

August 25, 2025

News and notes



Apples (*Malus domestica* 'Goodland') in My Garden – August 19, 2025

This week, before going on to discuss the geology and mineral resources of [Malawi](#), we will first look at some news items I thought were interesting.

Comments

If anyone has comments on any of my postings, please leave a comment on the LinkedIn page for the posting or email me at raymondreichelt@gmail.com.

Geopolitics

- [New Ukrainian Strike Halts Pipeline Oil Flow to Hungary and Slovakia Again.](#)
- Venezuela has the world's [largest oil reserves](#):
 - [Private Chinese Firm Invests \\$1 Billion to Pump 60,000 Bpd Crude in Venezuela.](#)
 - [US warships are circling Venezuela – what does this mean for the oil trade?](#)
 - [Let's talk about...looming war in Venezuela?](#)

- [US Adds Steel, Copper, Lithium To High-Priority List Under Uyghur Forced Labor Law.](#)
- [China turns up oil tap from Russia as purchases of US crude remain suspended in July.](#)

Research and News

- [Late Cretaceous to Eocene Sedimentary Source Change and Tectonic Evolution of Nanao Event in Taiwan: Implications From Detrital Zircon U-Pb Geochronology.](#)
- [A Geologist Discovered The World's Oldest Water Deep In A Mine, Then She Tasted It.](#)
- [Experiments and Models Bearing on the Role of Magma Mixing and Contamination on Chromite Crystallization in Ultramafic Magmas.](#)
- [Late Mesoproterozoic Rapid True Polar Wander Recorded in the Jingeryu Formation, North China Craton.](#)
- [Long-range modulation in uranium-bearing hematite superstructure constrained from STEM analysis and ab initio calculations.](#)
- [Petrographic image classification of complex carbonate rocks from the Brazilian pre-salt using convolutional neural networks.](#)
- [Zinc isotope evidence for volatile fluid remelting to form PGE-enriched reefs in layered intrusions.](#)
- [Geomagnetic Reversals and Excursions as an Outcome of Non-Equilibrium Wave-Turbulence and Beating MAC Waves in the Core.](#)
- 08/20 [The fate of CO₂, Ca, and Mg after terrestrial rock weathering.](#)
- Structural geology: [The Guanajuato resurgent graben caldera, Sierra Madre Occidental, central México: revised volcanic stratigraphy and geologic evolution.](#)
- [A new sedimentary record from the Tabernas Basin: Implications for the Messinian Salinity Crisis in the Western Mediterranean.](#)
- Geophysics: [Long Period Magnetotelluric Measurements in Southern South Island, New Zealand: The Resistivity Structure of Eastern Province Terranes.](#)
- Video: [More Common than You Think; The 10 Most Common Radioactive Isotopes.](#)
- [Channelized metasomatism in Archean cratonic roots as a mechanism of lithospheric refertilization.](#)
- [Signatures of hydraulic jump-related scouring in a deep-marine rift basin, Wollaston Forland Group, NE Greenland.](#)
- [U-Pb volcanic zircon dates from New Brunswick constrain the Middle Cambrian Drumian Stage and trans-Avalonian green-black boundary.](#)

- [Enrichment of organic carbon in a deep-water sand-prone turbidite system: A study from the Eocene Aínsa Basin \(Spanish Pyrenees\).](#)
- [Sedimentology and geomorphology of tufa barrages on rock coast shore platforms.](#)
- Geology rules: [New study reveals geological facility's value to UK economy.](#)
- [Nowhere to hide: Volcanic ash invasion of limestone caves in New Zealand.](#)
- [Variable Partitioning of Lithium in Rhyolitic Melt During Decompression and Ascent.](#)
- [Effect of pH and temperature on olivine dissolution anisotropy.](#)
- [Omission and pacing of events at the Norian–Rhaetian and Triassic–Jurassic transitions in Britain.](#)
- [Integrated geochemical and thermobarometric approach to ascertain provenance and pressure–temperature conditions from detrital Himalayan garnets \(Siwalik Group, Surai Khola, Nepal\).](#)
- [The sub-arc mantle has remained oxidized since the Neoproterozoic oxygenation event.](#)
- [Amaterasuite, \$\text{Sr}_4\text{Ti}_6\text{Si}_4\text{O}_{23}\(\text{OH}\)\text{Cl}\$, a new mineral from jadeitite, a representative stone of Japan; Sora News summary \[here\]\(#\).](#)

Plate Tectonics

- [Using the Dispersion of Apatite \(U-Th-Sm\)/He Single Grain Ages to Unravel the Burial and Exhumation History of the Foreland Basin of the Central Alps.](#)
- [Geodynamics of a global plate reorganization from topological data analysis.](#)
- [Ongoing India–Eurasia collision predominantly driven by Sumatra–Java slab pull.](#)
- [Geological framework and morphotectonic characterization of the Khon Kaen Geopark, Northeastern Thailand.](#)

Astrogeology

- [Space weathering effects in Bennu asteroid samples.](#)
- [Mineralogical evidence for hydrothermal alteration of Bennu samples.](#)
- [Core metamorphism controls the dynamic habitability of mid-sized ocean worlds—The case of Ceres.](#)

Paleontology

- [The origins of neural spine elongation in iguanodontian dinosaurs and the osteology of a new sail-back styracosternan \(Dinosauria, Ornithischia\) from the Lower Cretaceous Wealden Group of England; Natural History Museum press release \[here\]\(#\).](#)
- [Evolution of skeletal mineralogy in cheilostome bryozoans from calcite to aragonite seas.](#)

- [Microbial mats in dinosaur ichnocoenoses.](#)
- [Does intraspecific variation in juvenile Late Cretaceous ammonoids correlate with their systematic position, longevity and paleogeography?](#)
- [Femoral metadiaphyseal and nutrient foramen perfusion suggests comparable maximal metabolic rates in a pterosaur and in a semi-aquatic maniraptoran dinosaur.](#)

Mining and Energy

- Simandou iron ore project: [Contract worker dies in Rio Tinto mine in Guinea.](#)
- Ore geology: [Discovery of concealed copper orebodies at the Deerni copper deposit, northwest China by integrated geological investigations.](#)
- Michel Jébrak: ["With GIS, data and the help of BRGM, the Mineral System Approach streamlines mineral exploration".](#)
- Petroleum geology: [Enhancing formation resistivity factor estimation in carbonate reservoirs using electrical zone indicator and multi-resolution graph-based clustering methods.](#)
- Metallurgy of gold/silver deposits: [Mixing thermodynamic model of Au-Ag Alloys in gold deposits established by a modifier double defect method.](#)
- Norway: [North Sea yields 'significant' black gold discovery.](#)
- [2,000,000 solar panels left to rot — America's greatest energy failure exposed.](#)
- Columbia: [New silver and gold discovery confirmed to be extraordinarily high grade deposits.](#)
- Border of Argentina & Chile: [One of the world's largest gold mines discovered, along with tons of "red metal" also found.](#)
- [Despite Delays Suriname's Oil Boom is Fast Becoming a Reality.](#)
- [Mapped: Renewable Electricity's Share Across Europe.](#)

Environmental Geology and Hydrogeology

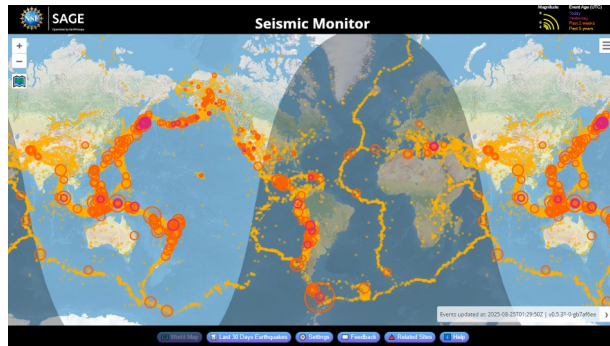
- Video: [PFAS - "Forever chemicals" in drinking | DW Documentary.](#)
- [Variations in Groundwater Recharge and Water Table Elevations Across the Holocene in a Semi-Arid Alluvial Basin.](#)
- [Groundwater: How scientists explore the mysteries of ancient aquifers.](#)
- [USGS Seeks Input for National Ground-Water Monitoring Network.](#)

Glaciers and Climate Change

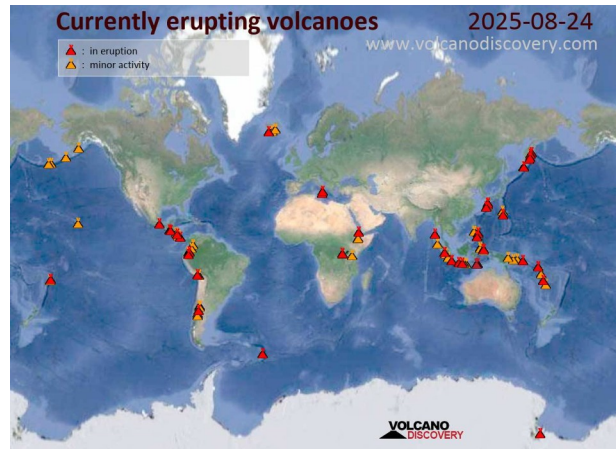
- Modelling: [Evaluating IPCC Projections of Global Sea-Level Change From the Pre-Satellite Era;](#) Phys.org summary [here.](#)

- [Emerging evidence of abrupt changes in the Antarctic environment.](#)
- [Svalbard's 2024 record summer: An early view of Arctic glacier meltdown?](#)
- [Subaqueous evidence of the last glacial maximum and its termination in southern Patagonia.](#)

Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

Volcanoes

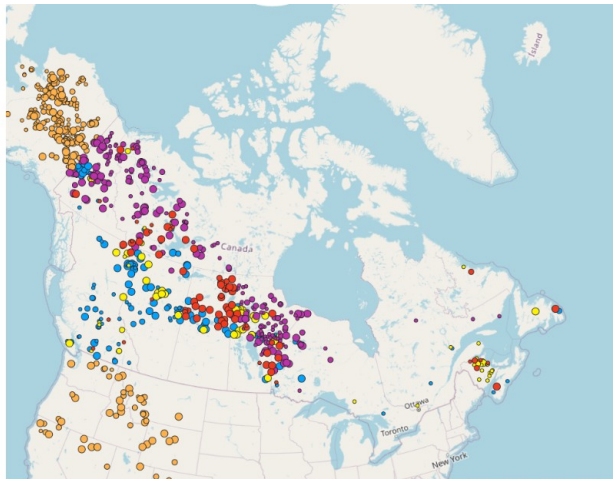
- [Smithsonian / USGS Weekly Volcanic Activity Report.](#)
- United States Geological Survey (USGS) Volcano Observatories:
 - [Cascades Volcano Observatory Weekly Update.](#)
 - [Volcano Watch – Fringes and fractures for episode 30.](#)
 - Livestream: [Kīlauea volcano, Hawaii \(west Halema‘uma‘u crater\).](#)
 - Yellowstone Caldera Chronicles: [To see how the ground moves in Yellowstone, first look at the rest of North America.](#)
- [Source mechanism of impulsive seafloor events that track submarine lava flows.](#)
- Video: [The Ground beneath the Yellowstone Super Volcano is being torn apart! Moving in OPPOSITE DIRECTIONS.](#)
- [Neogene and Pleistocene landslides along the Grand Valley fault in eastern Idaho and western Wyoming, USA, and their relationship to caldera-forming eruptions of the Yellowstone hotspot.](#)
- [The Role of Peridotite for Oceanic Volcanism.](#)

Earthquakes

- [Euro-Mediterranean Seismological Centre \(EMSC\).](#)

- [Earthquakes Monitoring Live Worldwide.](#)
- [Different Seismogenic Environments of Interplate and Intraslab Earthquakes: Re-Examination of Apparent Repeating Earthquakes.](#)
- [Monitoring Spatiotemporal Seismic Velocity Changes Using Seismic Interferometry and Distributed Acoustic Sensing in Mexico City.](#)
- [M7.5 earthquake strikes below the Drake Passage](#); USGS summary [here](#).
- [Magnitude 5.6 earthquake near Kilkivan, QLD.](#)

Wildfires and Other Geohazards



Interactive Wildfire Map August 24, 2025

Credit: © [Canadian Wildland Fire Information System](#)

- [Pickett Fire Expands To 6,500 Acres; Over 1,200 Personnel Deployed In Napa County.](#)
- [See the aftermath of Canada's prolific fires from space.](#)
- Geohazards: [BGS scientists work with United Nations to update hazard profiles.](#)
- [Increasing global human exposure to wildland fires despite declining burned area](#); Phys.org summary [here](#).
- United Kingdom geohazard summary: [Is your region susceptible? Britain's geohazard hotspots revealed.](#)

Free Geology Books and Other Stuff

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](#) has many groundwater geology books for free download; also they now have a [Free Online Learning Module: Pumping Test Analysis](#).

- Free Groundwater Modeling Course – [HydroGeoCenter](#).
- From Western Australia: [Carbonatite, lamprophyre and host rocks in the northern Aileron Province](#).
- Two volumes of Geology of Indonesia now can be accessed for [FREE/GRATIS](#). The books can be accessed from: vol 1 <https://lnkd.in/eH6Gcka4>; vol 2 <https://lnkd.in/egTYmpjk>.
- Brett Davis' book on veins in a deforming rock mass: "[The Veining Bible](#)"; also at [this site](#).
- From the Mineralogical Society of America: [Handbook of Mineralogy](#).

Upcoming Events

- [Copper to the World Conference, Tuesday 26 – Wednesday 27 August 2025](#), in Adelaide, Australia; report on 2024 conference [here](#).
- [The 52nd Congress of the International Association of Hydrogeologists, 15-19 September 2025, Melbourne Australia](#).
- [GeoManitoba 2025 78th Annual Canadian Geotechnical Society Conference & 9th Canadian Permafrost Conference, RBC Convention Centre, Winnipeg, Manitoba, September 21 – 24, 2025](#).
- [29 September – 1 October 2025, Stuttgart, Germany, Nature Conference on Advancing Perovskite-Based Photovoltaics](#).
- [Thursday 2nd October 2025, Early Career Hydrogeology Conference 2025, Leeds U.K.](#)
- Australia: [12–18 October 2025, Earth Science Week](#).
- [November 3 – 4, 2025 Central Canada Mineral Exploration Convention 2025 Victoria Inn Hotel & Convention Centre, 1808 Wellington Avenue, Winnipeg, Manitoba R3H 0G3, Canada](#).
- [5th International Professional Geology Conference \(IPGC\), November 5 to 7, 2025, Zaragoza, Spain](#).
- [Saskatchewan Geological Open House, December 1 to 3, 2025, Delta Bessborough Hotel, Saskatoon](#); Registration for the 2025 Conference now open.
- 2025 [Society of Petroleum Engineers Distinguished Lecturer Schedule](#).
- [List of geoscience events in 2025 from the International Union of Geological Sciences](#).
- [American Geophysical Union List of Upcoming Meetings](#).
- The Geological Society: [Events & Courses](#).
- [“Geology Hour” Online](#), evenings on the 3rd Monday of the Month from the Geological Society of the Oregon Country.

August 25, 2025

Geology and Mineral Resources – Malawi

Introduction

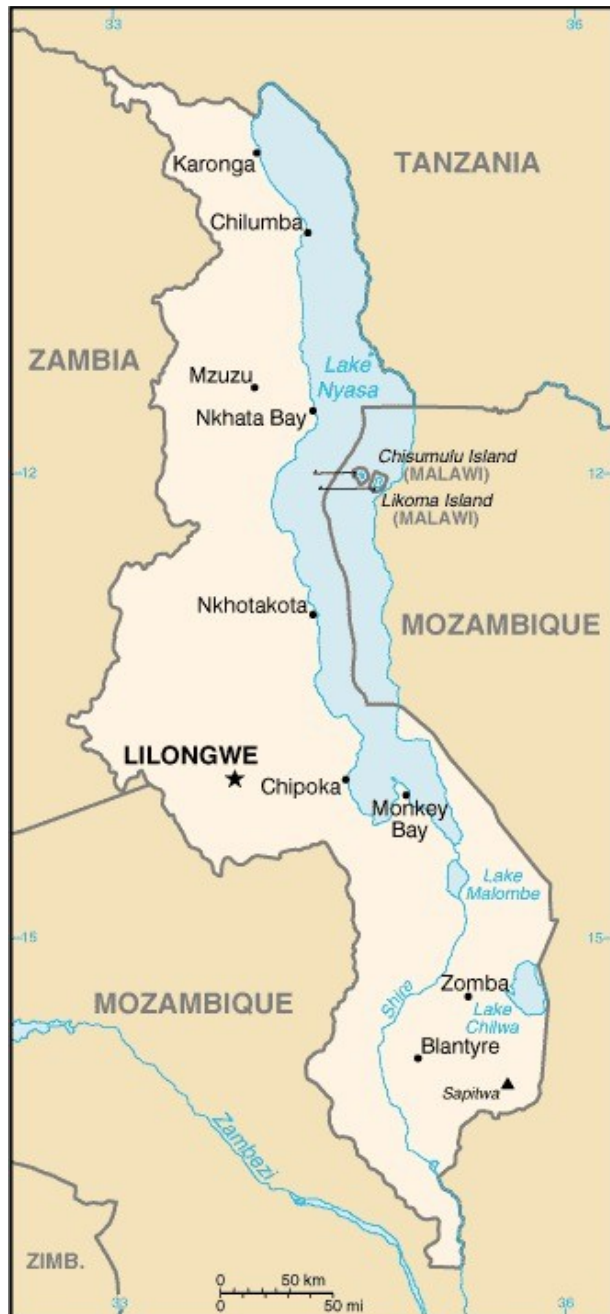


Figure 1a – Malawi

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



Figure 1b – Location of Malawi

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

[Malawi](#) is a landlocked country of 21,763,309 people in [Southeastern Africa](#). The country has an area of 118,484 square kilometres (km²) of which 94,080 km² is land and 24,404 km² is water. It is bordered by [Zambia](#) to the west, [Tanzania](#) to the north and northeast, and [Mozambique](#) to the east, south, and southwest. Malawi is a poor country, per capita [GDP \(PPP\)](#) is only \$1,668.

For more details on the country, check out the [CIA World Factbook on Malawi](#) as well as the [Wikipedia article](#).

Geology

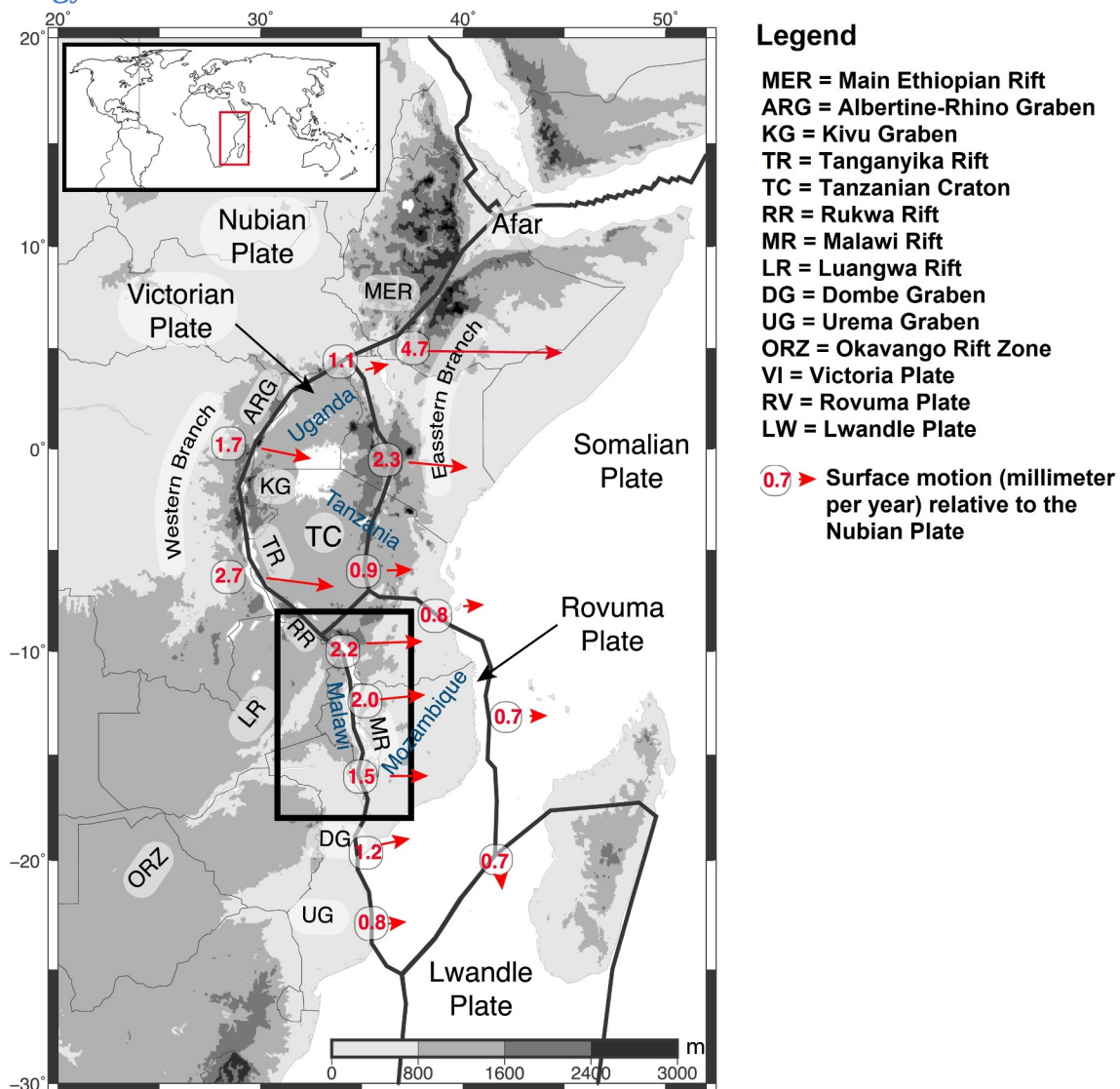


Figure 2 – Malawi in the East Africa Rift System

Credit: Figure 1 in [Njinju et al, 2019](#)

Malawi lies near the south end of the [East Africa Rift System](#). The major feature of this rift system in Malawi is, appropriately enough, the [Malawi Rift](#). To the west of the Malawi rift is the [Western Branch](#) of the [Nubian or African Plate](#). To the east is the [Rovuma Microplate](#), a portion of the [Somalian Plate](#).

As you can see from Figure 3, the geology of Malawi is fairly complex. The oldest rocks are from the [Paleoproterozoic Era](#), dating from the [Rhyacian](#) and [Orosirian](#) periods. These rocks include metamorphic rocks of: the [Nyika Group](#), the [Ufipa Group](#), and the [Mbozi Group](#), of the [Ubendian Domain](#), as well as intrusive rocks of the [Kaseche Suite and Nyika Suite](#). The next younger are more metamorphic rocks of the [Mchinji Group](#) from the [Statherian Period](#), also from the the Paleoproterozoic Era.

Straddling the boundary of the Paleoproterozoic and [Mesoproterozoic](#) eras, and ranging in age from Statherian to [Calymmian](#) periods, are the metamorphic rocks of the [Mafingi Group](#). Next younger, ranging in age from the Calymmian to the [Ectasian](#) periods of the Mesoproterozoic Era, are the metamorphic rocks of the [Kasungu Group](#) and [Mzimba Group](#) together with the intrusive orthogneiss of the [Mwakikome Suite](#). Next younger, ranging in age from the Ectasian to the [Stenian](#) Period of the Mesoproterozoic are the [Nampula Group](#) and the intrusive rocks of the [Mocuba](#) and [Mwenga](#) suites. Next youngest, also from the Stenian Period, are the [Unango Group](#) and the [Lilongwe Group](#) together with a wide range of intrusive suites made up of [gabbro](#), [leucogabbro](#), [tonalite](#), [monzodiorite](#), [granite](#) and [gneiss](#).

The next youngest rocks are intrusive rocks of the [Neoproterozoic Nyasa Suite](#), from the [Tonian](#) and [Cryogenian](#) periods. Next younger, ranging in age from the Ediacaran Period of the Neoproterozoic Era to the [Cambrian](#) and [Ordovician](#) periods of the [Paleozoic Era](#) are the intrusive rocks of the [Blantyre Suite](#).

Next younger are undifferentiated rocks of the [Karoo Supergroup](#), ranging in age from the [Carboniferous](#) to [Triassic](#) periods. Also part of the Karoo, but dating from the younger [Jurassic Period](#), are the deposits of the volcanic rocks of the [Drakensberg Group](#). Finally, the youngest rocks in Malawi are:

- [Cretaceous](#) formations such as the [Chilwa Alkaline Province](#), [Dinosaur Beds](#) and [Lupata Series](#);
- [Neogene](#) formations such as the [Chiwondo Beds](#); and
- [Quaternary](#) formations, mostly [lacustrine](#) and [alluvial](#) deposits.

Many of the intrusive and volcanic deposits are unusual felsic rocks such as [carbonatites](#), [trachyte](#), and [nepheline syenite](#). This in itself makes the geology of the country really interesting.

Mineral Resources

According to the [USGS Minerals Yearbook on Malawi](#), the country's mineral industry includes industrial, energy minerals, and metallic minerals.

Industrial mineral production in Malawi includes:

- Production of cement, lime, and crushed stone for construction projects.
- [Agates](#) from artisanal mines in the [Chikwawa District](#);
- [Garnet](#) from artisanal mines in the [Salima District](#)
- [Rose](#), yellow, [smoky](#), and crystal [quartz](#) from artisanal mines and the Zumwanda Mine in the [Mzimba District](#)

- [Ruby and sapphire](#) from artisanal mines at [Nyala Mine](#) at Chimwadzulu Hill, the [Mwalawanga Mining Company](#) has been attempting to start an industrial scale mine.
- A prospective [phosphate](#) rock [mine at Tundulu](#).



Figure 4 – [Aegerine](#) and Smoky Quartz, [Mt Malosa](#)
Credit: [Robert M. Lavinsky](#), [iRocks.com](#), [Creative Commons Attribution-Share Alike 3.0 Unported license](#)

Problems with gemstone production in Malawi include: conflict between artisanal miners and larger operations, such as at the [Nyala Mine](#); [resistance to Chinese involvement](#) in the mining business; and [environmental concerns](#).

Energy minerals includes coal from 2 active mines and a former uranium mine:

- The [Mchenga Coal Mine](#) in the [Rumphi District](#); and
- The [Kaziwiziwi Mine](#), also in the Rumphi District.
- Other coal mines listed in the USGS Yearbook appear to out of operation
- The uranium mine at [Kayelekera](#) has been closed since 2014 but there are [plans to reopen it](#).

Metallic mineral production is mostly prospective and includes:

- [Gold production](#) has mostly been [artisanal](#), much of it [deemed illegal](#). Start up gold mining operations have had [numerous setbacks](#), and some “gold rush” activities have left [communities suffering](#).
- [Kula Gold](#) has begun an [exploration project for niobium](#), a rare earth element. Other rare earth element projects include: [Songwe Hill](#) by [Mkango Resources Ltd.](#); the [Chilwa Minerals Ltd.](#) projects at [Lake Chilwa](#); the [Kangankunde](#) rare earths project by [Lindian Resources](#)

The most recent production statistics from the USGS can be found [here](#). Figure 5 links to an interactive mineral occurrence map from [Mindat.org](#).

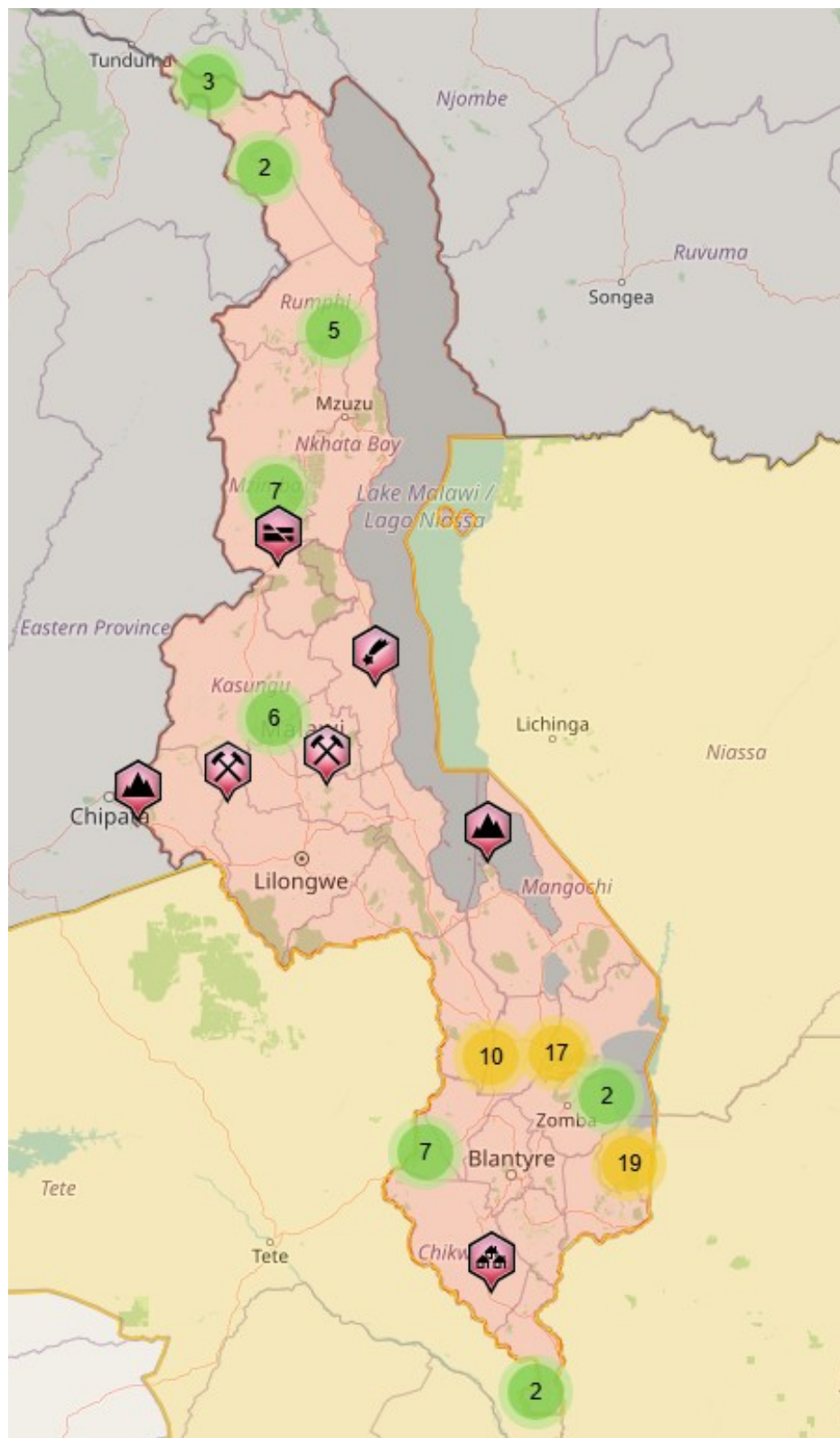


Figure 5 – Mineral Occurrence Map of Malawi
 Credit: [©Mindat.org](https://www.mindat.org)

Summary



Figure 6 – Lake Malawi

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

A poor country, Malawi could use more economic development. The challenges for developing its mineral resources are more political and social rather than technical. All things considered, there appear to be many opportunities to find and develop new mineral deposits. It will be a place to keep an eye on.

Standard Caveat

[J. Robert Oppenheimer on freedom and scientific inquiry](#)

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.