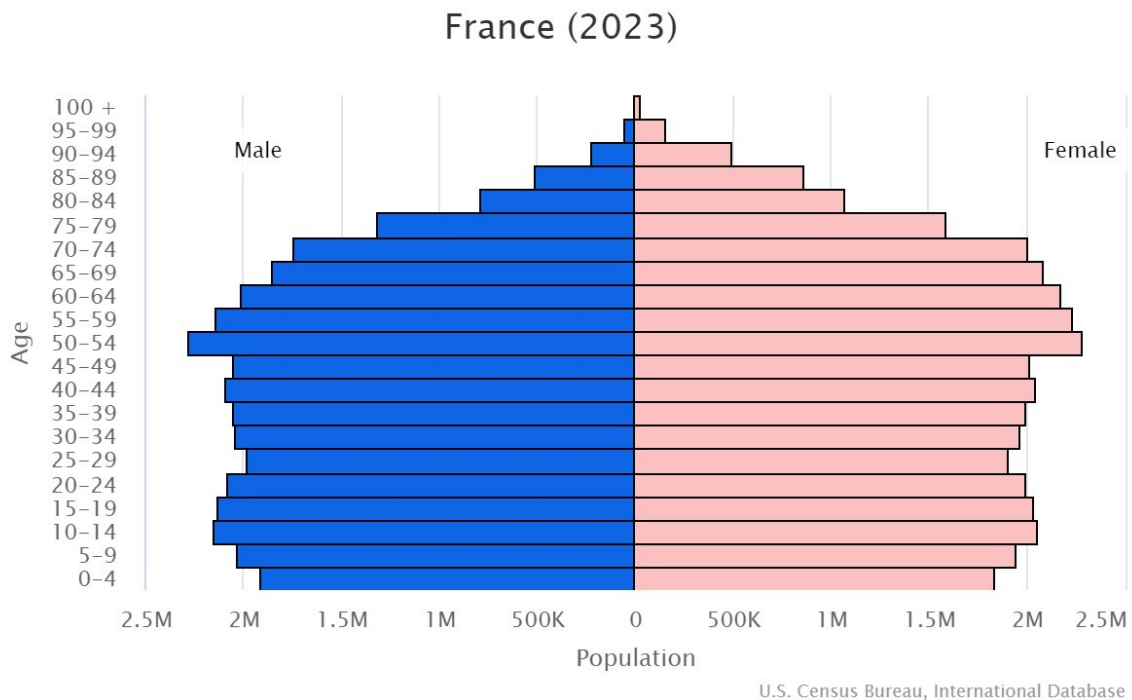
France is a unitary [semi-presidential republic](#); the [President](#) is [Emmanuel Macron](#) who [recently](#) appointed [Michel Barnier](#) as Prime Minister. The legislature consists of an upper house, the [Senat](#) (Senate) and a lower house, the [Assemblée nationale](#) (National Assembly or Parliament). The President of the Senate is [G rard Larcher](#) and the President of the National Assembly is [Ya l Braun-Pivet](#).

According to the [Central Intelligence Agency](#) (CIA) [World Factbook](#), Metropolitan France has a total area of 551,500 square kilometres (km<sup>2</sup>), 549,970 km<sup>2</sup> of which is land and 1,530 km<sup>2</sup> is water.

According to [Institut national de la statistique et des  tudes  conomiques](#) (INSEE), 65,250,000 people lived in Metropolitan France as of January 2021, some 95.9% of the French Republic's population.

81.8% of the population live in urban areas. Of the approximately 65.2 million people in France, 92.2% of the people are [French](#) and the remaining 7.8% something other. [French](#) is the official language, regional dialects and languages include [Proven al](#), [Breton](#), [Alsatian](#), [Corsican](#), [Catalan](#), [Basque](#), [Flemish](#), [Occitan](#), and [Picard](#).

France is [proudly secular](#), with 51% saying that they have no religion. Of the remaining, 38% are [Christian](#), mostly [Roman Catholic](#), 10% are [Moslem](#), and the remaining 1% are something other. The French are a [well educated nation](#); median schooling is 16 years and includes universal primary and secondary education. Economically, the per capita [GDP](#) is \$60,339, the [Gini](#) coefficient is 29.8 (low inequality), and the [Human Development Index](#) is very high at 0.910.



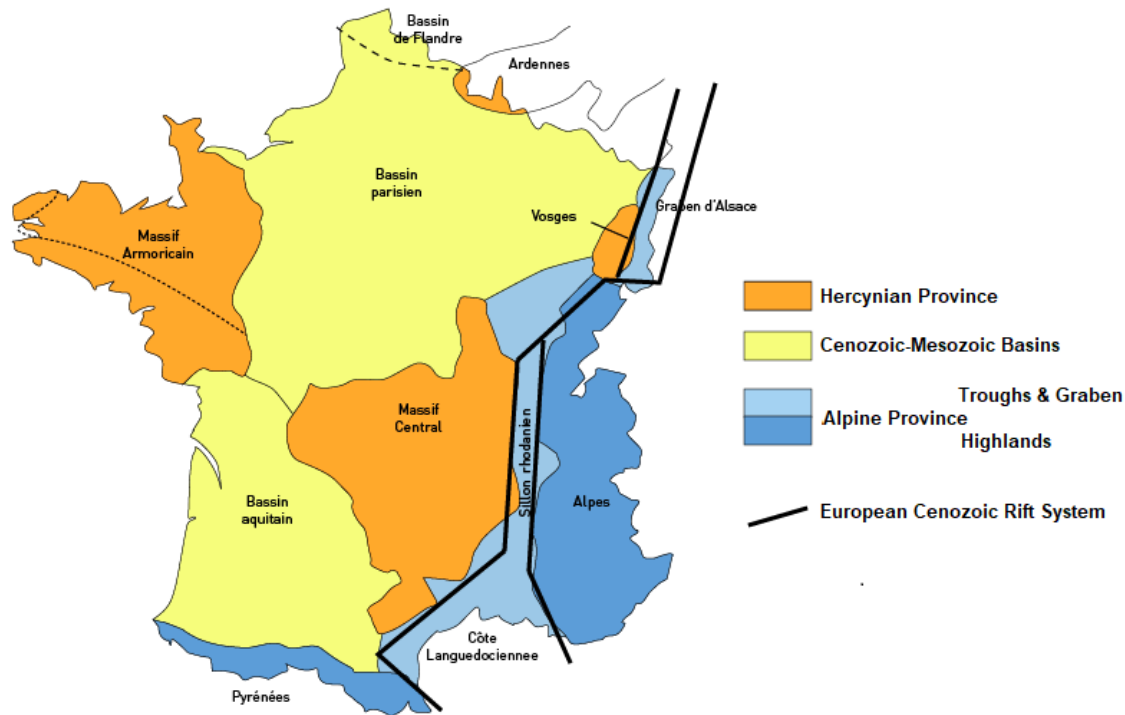
**Figure 2 – Demographic Profile of France**

**Credit:** [U.S. Census Bureau, International Database](#), public domain

The [demographic profile of France](#) shows an aging but fairly stable population. Median age is 42.6 years; the total fertility rate is 1.90 births per woman; the annual growth rate is 0.2%; and the life expectancy at

birth, for both sexes, is 82.5 years. [Net migration](#) to France in 2023 was 67,761 and [664,366 asylum seekers](#) now reside in France.

## Geology



**Figure 3 - Geological Provinces of France**

**Credit:** Teper, [Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic](#) license.

The regional [geology of France](#) is commonly divided into three main provinces or, in French, *domaines*:

1. The [Hercynian Province](#) consists of rock formed during the [Hercynian or Variscan Orogeny](#). The Hercynian Orogeny took place during the late [Paleozoic](#) and involved the [collision](#) of the [Euramerica \(Laurussia\)](#) and [Gondwana](#) cratons to form the [supercontinent](#) of [Pangaea](#). French geological terranes part of the Hercynian Province include: the [Armorican Massif](#); the [Ardennes Massif](#); the [Massif Central](#); and the [Vosges](#).
2. The [Cenozoic – Mesozoic Sedimentary Basins](#) are deposits laid down following the Hercynian Orogeny during the [Mesozoic](#) and [Cenozoic](#) eras. The Cenozoic – Mesozoic sedimentary basins in France include: the [Aquitaine Basin](#); the [Flanders Basin](#); and the [Paris Basin](#).
3. The [Alpine Province](#) consists of features formed during [Alpine Orogeny](#) that began during the Late Mesozoic Era and the continued into the current Cenozoic Era. The terranes within the French Alpine Province include highland zones and lowland area, troughs and grabens. The two highland terranes in Alpine Province are the [Alps](#) and the [Pyrenees](#). The troughs and [grabens](#) are part of the [European Cenozoic Rift System](#) that separates the Alps from the terranes to the west.

The constituent parts of the French portion of the include: the [Alsace or Upper Rhine Graben](#); the [Côte languedocienne](#); and the [Sillon rhodanien](#).

For a more detailed description of the [Geology of France](#), peruse Figure 4, below:

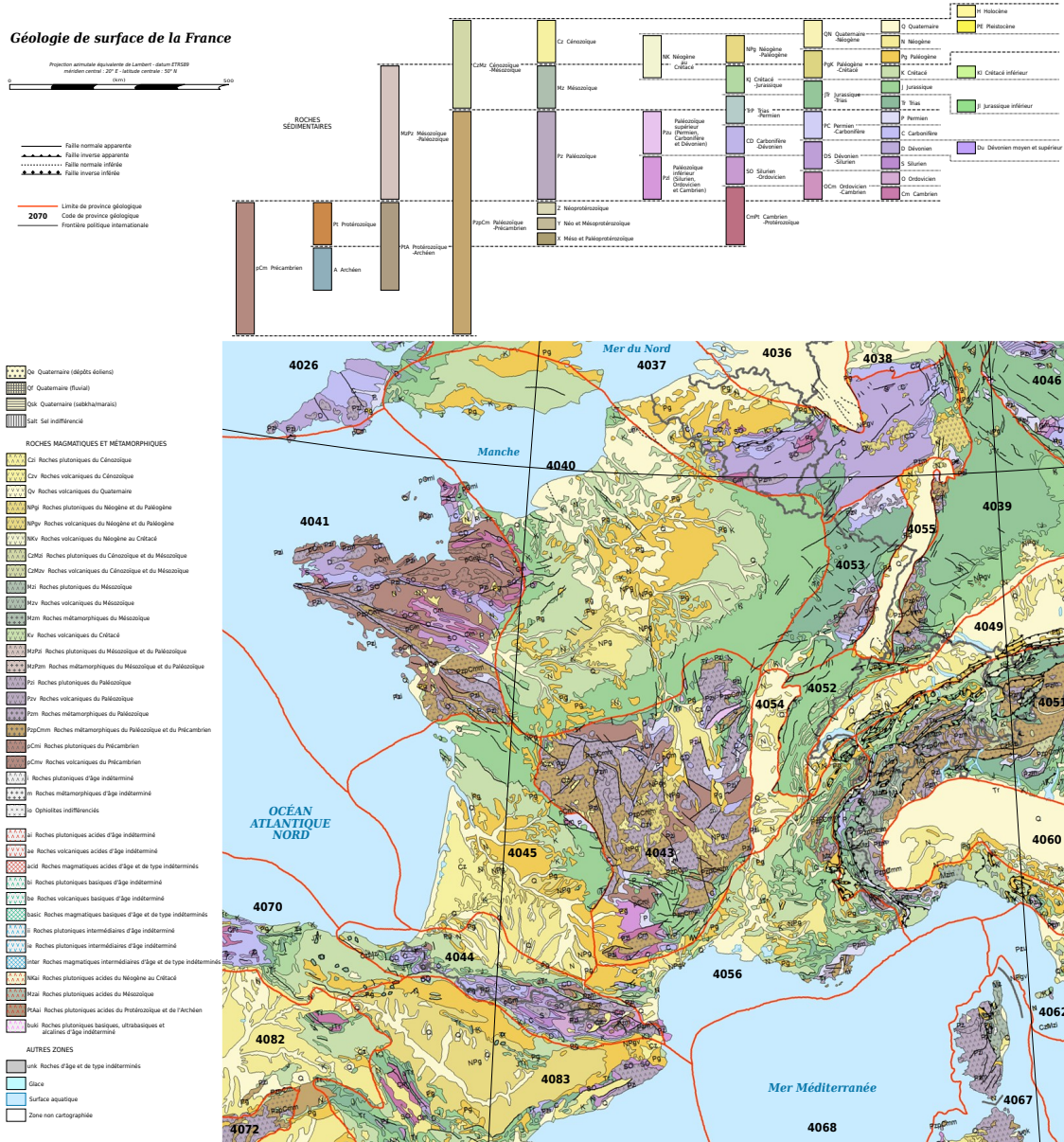


Figure 4 – Geology of France

**Credit:** Eric Gaba ([Sting – fr: Sting](#)), [Creative Commons Attribution-Share Alike 3.0 Unported license](#)

## Resources

## Agriculture



**Figure 5 – Panoramic of Vineyards of [Kaysersberg](#), Alsace**

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

[William Shakespeare](#) called France “this best garden of the world” ([Henry V – Act 5, scene 2](#)) and France remains, to this day, an [important agricultural producer](#). According to the CIA World Factbook, agricultural land makes up 52.7% of France’s total area (33.4% [arable land](#), 1.8% [permanent crops](#), 17.5% permanent [pasture](#)). Of the remainder, forest occupies 29.2% of the land and 18.1% is something other. France has 437 400 agricultural holdings and 824 000 people live and work on French farms

The main crops are [wheat](#), [maize](#), [sugar beets](#), and [barley](#). France also has [extensive vineyards](#) and French wine is [world renowned](#); the French [certainly love it](#), although [less than in the past](#). Livestock production includes [cattle](#), [pigs](#), [dairy products](#) (France is famous for [cheese](#)), [poultry](#), [sheep](#) and [goats](#). Production statistics from the [United Nations Food and Agriculture Organization](#) (FAO) can be found [here](#). Other statistics on French agriculture, from the FAO, can be found [here](#).



**Figure 6 – Farmers' Demonstration, January 2024, near [Saint-Etienne-de-Fontbellon](#)  
Credit: [Kakoula10](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license**

As part of the EU, the [Common Agriculture Policy](#) (CAP) applies to France. In general, the policy has benefited French farmers; they produce the largest amount of agricultural products in the EU accounting for [18% of total EU agricultural production](#). However, all is not sunny. French farmers [protested in January of this year](#) over what they see as unfair changes to the CAP such as low prices for their produce and reductions in state subsidies for farmers' diesel fuel.

### **Forestry**

[Forests cover](#) about 17 million hectares in metropolitan France. 1/3 of the land in France, this represents 13% of the European Union’s wooded area. Three-quarters of the French forest is privately owned. 10%

is state-owned, and the rest is owned by local authorities, mainly communes but also departments and regions. The [top ten species of trees](#) that grow in France are [willow](#), [hornbeam](#), [oak](#), [ash](#), [beech](#), [chestnut](#), [poplar](#), [pine](#), [larch](#), and [maple](#).



**Figure 7 – French Forest in the Mist, Normandy**  
**Credit: [Samuel S, Creative Commons Attribution 2.0 Generic](#) license**

Statistics on forestry production in France from the FAO can be found [here](#).

### *Minerals*



**Figure 8 – Wendel à Petite Rosselle Coal Mine, Moselle**

**Credit: Celeda, Creative Commons Attribution-Share Alike 4.0 International license**

A wide variety of [minerals are mined in France](#). These include:

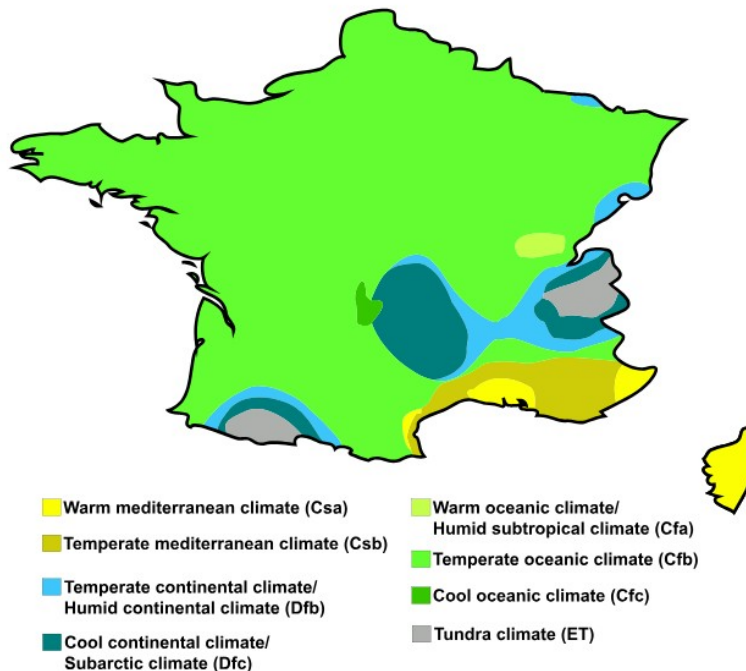
- Metallic minerals including [bauxite](#) (for aluminum), [copper](#), [gold](#), [iron](#), [lead](#), [silver](#), [tungsten](#), and [zinc](#);
- Industrial minerals such as [clay](#), [dimension stone](#), [crushed stone](#), [fluorite](#), [salt](#), [potash](#), and [talc](#); and
- Fuel minerals such as [coal](#) (including [lignite](#)), [natural gas](#) and [petroleum](#).

Coal has been mined throughout France, major coal producing areas include: [Nord-Pas-de-Calais](#), [Lorraine](#), [Blanzly](#), [Auvergne](#), the [Loire basin](#), [Dauphiné](#), [Midi-Pyrénées](#), [Provence](#), and [Cévennes](#). Iron ore producing areas include: [Lorraine](#), [Normandy](#), Western [Anjou](#) and [Brittany](#). Petroleum and natural gas has been extracted from the [Paris Basin](#) and the [Aquitaine Basin](#).

Production statistics from the USGS can be found [here](#). Mindat has a list of French mineral occurrences exploitable mineral commodities [here](#) (sorry, no mineral occurrence map).

## Climate

France map of Köppen climate classification



**Figure 9 – France Map of Köppen Climate Classification**

**Credit: Ali Zifan, Creative Commons Attribution-Share Alike 4.0 International license**

Most of France has a temperate oceanic climate ([Cfb](#)). Elsewhere, climate varies with elevation and includes temperate continental climate ([Dfb](#)), cool continental climate ([Dfc](#)), and, at the highest elevations, tundra climates ([ET](#)). Finally, along the Mediterranean coast you find warm Mediterranean climate ([Csa](#)) and temperate Mediterranean climate ([Csb](#)).

France has an [extensive tourist industry](#) and is favourite place to visit for many people. If you plan to go, check the news for current demonstrations and possible terrorist problems (travel advisories [here](#) and [here](#)). Otherwise, dress for the weather and check out the websites [Climates to travel](#) and [Lonely Planet](#).

## History and Geopolitics

### *A Glorious History*



Figure 10 – Charles Martel in the Battle of Tours

Credit: [Charles de Steuben \(1788–1856\)](#) in the collection of the [Château de Versailles](#), public domain

The history of France is fascinating and there is a lot in it to cover. However, rather than go into detail here, I will focus on the general trends that are important for the development of France’s geopolitical situation. If you want to delve into the details of the history of France, start [here](#) and [here](#).

The three trends in French history that shaped its current geopolitical situation are: the growth of central authority, the growth of French national consciousness, the growth of French influence as a world power.

#### 1. The Growth of Central Authority

Following the fall of the [Western Roman Empire](#), the area that is now modern France fell into anarchy. [Roman Gaul](#) was invaded by numerous war bands and armed tribes such as the [Franks](#) and the [Moslem Umayyads](#). Under first the [Merovingian Franks](#) and then [Carolingian](#) rulers such as [Charles Martel](#) (who defeated the [Umayyads at Tours](#)), the [Frankish Kings](#), most notably [Charlemagne](#), began the process of establishing central government in what became France. It was not a forgone conclusion, and only by the best of luck and diligent work did the medieval and early modern kings, such as [Philip the Fair](#), establish their authority over the numerous [feudal fiefdoms in the realm of France](#).



By the time of [Louis XIV](#), the Sun King could truly say [l'etat c'est moi](#) (i.e. I am the State). The [ancienne regime](#), however had serious flaws, especially financial. The [French Revolution](#) and especially the reign of [Napoleon Bonaparte](#) established the administration and the institutions of strong central government in France. These institutions survived [four republics](#), a [Second Empire](#), and even the [occupation of France by Nazi Germany](#). The current [Fifth Republic](#), established by [Charles de Gaulle](#) in 1958, is the inheritor of those centralized institutions of state authority.

**Figure 11 – Charles de Gaulle in 1945**  
**Credit: [UK National Archives](#)**

## 2. The Growth of French National Consciousness

In medieval and much of modern times, few people thought of themselves as part of anything larger than their local community. One of the factors that led to the growth of national consciousness was the growth of the State, as outlined above. Another factor, if we follow the [research of Peter Turchin](#), are the [many wars that the French state fought](#). In successfully defending themselves, the French saw that they were different from their neighbours, be they English, Spanish or German, and began to see themselves as a nation. Modern France has inherited that history and national consciousness.

## 3. The Growth of French Influence as a World Power

Charlemagne ruled over most of what is modern France and Germany. Subsequent French kings never forgot that and continually sought to extend French power and influence. The [rulers of the French Revolution](#) and both the [First](#) and [Second Empire](#) all sought to extend the French domain. France developed a [large overseas empire](#) that at one time included [much of North America](#).

Although France lost much of its influence in Europe, and the world, with the rise of competing powers, they never quite forgot their grand ambitions. In helping to found the



European Union, statesmen such as Charles de Gaulle satisfied those ambitions, for the time being.

**Figure 12 – Napoleon’s Empire**  
**Credit:** [maparchive](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

### *Geopolitics of a Modern State*



**Figure 13 – Palais de l'Élysée, Paris**  
**Credit:** [Gzen92](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Modern France is a wealthy and relatively secure state. Internally, they have an educated and prosperous population with access to [numerous social services](#). Externally, their former rivals, such as Germany, are joined with France in the EU and the [North Atlantic Treaty Organization](#) (NATO). Other rival states, such as the United Kingdom, while not a part of the EU, are joined to France in NATO. Finally, France has nuclear weapons to ensure that no one ever again subjects them to a humiliating occupation.

They should be happy, right? Not quite....

Internally, like all democracies, France has its share of purely internal disputes. [Right now](#) they are arguing about the results of the [recent parliamentary elections](#) and how to form a government that represents the voter’s wishes. The French are very good at political squabbling. They are also [good at](#)

[letting their rulers know](#) when they are unhappy, witness the farmers protests earlier this year. Usually they succeed in finding an acceptable solution.

However, one internal problem that won't easily go away are [the migrants and asylum seekers](#) that just keep coming. Like many countries receiving migrants in this modern day [volkerwanderungen](#), many [French citizens resent the newcomers](#) as unwilling to integrate into French society and just being foreign. The French are still trying to [integrate the many people](#) that came to France after the French African Empire was wound up in the 1960's. And still more people come. It is hard to see a happy outcome for this situation. It will be interesting to see [what happens if Marine Le Pen ever becomes President](#).

In their relationship with other countries, France has actually done quite well for itself. Together with Germany, they basically dominated the EU and set its policies for most of the past 60 years or so. However, French are currently [re-evaluating their relationship](#) with the EU [as their influence shrinks](#).

With regards to NATO, and its leading member, the [United States](#), the French are quite adept at [carving out their own path](#). It will be interesting to see what happens if and when the USA leaves NATO and how the European countries sort out their relationships. I think that France will do well.

Another troubling situation for France and NATO is the [current war in Ukraine](#). Some Ukrainian [migrants have gone to France](#) to escape the war. More concerning is the possibility that the Ukraine War will escalate into a more general conflict. Having nuclear weapons might actually make France a target. We can hope for a negotiated solution and France has the advantage of having a competent diplomatic corps.

That winds up this short look at France. I am fairly optimistic for their future. It is easy to look down on the French, especially given their many defeats in the 20<sup>th</sup> Century. Also, their current difficulties are dramatic, but not fatal. However, the French nation and French State are resilient. Don't expect their downfall any time soon.

## 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.