

January 29, 2024

News and notes

Before going on to discuss the geology and geopolitics of the [Cayman Islands](#), here are some news items I thought were interesting.

Bad Science

- [Whistleblowers flagged 300 scientific papers for retraction. Many journals ghosted them.](#)
- [The Science Journals That Will Publish Anything.](#)
- [Springer Nature journal pulls nearly three dozen papers from special issues.](#)

Research

- New issue of the journal [Sedimentology, Volume 71, Issue 2.](#)
- New guidebook from the Utah Geological Association: [UGA-51 Great Salt Lake and the Bonneville Basin.](#)
- Geological history: [The Precambrian continental record: A window into early Earth environments.](#)
- More geological history: [A phosphate-rich marine reservoir in the redox stratified Ediacaran ocean.](#)
- Metamorphic petrology: [Metamorphism and P-T Evolution of High-Pressure Granulites from the Fuping Complex, North China Craton.](#)

Plate Tectonics

- [Archaean continental crust formed from mafic cumulates.](#)
- [Light oxygen isotopic composition in deep mantle reveals oceanic crust subduction before 3.3 billion years ago](#); summary of this and related research in [Forbes](#).
- [Effects of Along-Trench Asymmetric Subduction Initiation on Plate Rotation and Trench Migration: A Laboratory Modeling Perspective.](#)
- Mineralogy and plate tectonics: [Exhumation of an Ultrahigh-Pressure Slice From the Upper Plate of the Caledonian Orogen—A Record From Titanite in North-East Greenland.](#)
- More mineralogy and plate tectonics: [Rapid development of spiral garnets during subduction zone metamorphism revealed from high-resolution Sm-Nd garnet geochronology.](#)
- Some people are asking: [How Did the Late Paleozoic to Early Mesozoic Tectonism Constrain the Carboniferous Stratigraphic Evolution in the Eastern Qaidam Basin, NW China?](#)

Paleontology

- Whales: [A vertebra of a small species of *Pachycetus* from the North Sea and its inner structure and vascularity compared with other basilosaurid vertebrae from the same site.](#)
- [Dinosaur World Thrilled Over Allosaurus Found In Wyoming's Jurassic Mile.](#)
- [A newly identified 'Hell chicken' species suggests dinosaurs weren't sliding toward extinction before the fateful asteroid hit.](#)
- Feathers: [Escape behaviors in prey and the evolution of pennaceous plumage in dinosaurs.](#)
- [Interrelationships among Early Triassic faunas of Western Gondwana and Laurasia as illuminated by a new South American benthosuchid temnospondyl](#); Sci News summary [here](#).
- [Exquisite Jurassic fossils reveal cannibalism in ancient fish.](#)
- Ammonites: [The Secrets of the Sea Hidden High in the Andes.](#)
- [Life in the Cambrian shallows: Exceptionally preserved arthropod and mollusk microfossils from the early Cambrian of Sweden.](#)
- Co-evolution of plants and insects: [Ancient insect vision tuned for flight among rocks and plants underpins natural flower colour diversity](#); Phys.org summary [here](#).
- More ancient plants: [A late refugium for *Classopollis* in the Paleocene Lower Wilcox Group along the Texas Gulf Coast.](#)
- [1.63-billion-year-old multicellular eukaryotes from the Chuanlinggou Formation in North China.](#)
- [Biogeochemical explanations for the world's most phosphate-rich lake, an origin-of-life analog](#); Phys.org summary [here](#).
- [Early life was radically different than today.](#)

Mining and Energy

- Northern Ontario: [IAMGOLD aims for March startup of gold production in Gogama.](#)
- [Junior miner shows more nickel to be had in the Sudbury basin](#); unfortunately [Nickel prices keep slumping even as mines close.](#)
- [McClellan Lake uranium mine in Canada to resume production](#); related: [Uranium price jumps to 15-year high as top miner flags shortfall.](#)
- [China unveils massive lithium deposit amid global resource competition.](#)
- [Ghana takes stake in Atlantic Lithium with \\$5m investment.](#)
- [Bolivia launches new international tender for lithium extraction.](#)

- [Northvolt looks at sourcing cobalt from Congo](#); meanwhile [Lamborghini interested in cobalt-free battery developed at MIT](#); see also [How 'modern-day slavery' in the Congo powers the rechargeable battery economy](#).
- Cobalt ore mineralogy: [Growth and Stability of Stratiform Carrollite \(CuCo₂S₄\) in the Tenke-Fungurume Ore District, Central African Copperbelt](#).
- More ore mineralogy: [The Solubility of Antimony \(Sb\) in Liquid Hydrocarbons and Its Implication for the Ore-Forming Process of Orogenic Antimony-Gold Deposits in Southern Tibet](#).
- Coking coal: [Chinese engineers are keeping Russia's metal furnaces firing](#).
- [New B.C. coal mine enters public comment period](#).
- [Five Energy Sector Predictions for 2024](#).
- [North Dakota Oil Production Climbing Back Faster Than Anticipated](#).
- [Russia Says New Discoveries Fully Replaced Its Oil and Gas Reserves in 2023](#).
- [Norway's Natural Gas Production Hits Record High](#).
- [Increased U.S. Natural Gas Production Driving Emissions Reduction](#).
- [World's Largest Nuclear Reactor Aims to Power the Earth with Unlimited Energy: 'Arguably the Most Complex Machine Ever Designed'](#).
- [EU Looks to Accelerate Development of Small Nuclear Reactors](#).
- [Nuclear power output expected to break global records in 2025](#).
- Making hydrogen with solar energy and a perovskite catalyst: [All-perovskite-based unassisted photoelectrochemical water splitting system for efficient, stable and scalable solar hydrogen production](#); description of the mineral perovskite [here](#).

Environmental Geology and Hydrogeology

- Not quite recycling: [Towards a Just Circular Economy Transition: the Case of European Plastic Waste Trade to Vietnam for Recycling](#); Phys.org summary [here](#).
- [Humans are depleting groundwater worldwide, but there are ways to replenish it](#).
- [No recharge: long-term Prairie drought raises concerns over groundwater levels](#).
- From the United States Environmental Protection Agency (US EPA): [Estimated Nitrate Concentrations in Groundwater Used for Drinking](#).
- Also from the US EPA: [National Rivers and Streams Assessment 2018-19](#); Weather Channel summary [here](#).

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Geology and the Fate of Societies – Cayman Islands



Figure 1 – Cayman Islands

Credit: [Peter Fitzgerald](#), [Creative Commons Attribution-Share Alike 2.0 Generic](#) license

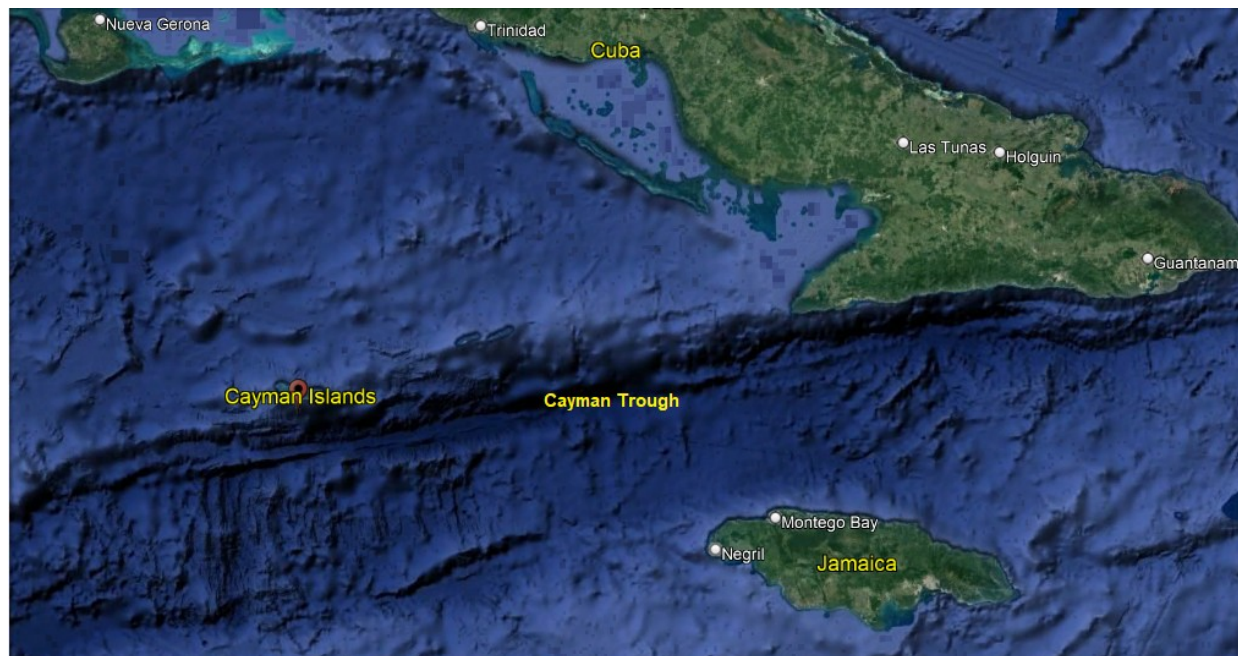


Figure 2 – Location of the Cayman Islands

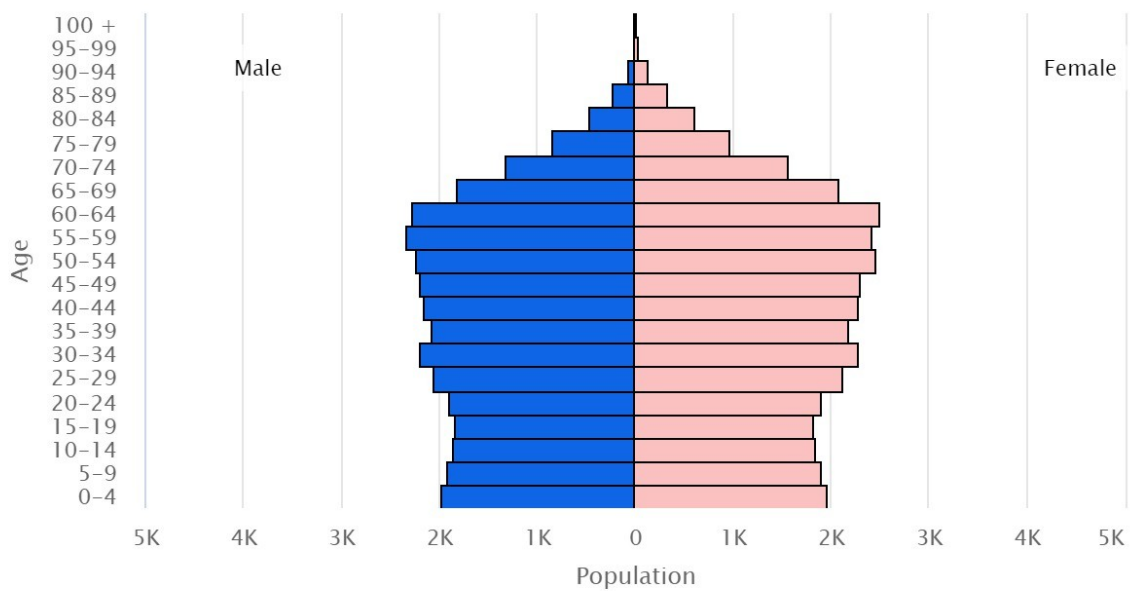
Credit: [Google Earth](#)

A self-governing [British Overseas Territory](#), the [Cayman Islands](#) are not, by themselves, a [member state of the United Nations](#) but they are listed as a country in the American [Central Intelligence \(CIA\) Agency World Factbook](#), so I thought that they were worth looking at in this series on geology and geopolitics.

The [Cayman Islands](#) are located in the [Caribbean Sea](#), 373 kilometres (km) south of [Cuba](#) and 328 km northwest of [Jamaica](#). The Caymans consist of three islands: [Grand Cayman](#), [Cayman Brac](#) and [Little Cayman](#), of which Grand Cayman is the largest.

According to the CIA World Factbook, the Cayman Islands, the total land area is 264 square km. The CIA also estimate that 65,483 people live on the Caymans, almost all of them on Grand Cayman. The ethnic makeup of the islands is 40% mixed (mostly [Mulatto](#)), 20% [White](#), 20% [African descent](#) and 20% various groups of expatriates – a real mixed bag. 90.9% of the population speak [English](#), the official language of the Cayman Islands, with the local [Cayman dialect as the most common vernacular](#). Of the remaining, 4% speak [Spanish](#), 3.3% speak [Filipino](#), and the rest, 1.8% are other or unspecified. In terms of religion, the most common faiths are varieties of [Protestant Christianity](#) at 67.8%; of the rest, 14.1% are [Roman Catholic](#), 1.1% are [Jehovah's Witness](#) 1.1% and the remaining 17% are other, no religion, or unspecified.

Cayman Islands (2023)



U.S. Census Bureau, International Database

Figure 3 – Demographic Profile, Cayman Islands

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

The [demographic profile](#) of the Cayman Islands shows a middle aged country with a median age of 41 years.

A self governing British colony, the Head of State is [King Charles III](#). The King’s representative in the Caymans local government is Governor [Jane Owen](#). The government includes a [Parliament](#) of 19 elected members, and 2 members appointed by the Governor. The Head of Government is Premier [Julianna O'Connor-Connolly](#). The largest settlement and capitol city of the Cayman Islands is [Georgetown](#), pop. 40,957.

A significant fact about the islands is that the [economy of the Cayman Islands](#) relies on almost entirely tourism and financial services; there are close to 600 [Bank](#) and [Trust companies](#) in the Cayman Islands. About 90% of their food and consumer goods must be imported.

Geology



Figure 4 – Tectonic Setting of the Cayman Islands

Credit: Mike Norton, modified from [NWCaribbean_satellite.png](#), public domain

The best way to describe the [Geology of the Cayman Islands](#) is to first discuss the tectonic setting. The Cayman Islands consist of the remains of [coral atolls](#) that sit on top of [fault blocks](#) just north of the [Oriente Fault Zone](#). The Oriente Fault Zone separates the [North American Tectonic Plate](#) from the [Gonave Microplate](#), which may or may not be part of the [Caribbean Tectonic Plate](#), further to the south. At the west end of the Gonave Microplate is the [Mid-Cayman Rise](#), a centre of [sea floor spreading](#). There is a deep trough, the [Cayman Trough](#), immediately south of the Oriente Fault Zone. The Cayman Trough is approximately 5,000 metres deep. A team from the British [National Oceanography Centre](#) found [hydrothermal vents](#), a.k.a. [black smokers](#), at the bottom of the [Cayman Trough in 2010](#).

The [fault blocks that eventually made up the Cayman Islands](#) appear to have been formed around the time of the [Laramide Orogeny](#). The basement rocks in the fault blocks appear to be a mixture of [basalt](#), [amphibolite](#), [dolerite](#), [gabbro](#), [serpentinite](#) and serpentinized [peridotite](#). These are the typical suite of rocks in [oceanic crust](#).

The formations that makes up the surficial geology of the Cayman Islands range in age from [Late Oligocene](#) to [Holocene](#). The [Oligocene](#) to [Pliocene](#) rocks of the Cayman Islands are [dolostone](#), the younger rocks are coral [limestones](#) that gradually becoming dolostone through the process of [dolomitization](#).

[Dr. Brian Jones of the University of Alberta](#) has studied the geology of the Cayman Islands for the past 42 years. Together with his graduate students, Dr. Jones has compiled a detailed study of the islands called "[Geology of the Cayman Islands, Evolution of Complex Carbonate Successions on Isolated Oceanic](#)

[Islands](#)”, published in 2022 by Springer. In 2014, Dr. Jones posted a lecture on YouTube on the geology of the Cayman Islands, that you can find it [here](#).

Resources

The Cayman Islands are fairly limited in resources.

- Agriculture is limited to the raising of livestock: goats, pigs, cattle and poultry ([statistics here](#));
- Fishing seems to be restricted to [sport fishing](#), which is actually more lucrative than commercial fishing;
- Mineral production consists of quarrying aggregate for construction ([here](#), [here](#) and [here](#)), [boutique salt production](#), and quarrying a semi-precious stone, [caymanite](#);
- [Groundwater resources](#) are limited and unable to meet all the demands for domestic consumption, [desalination of seawater](#) is needed to meet the remaining demand;
- I have not found any references to potential off-shore oil & gas exploration.

Climate

The Cayman Islands has a [tropical savanna climate](#) where it is hot and humid all year round. From late November to mid-April is the dry season, when the northeast trade winds blow, and April to early November is the rainy season. Hurricane season is from June to November. If you want to visit the Cayman Islands, you might want to check out this site [here](#).

History and Geopolitics

History of Pirates and Banksters



Figure 5 – Cayman Island Pirate Festival

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

The [History of the Cayman Islands](#) is interesting. There were no indigenous people found living on the islands when Europeans first visited them in the 16th Century. Nominally claimed by [Spain](#), the [British empire](#) acquired the islands, along with Jamaica, in the [Treaty of Madrid](#), 1670.

British settlers began to move into the Cayman Islands during the 1600's. A major attraction was its relative isolation, making it a prime anchorage for [pirates](#); the Cayman Islanders are quite proud of [their pirate past](#). After piracy was suppressed in the 1730's, the Cayman Islanders made a living off of subsistence farming, fishing, harvesting turtles, schooner building and making thatch-rope. It was also common for Cayman Islanders to serve as merchant seamen on ocean-going ships.

Another common practice to make a living in the Caymans was [wrecking](#): laying traps for merchant ships to run aground and salvaging from the wrecks. [In one such incident in 1788](#), a ship called the Cordelia ran aground near the settlement of [East End](#) along with nine other ships that night. The residents of East End showed great courage in rescuing passengers of the stranded ships (and helping themselves to the loot). As a reward for their bravery, the British King, [George III](#) exempted residents the Cayman Islands from military and [naval conscription](#), but not, as is sometimes claimed, from taxation. The simple truth is that the Cayman Islands were an out of the way parish of British administered Jamaica, so poor that no one bothered to collect direct taxes. Later, in the 20th Century this tax-free status was to be exploited.

When Jamaica was granted independence from Britain in 1962, the Cayman Islands remained as a British dependency. In the 1960's, the tax-free status of the colony was [leveraged to create a financial services industry](#), a situation that makes the Cayman Islands a haven for modern pirates a.k.a. [banksters](#).

Geopolitics of a Banking Haven



Figure 6 – Beach on Grand Cayman

Credit: [Diego Delso](#), [Creative Commons Attribution-Share Alike 3.0 Unported](#) license

The Cayman Islands appear to be a [fun place to visit](#) as a tourist and may even be a great place to live if you are in the [financial services industry](#). The [only taxes are indirect](#) and there are plenty of people who want to park their money in a Cayman Islands bank; so there is lots of work for people who want to [establish a bank in the islands](#).

Just don't ask questions about where the money comes from.

[Money laundering, fraud, tax evasion and trafficking](#) are all enabled by the free-wheeling Cayman Island financial services sector. It helps that some of the most [powerful people in the world](#) use the convenient services of Cayman Island banks to hide their savings from the tax collector. [Calico Jack Rackham](#) and his pirate cohort may be long dead and gone, but their spiritual descendants live on in Cayman Islands financial services.

Still, making your livelihood off of finance is a risky game. Financial crises [happen fairly regularly](#) and [can be devastating](#). Also, since tourism is affected by financial conditions, a downturn in the markets [will also lead to reduced tourist trade](#). Another danger is the [distrust of the financial industry](#) that has grown since the [Great Financial Crisis of 2008](#). The revelations of [pervasive dishonesty in the financial sector](#) are likely to lead to calls for further regulation and this would directly affect the Cayman Islands banks.

In terms of geopolitics, the major players in the Caribbean that control the political fate of the Cayman Islands, the British and especially the [United States](#), may find that the existence of a tax haven with questionable banking practices is no longer in their national interest. This may also force reforms in the financial service sector in the Cayman Islands and strict regulation of the financial services industry may drive some current customers elsewhere. [Bank runs](#) and failures are not hard to imagine.

It is hard to be optimistic for the financial services industry on the Cayman Islands and hence for the country as a whole. If there is ever a reckoning, things could be tough on the Cayman Islands. Many now employed will have to leave the islands when their work in the financial sector dries up.

When all the dust settles, the remaining Cayman Islanders may have to return to harvesting turtles, making rope, salvaging shipwrecks and catering to the few tourists able to come.

That kind of wraps up my short look at the Cayman Islands. Don't get me wrong, there are plenty of good people who live in the Cayman Islands who are in no way deserving of whatever fate awaits the islands, either from [hurricanes](#), [earthquakes](#) or [financial disaster](#). If Abraham were to return and [bargain with God](#) on the fate of the Cayman Islands, like he bargained over the [fate of Sodom and Gomorrah](#), he would find plenty of righteous people worth saving. Follow up on the 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.