

**May 18, 2026**

## News and notes

Here are some news items that I thought were interesting. For my news items, I try to stick to open access papers.

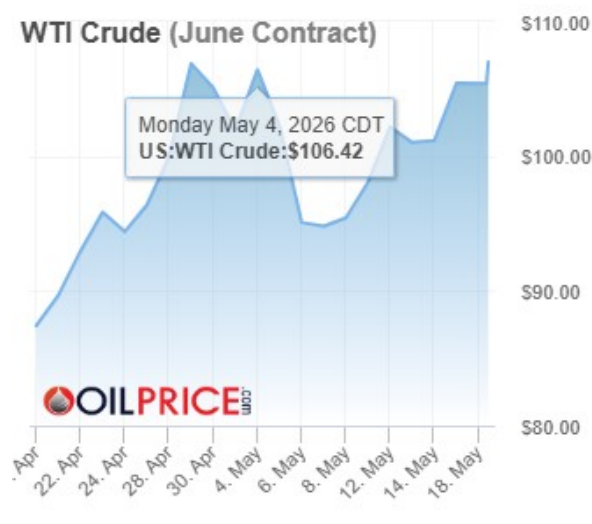
If you enjoy my blogs, bookmark the site and check on Mondays rather than relying on social media postings which can get lost in the shuffle. For my news items, I try to stick to open access papers.

## Comments

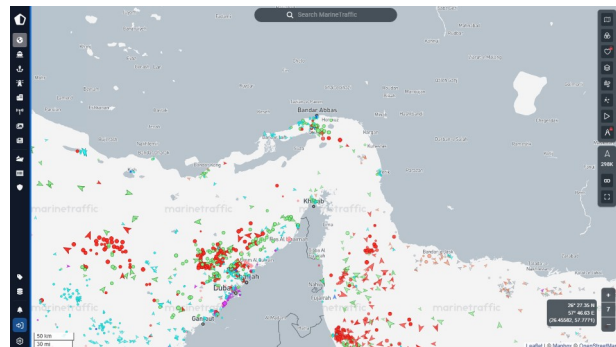
If anyone has comments on any of my postings, please leave a comment on the LinkedIn page for the posting or email me at [raymondreichelt@gmail.com](mailto:raymondreichelt@gmail.com).

In response to [last week's posting](#), Marcus S. suggested checking out the mineral collection of the [Museo Andres del Castillo](#) in Lima, Peru. There are some good photos on the website. If you plan to go to Lima, check out the museum.

## Geopolitics



**Oil prices up to May 18, 2026**  
**Credit: [Oilprice.com](https://oilprice.com)**



**Marine Traffic in the Strait of Hormuz**  
**Credit: [marinetraffic.com](https://marinetraffic.com)**

## Iran War

- [Ongoing coverage of the Iran War.](#)
- [Attack Drone Hits Near UAE Nuclear Power Plant.](#)
- [UAE to complete second oil pipeline bypassing strait of Hormuz by 2027.](#)
- [Iran allowing transit of Chinese vessels in Strait of Hormuz, Fars news reports.](#)

- [The battle for Hormuz risks sparking the next Iran clash: Bousso.](#)
- [Shipping industry fears fuel shortages as Iran war squeezes bunker fuel supply](#); related: [Panama Canal slot auctions hit record \\$4m.](#)

### **Other Geopolitics**

- [Fury Targets Starmer in One of Britain's Biggest Political Street Protests.](#)
- [As Hormuz crisis rattles the world, eyes are on another key waterway.](#)
- [OPEC Fractures, the Draft Returns, and the Age of Consequences Begins.](#)
- [Russia Rocks Ukraine With Unprecedented 1,500+ Drones in One of Largest Aerial Attacks Ever.](#)
- [Xi confronts Trump over Taiwan.](#)
- [US in closely guarded talks to open new bases in Greenland.](#)
- From Gail Tverberg: [China and US Trade Talks: A Solution for Oil Shortages?](#)
- [The missing link in America's critical minerals push isn't mining – it's processing expertise.](#)
- [US rare earth ambitions take big step forward in Greenland.](#)

### **Research and News**

- [Digital archive of ephemerally preserved sedimentary structure in surf zone uplifted by the 2024 Noto Peninsula Earthquake.](#)
- Geomorphology: [Local and regional tectonic controls on spatial patterns of erosion rate and topography in the Three Rivers Region, southeastern Tibetan Plateau.](#)
- [The Influence of Fluvial Incision on the Lithospheric Stress Field: A Numerical Approach.](#)
- [Bedrock testing of zircon annealing for detrital provenance studies: Raman and U-Pb analysis in the Adamello batholith \(Southern Alps, Italy\).](#)
- [Provenance and Petrological Evolution of Sand Injection Complexes: Insights From Heavy Mineral Analysis in the Paleogene Forearc Succession of the San Joaquin Basin.](#)
- [Balancing Earth's Deep Carbon Cycle.](#)
- Biogeochemistry: [Interaction of transition metals with carbonate green rust: Environmental applications and insights into ancient oceans.](#)
- [Thermodynamics of alkali feldspar solid solutions with varying Al-Si order: atomistic simulations using a neural network potential.](#)
- [Pulsed volcanic sulfur emissions linked to the end-Triassic terrestrial crisis.](#)

- [Mid-late Pleistocene evolution of fluvial landscapes in Central Amazonia: Shaping ecosystems and areas of endemism.](#)
- [The generation of geochemical gradients in the pre-caldera Glass Mountain high-SiO<sub>2</sub> rhyolites of Long Valley, CA: Clues to the preservation of Rb-Sr isochrons.](#)
- Geophysics and formation pressures: [Evolution of the V<sub>p</sub>/V<sub>s</sub> ratio during deformation and implications for fault mechanics.](#)
- Iron geochemistry: [Occurrence of Schwimweisen in a disused dewatering shaft.](#)
- Magnesium/manganese in the lower mantle: [High-pressure spin transition in \(Mg,Mn\)O.](#)
- [USGS, NASA Map Critical Minerals from 65000 Feet.](#)
- [Modern mantle-like μ<sup>182</sup>W signatures in Paleoarchean rocks from southern India.](#)
- Ooh, shiny: [Pennsylvania woman finds 3.09-carat white diamond at state park in Arkansas: the Geology of the Crater Of Diamonds State Park and Vicinity, Pike County, Arkansas.](#)
- [How understanding planet Earth became science.](#)
- [Coupled sulfur-silicon isotopes reveal supracrustal origin of Archean continents.](#)
- From Vivid Maps: [The Earth 70 Million Years Ago.](#)

## Planetary Geology

- [Ferric Iron Content of Majorite Coexisting With Reducing Melt at 18 GPa: Implications for the Mantle Oxygen Fugacity of Mars and Earth.](#)
- Minerals in meteorites: [Revealing multiple ringwoodite and wadsleyite transformation mechanisms in a shock-melt vein using transmission Kikuchi diffraction.](#)

## Plate Tectonics

- [Anisotropic Permeability Pathways Controlled by Intraslab Stress Heterogeneity in the Philippine Sea Slab Beneath the Ryukyu Arc.](#)
- [The Roles of Climate and Tectonics in the Tectonomorphic Evolution of the Sagarmatha \(Mt. Everest\) Region, Eastern Nepal Himalaya.](#)
- [Multi-Proxy Thermal History of Basin Heating During Cordilleran Orogenesis in the Magallanes-Austral Retroarc Foreland Basin, Patagonian Andes.](#)
- [Crustal and Upper Mantle Structure Beneath the Corinth Rift Using Receiver Function Analysis.](#)
- [Sublithospheric diamond constraints on the state of deeply subducted slabs.](#)
- [Tectonics and Sliver Motion in Costa Rica: Strain Partitioning Constrained by GNSS Velocities Data.](#)

- [The Tuno terrane and evolution of the northernmost part of the North Atlantic Archean Craton, West Greenland.](#)
- [Flux and Isotopic Composition of Sedimentary Carbon Subducting Along the World's Trenches.](#)
- [The Southwestern Rift of Africa: isotopic evidence of early-stage continental rifting; Phys.org summary \[here\]\(#\).](#)

## Paleontology

- [Scientists Found Massive Dinosaur Footprints on a Cave Ceiling From a 165-Million-Year-Old World Turned Upside Down.](#)
- Fossil weasel: [New materials of the rare fossil mustelid \*Cernictis hesperus\* \(Carnivora, Mammalia\) from the Pinole Tuff genotype locality in California.](#)
- [The Hipparionini horses \(Equidae, Perissodactyla, Mammalia\) from the Late Pliocene of Jradzor \(Armenia\).](#)
- [Avian remains from Venta Micena \(Baza Basin, Granada Geopark\) shed light on the Early Pleistocene wetland environments and trophic dynamics of the Southern Iberian Peninsula.](#)
- [Eco-phenotypic diversity in European Middle Pleistocene Hippopotamus populations.](#)
- [Formation processes of Late Miocene Hipparion Red Clay vertebrate assemblages from northern China: taphonomic constraints on palaeoecological and biochronological interpretations.](#)
- Fossilization of forams: [Bioerosion Drill Holes Increase Carbonate Dissolution in the Planktonic Foraminifer \*Globigerinoides ruber\*.](#)
- [A new early monofenestratan pterosaur from the Mörnsheim Formation of southern Germany.](#)
- [Proposed Ediacaran meiofaunal burrows from Brazil are pyritized algal/microbial consortia; ScienceDaily summary \[here\]\(#\).](#)

## Ore Deposit and Energy Geology

- Shale gas geology: [Prediction of Fault and Fracture Density From Seismic Attributes and Machine Learning Models Calibrated With Borehole Image Logs.](#)
- [Linking Mississippi Valley-type deposit size to metal provenance.](#)
- [The source of the gold in Carlin-type gold deposits.](#)
- [Rare earth elements in phosphorite from Maknassy-Mezzouna basin \(Central Tunisia\): Geochemical features, paleoenvironmental indicators and implications for economic resource potential.](#)

## Mining and Energy

- [US shale gas and tight oil production: 2026 Q1.](#)

- [Canada Clears Path for West Coast Oil Pipeline Build.](#)
- [U.S. industrial natural gas consumption expected to hit records in 2026 and 2027.](#)
- [The truly staggering cost of ‘cheap’ renewable energy.](#)
- [The Math Isn’t Mathing: US Natural Gas Shortfalls by 2030.](#)
- [First Quantum says Panama has lost \\$3.5B from mine halt.](#)
- [Coal plants persist as a large barrier to the global solar energy transition; Phys.org summary \[here\]\(#\).](#)
- [First RITM-200 reactor unit manufactured for Leningrad nuclear icebreaker.](#)
- Video from Tony Heller: [Analyzing Oil Production](#).
- [China’s new 800-cycle lithium-sulfur battery could nearly double drone flight time.](#)
- Art Berman: [The Price Isn’t Right: Fundamentals Don’t Support \\$100 Oil.](#)
- [Mexico's Pemex says fire inside its Oaxaca refinery fully extinguished, six injured.](#)
- [First Quantum’s Peru project joins ranks of copper giants.](#)
- From Mining.com: [World’s 10 Biggest Copper Mines \(2026 Rankings\).](#)
- [Uranium – Cameco Guidance Hanging by a Thread, Implications for Market Purchases.](#)
- [80 Mile gets exploration permits to begin drilling at Disko project in Greenland.](#)
- [Global Coal Demand Surges as Middle East Energy Crisis Deepens.](#)

## **Environmental Geology and Hydrogeology**

- [World's largest carbon capture complex gets go-ahead in Ottawa's oilsands 'grand bargain'.](#)
- [Quebec mining company fined \\$100M for polluting fish-bearing waters.](#)
- [Air Contamination and Mass Fractionation Correction in Groundwater From a Hydrocarbon System.](#)
- [A novel method to estimate baseflow using open-source well data.](#)
- [Community-led small-scale managed aquifer recharge can slow drought propagation: Sociohydro\(geo\)logical evidence from Oaxaca, Mexico.](#)
- [The impact of lead-zinc mining activities on watershed environment with respect to lead \(Pb\) isotopes: A case study in typical mining areas of the western Qinling Mountains, China.](#)
- France: [The Thau inverted aquifer: when an underwater spring absorbs salt water and threatens groundwater.](#)

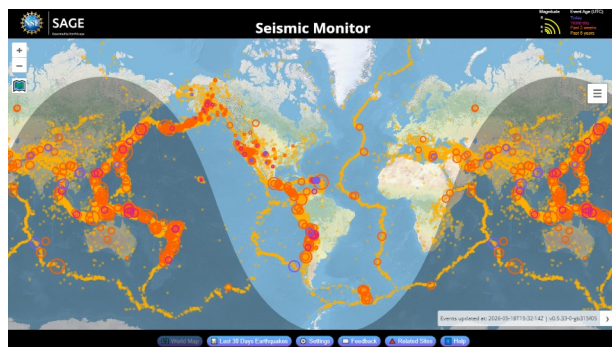
## Glaciers and Climate Change

- Lots of recent papers on glaciers in [The Cryosphere](#) from the EGU.
- [Co-development of physical and biological variables on glacial hillslopes over millennia.](#)
- Periglacial environment: [Mapping Subsea Permafrost Distribution in the Canadian Beaufort Sea With Marine Seismic and Deep Learning.](#)
- [Gas hydrate dissolution triggered by subglacial groundwater flushing during deglaciation.](#)
- [Vanishment of very small glacierets throughout the Northern and Central Andes of Chile.](#)
- [Daily briefing: Ice core is the longest-ever continuous record of Earth's climate.](#)
- [Temperature-dependent feedbacks drive the pattern of Antarctic temperature change.](#)
- [2024 global temperature record is consistent with model-predicted warming.](#)

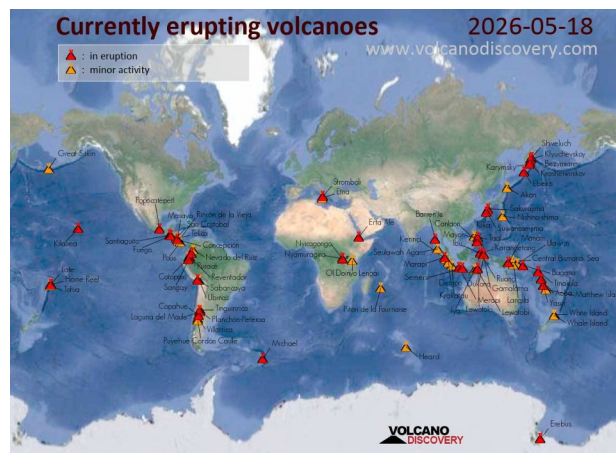
## Bad Science

- [Gotcha! Odd language mistakes may help identify fake papers.](#)
- [LLM hallucinations in the wild: Large-scale evidence from non-existent citations.](#)

## Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

## Volcanoes

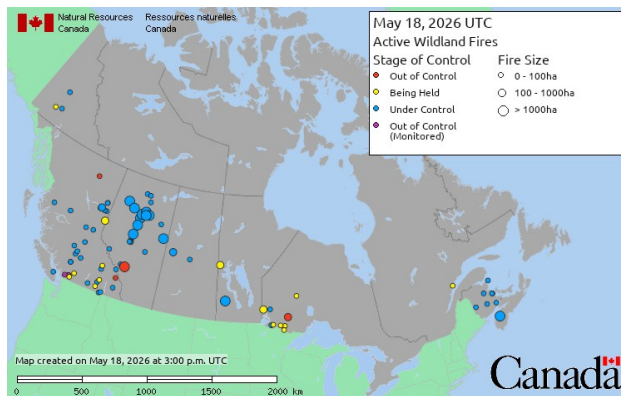
- [Smithsonian / USGS Weekly Volcanic Activity Report.](#)
- United States Geological Survey (USGS) Volcano Observatories:
  - Yellowstone Caldera Chronicles: [Happy 25th Birthday YVO!](#)
  - [Cascades Volcano Observatory Weekly Update.](#)

- Volcano Watch – [A "window" into forecasting fountaining episodes at Kīlauea's summit.](#)
- [Long-term deformation and surface change of the Heisei-Shinzan lava dome revealed by integrated monitoring.](#)
- [Geophysical Signals Induced by Magma Propagation: Insights From Analog Experiments.](#)
- [Insights into the internal structure and mechanical behavior of Copahue volcano \(Argentina–Chile\).](#)
- [Investigating magmatic processes on the Reykjanes Peninsula, Iceland, with local earthquake tomography.](#)
- [Water driven iodine degassing from basaltic volcanic systems.](#)

### Earthquakes

- [Spatial and Temporal Variations in Slip Rate Over Millions of Years on an Extensional Fault System and Implications for Seismic Hazard.](#)
- [Ultra-low friction graphene oxide in the Atotsugawa Fault System.](#)

### Geohazards



**Wildfires – May 18, 2026**

[Credit: Canadian Wildfire Fire Information System](#)

- [Canada's first confirmed tornado of 2026.](#)
- [Strong global radiative effects from wildfire dark brown carbon.](#)

### 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 together with free online courses, listed [here](#).
- Free [Groundwater Modeling Courses](#) from the HydroGeoCenter.
- [Lectures on groundwater from the IAHR, on YouTube.](#)

- From Western Australia: [Carbonatite, lamprophyre and host rocks in the northern Aileron Province](#).
- The Geology of Indonesia: [Volume 1](#) and [Volume 2](#).
- 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](#).
- [Systematic geochemical classification of felsic igneous rocks of the Yilgarn Craton](#).
- From the Arizona Geological Survey: [Geochemistry Diagram Generator v 1.0](#).
- Online app: [Australia's full national topographic library at your fingertips](#).

## Upcoming Events

- [GAC-MAC 2026 St. John's NL, St. John's Convention Center, May 25-28, 2026](#).
- 8-11 June 2026, [World Geothermal Congress 2026, Calgary Telus Convention Center](#).
- June 9–10, 2026, [Critical Minerals for Defence, Marriott Downtown CF Toronto Eaton Centre](#).
- [PEG2026: 11th International Symposium on Granitic Pegmatites; 16th–19th August 2026, in Perth, Western Australia](#).
- [August 23 – 28, 2026, 24th Annual Conference of the International Association for Mathematical Geosciences, Montreal, Canada](#).
- [14-18 September 2026, IAH 2026, 53rd Congress of the International Association of Hydrogeologists; Budapest Congress Center](#).
- September 24, 2026, [25 years of Extraordinary, Oakridges Moraine Groundwater Program, The Village of Black Creek, 1000 Murray Ross Pkwy, Toronto, ON](#).
- [September 30 - October 3, 2026 SEG 2026 Conference Salt Lake City, United States](#).
- [Paleoamerican Odyssey 2026, October 14-17, 2026, Santa Fe Convention Center, Santa Fe, New Mexico](#).
- [November 2-3, 2026 CCMEC 2026 Victoria Inn Hotel & Convention Centre, Winnipeg, Manitoba](#).
- [12-20 August 2028, Geosciences for Humanity, 38th International Geological Congress, in the BMO Centre, Calgary](#).
- [Society of Petroleum Engineers Distinguished Lecturer Schedule](#).
- [American Geophysical Union List of Upcoming Meetings](#).
- The Geological Society: [Events & Courses](#).
- [Upcoming Distinguished Geoscience Australia Lectures \(DGALs\)](#).

May 18, 2026

# Geology and Mineral Resources – The Philippines

## Introduction



Figure 1 – The Philippines

Credit: [Mapsland, Creative Commons Attribution-Share Alike 3.0 Licence](https://creativecommons.org/licenses/by-sa/3.0/)

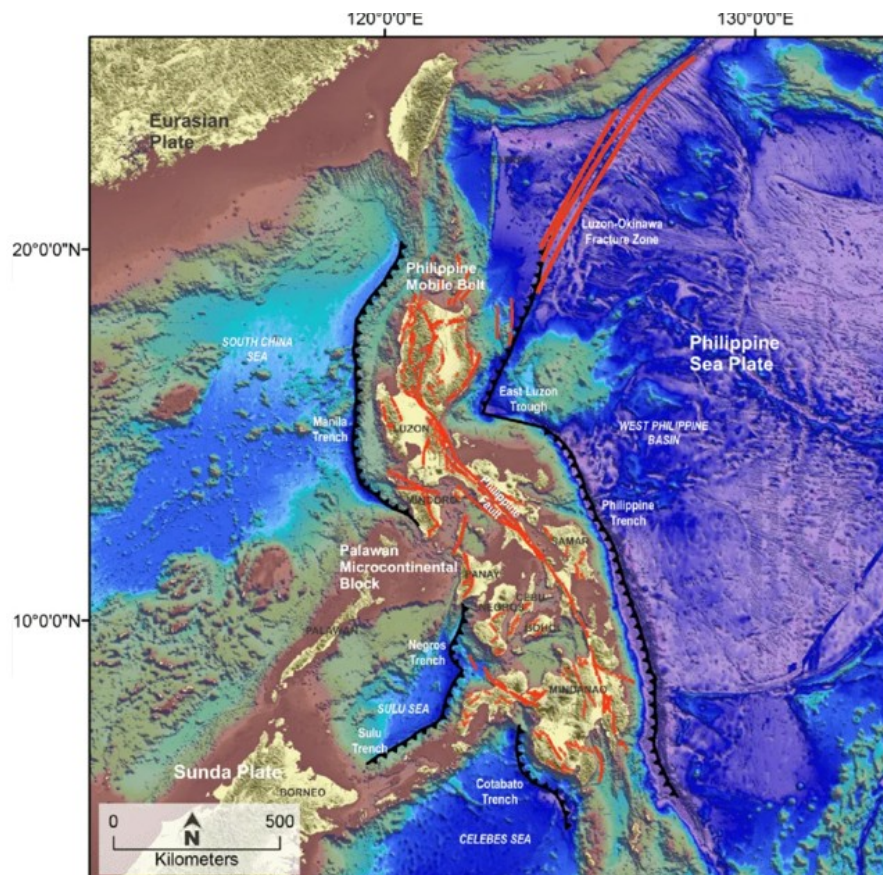
The [Republic of the Philippines](#) is a country of [111,349,016](#) people on about 7,641 islands in [Southeast Asia](#). The country has an area of approximately 300,000 square kilometres. Connected to the [Pacific Ocean](#), the seas surrounding the Philippines are: the [South China Sea](#), to the west; the [Philippine Sea](#), to the east; and the [Celebes Sea](#), to the south. Nearby countries across those seas are: [Taiwan](#), to the north; [Japan](#), to the northeast; [Palau](#), to the east/southeast; [Indonesia](#), to the south; [Malaysia](#), to the southwest; [Vietnam](#), to the west; and [China](#), to the northwest.

The Philippines is a modestly prosperous country with a per capita [GDP \(PPP\)](#) of \$13,639 and a high [Human Development Index](#) of 0.720. The [Philippine economy](#) is a service-oriented economy, with an expanding manufacturing sector and an important agriculture sector, feeding those 111 million people.

The [top exports](#) of the Philippines in February 2026 were integrated circuits, small general trade shipments, insulated wire, coconut oil, and electrical transformers. The main destinations for exports were: the United States, Hong Kong, Japan, China, and the Netherlands. The [main imports](#) were integrated circuits, refined petroleum, small general trade shipments, cars, and crude petroleum. The main countries of origin for imports to the Philippines were China, South Korea, Japan, Indonesia, and the United States.

For more details on the country, check out the [Wikipedia](#) and [Grokopedia](#) articles on the country.

## Geology



**Figure 2 – Tectonic Geology of the Philippines**  
**Credit: Figure 1 in [Queaño et al, 2020](#), CC BY 4.0**

The [geology of the Philippines](#) is a consequence of ongoing [tectonic activity](#). This [orogeny](#) pushed together the [Pacific Plate](#), the [Eurasian Plate](#), the [Indo-Australian Plate](#), and the [Philippine Sea Plate](#). Attached to the Indo-Australian Plate are two smaller plates: the [Sunda Plate](#), and the [Palawan Microcontinental Block](#). At the junction of the Sunda Plate, Palawan Microcontinental Block, and the Philippine Sea Plate is the [Philippine Mobile Belt](#).

The [Philippine Mobile Belt](#) is surrounded by [complex plate boundaries](#) including various [subduction zones](#) including: the [East Luzon Trough](#), to the northeast; the [Philippines Trench](#), to the east; the [Cotabato Trench](#), the [Sulu Trench](#), and the [Negros Trench](#), to the southwest; and the [Manila Trench](#), to the northwest. Running down the middle of the Philippine Mobile Belt is a complex of faults generally called the [Philippine Fault](#).

The [geologic history of the Philippines](#) began during the [Cretaceous Period](#). The geological and tectonic processes that made the modern Philippines include: [subduction related volcanism](#), [strike slip faulting](#), [continent-arc collision](#), and [ophiolite accretion](#). Significant events in the [evolution of the Philippines](#) include:

- The emergence of the [Philippines as an island arc](#) during [the Cretaceous](#);
- The [Andean-like subduction](#) and [rifting](#) of Eurasian Plate fragments during the [Late Cretaceous](#) and [Paleogene](#);
- The drifting of the Eurasian Plate fragments southward and [eventually colliding](#) with the developing Philippine arc beginning in the [Miocene](#) and continuing to this day.

The lithology of the Philippines includes Cretaceous or older [metamorphic rocks](#). Associated with these Cretaceous aged metamorphic deposits are [ophiolites](#) including: the [Isabela Ophiolite](#), [Casiguran Ophiolite Belt](#); [Zambales Ophiolite Belt](#); [Angat Ophiolite Belt](#); [Eastern Bicol–Eastern Mindanao Ophiolite Belt](#); [Antique Ophiolite Belt](#); Western Bicol–Eastern Leyte Ophiolite Belt; [Palawan Ophiolite Belt](#); Zamboanga–Sulu Ophiolite Belt; and Central Mindanao Ophiolite Belt.

Volcanic rocks in the Philippines are common and are found in: [magmatic arcs](#), [ancient arc deposits](#), and [active volcanic arcs](#).

The [Philippines](#) also has numerous [sedimentary basins](#) ranging in age from [Jurassic](#) to [Quaternary](#). These include: the [Ilocos - Central Luzon Basin](#); the [Cagayan Valley Basin](#); the [Southern Luzon - Bicol Basin](#); the [Mindoro Basin](#); the [Iloilo Basin](#); the [Visayan Sea Basin](#); the [Samar Basin](#); the [Agusan-Davao Basin](#); and the [Cotabato Basin](#).

This, of course, only scratches the surface of the complex geology of the the Philippines. If you want to dig into it deeper, follow up on the links above. Two good documents are:

- Mario A. Aurelio and Rolando E. Peña (ed.), 2010, *Geology of the Philippines, Second Edition*, Mines and Geosciences Bureau, North Avenue, Quezon City, Philippines, <https://www.geokniga.org/bookfiles/geokniga-geologyofthephilippines2ndeditionminesandgeosciencesbureau.pdf>

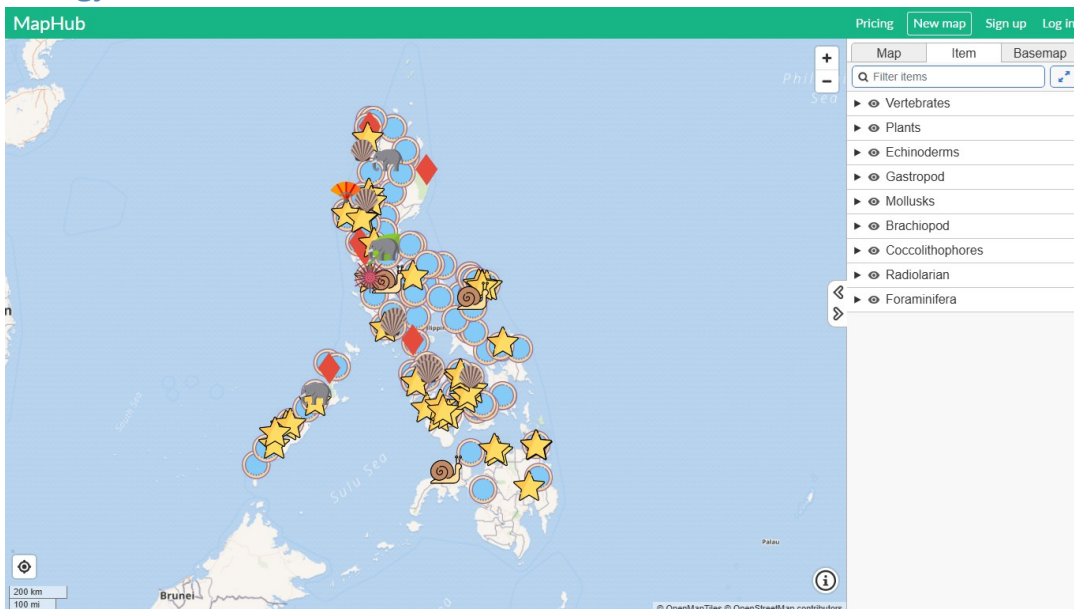
- Morrison, Sean, Geologic evolution of the Philippines, <https://geomorrison.files.wordpress.com/2014/04/geologic-evolution-of-the-philippinesv04.pdf>

Figure 3, below, links to an interactive geological map of the Philippines, from [Macrostrat](#).



**Figure 3 – Interactive Geological Map of the Philippines**  
**Credit: Macrostrat, CC BY 4.0**

## Paleontology



**Figure 4 – Fossil Sites in the Philippines**  
**Credit: Copyright © 2026 Nannoworks Laboratory**

The [Nannoworks Laboratory](#) of the National Institute of Geological Sciences, University of the Philippines Diliman has published an [interactive map](#) showing the locations sedimentary basins with fossils found in the Philippines (see Figure 4, above). Let's look at a few examples of these fossil finds.

*Stegodon* sp.



Figure 5 - *Stegodon* at the [Davao City Museum](#)

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

An extinct genus of [proboscidean](#) (elephant), *Stegodon* lived in the Philippines during the [Pliocene Period](#) and into the [Pleistocene Epoch](#) of the Quaternary Period. The *Stegodon* specimens found in the Philippines were pygmy specimens, typical of [island dwarfism](#).

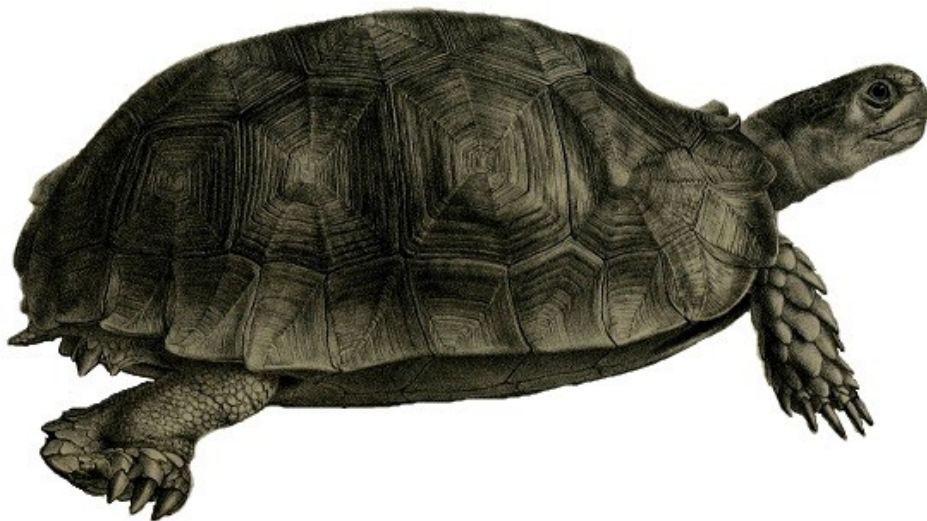
A student, Cheerie T. Magalit, is credited with [first finding](#) a *Stegodon* fossil at the [Tres Hermanas Quarry](#), in [tuffs](#) of the Laguna Formation (Pliocene-Pleistocene), near [Antipolo, Rizal](#). This discovery is further described in the paper by W. U. Schoell, A. Peleo-Alampay, and P. J. Militante-Matias, July 1987, *Stegodon* fossil remains from the Plio/Pleistocene, Laguna Formation, Antipolo, Rizal, Natural and Applied Science Bulletin 39(3):217-236 (1987), [https://www.researchgate.net/publication/339102605\\_Stegodon\\_fossil\\_remains\\_from\\_the\\_Plio-Pleistocene\\_Laguna\\_Formation\\_Antipolo\\_Rizal](https://www.researchgate.net/publication/339102605_Stegodon_fossil_remains_from_the_Plio-Pleistocene_Laguna_Formation_Antipolo_Rizal)

Figure 6 shows the location of the Tres Hermanas Quarry, it's just outside [Manila](#).



**Figure 6 - Tres Hermanas Quarry Location**  
 Credit: [Figure 1 in Karl & Staesche, 2014](#)

*Manouria*

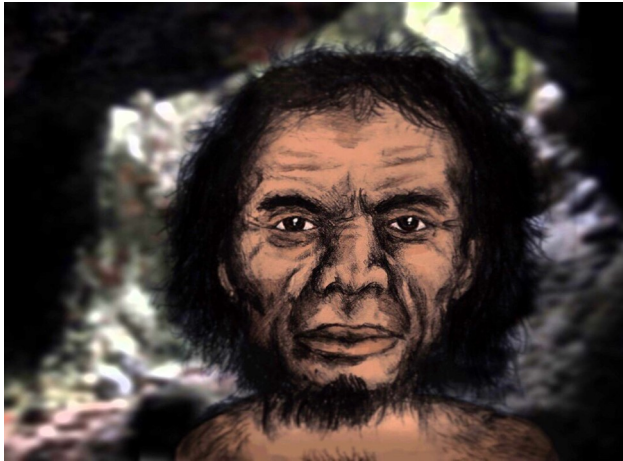


**Figure 7 – *Manouria***  
 Credit: [Biodiversity Heritage Library, public domain](#)

Island isolation can also make [giants of smaller creatures](#). This was the case with [Manouria](#), a common brown land tortoise still found [today in Southeast Asia](#). During the Pleistocene, however, one species of *Manouria*, *Manouria sondaari*, grew to be a giant land tortoise. Fossils of *Manouria sondaari* were found in the Tres Hermanas Quarry by Hans-Volker Karl and Ulrich Staesche in 2007. This was

documented in the paper: Karl, Hans-Volker & Staesche, Ulrich. (2014). *Fossile Riesen-Landschildkröten von den Philippinen und ihre paläogeographische Bedeutung [Fossil Giant Land Tortoises from the Philippines and their palaeogeographic importance]*. Geologisches Jahrbuch. B. 171-197, [https://www.researchgate.net/publication/260382701\\_Fossile\\_Riesen-Landschildkroten\\_von\\_den\\_Philippinen\\_und\\_ihre\\_palaogeographische\\_Bedeutung\\_Fossil\\_Giant\\_Land\\_Tortoises\\_from\\_the\\_Philippines\\_and\\_their\\_palaogeographic\\_importance](https://www.researchgate.net/publication/260382701_Fossile_Riesen-Landschildkroten_von_den_Philippinen_und_ihre_palaogeographische_Bedeutung_Fossil_Giant_Land_Tortoises_from_the_Philippines_and_their_palaogeographic_importance)

### *Homo luzonensis*



**Figure 8 - *Homo luzonensis* restoration**  
**Credit:** Luzonensis, [Creative Commons Attribution-Share Alike 4.0 International](#) license

The phenomena of [island dwarfism](#) is not confined to elephants, a population of [archaic humans](#) were stranded on [Luzon](#) during the [Late Pleistocene](#) and became smaller over time. Bones of these people were first found in 2007 by archaeologist [Philip Piper](#). In 2019, a group of archaeologists, lead by [Armand Mijares](#) and [Florent Détroit](#), published a [paper](#) naming the new human species [Homo luzonensis](#) based on bones found in [Callao Cave](#). It is very likely that *Homo luzonensis* hunted the giant tortoises and dwarf elephants also found on Luzon during the Pleistocene.

### *Taramelliceras*

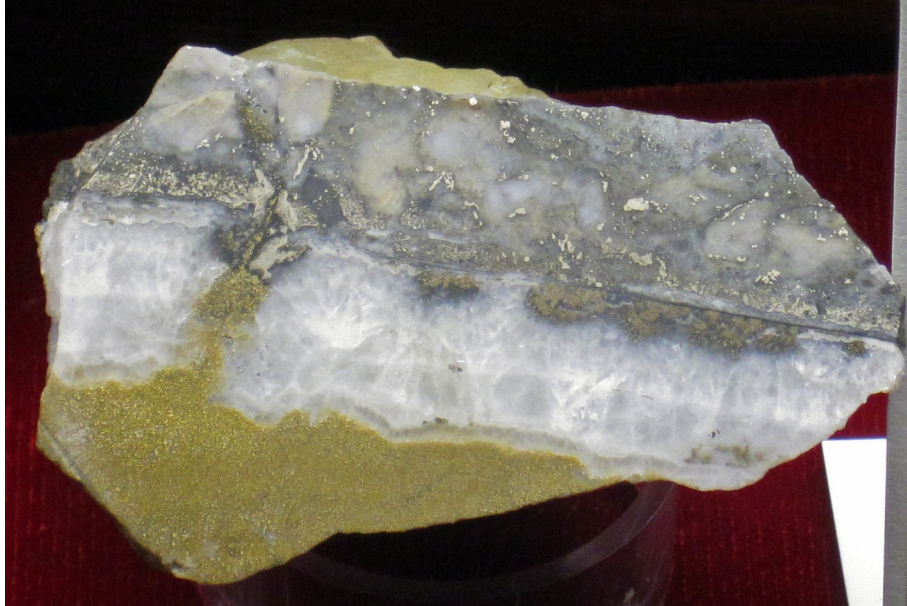


**Figure 9 – *Taramelliceras***  
**Credit:** [Ghedoghedo](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Found in the [Jurassic aged Mansalay Formation](#) in Southern Mindoro, [Taramelliceras](#) was a marine cephalopod, an [ammonite](#).

The *Taramelliceras* find was documented in: D. R. Andal, J. S. Esguerra, W. Hashimoto, B. P. Reyes and T. Sato, 1968, *The Jurassic Mansalay Formation, Southern Mindoro, Philippines*, Contributions To The Geology And Palaeontology Of Southeast Asia, L., Geology And Palaeontology Of Southeast Asia Vol. IV, pp. 179-197, Pis. XXVIII-XXX, February 25, 1968, [http://jurassic.ru/pdf/Andal%20et%20al.,1968\\_Amm\\_Philippines.pdf](http://jurassic.ru/pdf/Andal%20et%20al.,1968_Amm_Philippines.pdf)

## Mineral Resources



**Figure 10 - Gold & Quartz from the [Benguet Province](#), Philippines**  
**Credit: [James St. John](#), [Creative Commons Attribution 2.0 Generic](#) license**

According to the [USGS Minerals Yearbook on the Philippines](#), the country has a broad based mineral industry. In 2022, the Philippines was the second-ranked producer of nickel and it was the fifth-ranked producer of cobalt. The most current statistics on mineral production from the USGS are [here](#).

### *Metallic Minerals*

- Chromium, as [chromite](#), is mined at: the [Homonhon chromite project](#) on [Homonhon Island](#) in [Eastern Samar Province](#); the [Redondo Mine](#) in [Dinagat Island Province](#); and by the [Shangfil Mining and Trading Corp. mine](#) in [Zambales Province](#).
- Cobalt and nickel are mined at: the [Rio Tuba nickel project](#) in [Palawan Province](#) and at the [Taganito Mine](#) in [Surigao del Norte Province](#).
- Copper and gold are mined at: the [Toledo copper mine](#) in [Cebu Province](#); the [Lepanto Mines](#) in [Benguet Province](#), the [Didipio copper-gold mine](#) in [Quirino Province](#); the [Padcal mine](#) in Benguet Province; and the [Victoria Mine](#), Benguet Province.
- Gold alone is mined at: the [Maco gold mine](#) in [Davao de Oro Province](#); the [Acupan Mine](#), Benguet Province; the [Masbate gold mine](#) in [Masbate Province](#); at the [Siana gold mine](#) in Surigao del Norte Province; [Co-O gold mine](#) in [Agusan del Sur Province](#);

- Gold and silver are mined at: the [Sangilo Mine](#) in Benguet Province; and the [Balabag gold-silver mine](#) in [Zamboanga del Sur Province](#).
- Iron ore is mined at: the [Camachin iron mine](#) in [Bulacan Province](#).
- Molybdenum and gold are mined at the [Runruno mine](#) in [Nueva Vizcaya Province](#).
- Nickel is mined at [approximately 45 mines](#) in many provinces in the country.

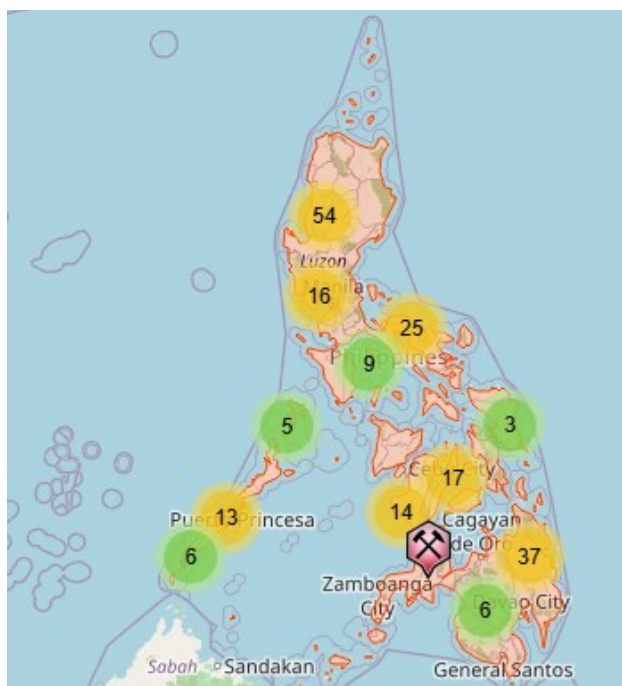
### ***Industrial Minerals***

- For construction materials, the Philippines produces cement, clay, lime, [pozzolan](#), dimension stone, crushed stone, sand and gravel.
- Other industrial minerals include: feldspar, [perlite](#), phosphate rock, sea salt, and [zeolites](#).

### ***Mineral Fuels and Related Materials***

- Coal is mined by the [Semirara Mining and Power Corp.](#) in [Antique Province](#).
- Natural gas and [condensate](#) are produced at the [Malampaya gas field](#), 80 kilometers offshore Palawan Province.
- Petroleum and natural gas are produced at the [Alegria oil and gas field](#) in [Alegria](#) and offshore Cebu Province.
- Petroleum is produced at the [Galoc oilfield](#), 60 kilometers northwest of [Culion Island](#), Palawan Province.

Figure 11 links to a interactive mineral occurrence map from Mindat.



**Figure 11 - Interactive mineral occurrence map, Philippines** [Credit: Mindat.org](#)

## Summary



**Figure 12 - Sunset [Agta Beach Resort – Biliran](#)  
Credit: [Leodb](#), [Creative Commons Attribution-Share Alike 3.0 Unported](#) license**

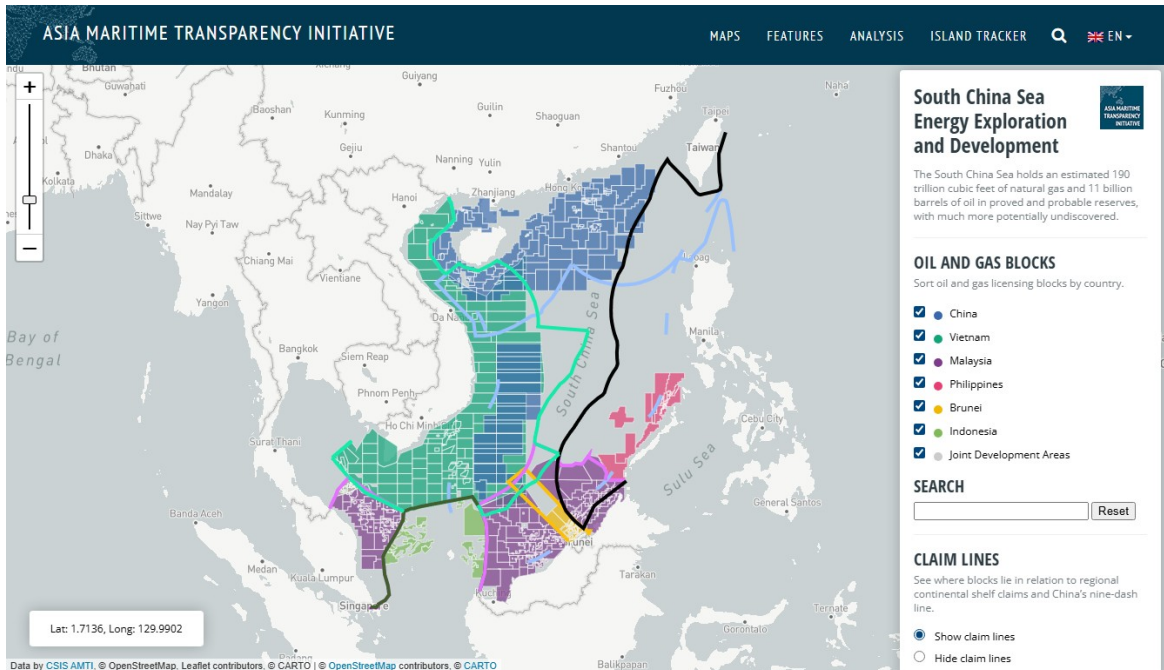
I have to admit my strong positive bias about the Philippines since my daughter-in-law came from there and she has told me many good things about the place. Also, my daughter visited the Philippines a couple of years ago and also had positive reviews of it. I have met many fine people from that country.

However, the country is not without its problems as in this recent news item:

- [Gunfire breaks out in Philippine Senate where authorities tried to arrest a senator.](#)

Internally, the Philippines has struggled with generating enough economic growth to gainfully employ its many well educated people. That is one reason I have had the opportunity to meet people from the Philippines in my own country, many Filipinos and Filipinas have moved to Canada for better economic opportunities. Like many countries, the Philippines also struggles with [political corruption](#) – a serious drag on economic growth and a constant annoyance to ordinary people.

The Philippines also has serious geopolitical issues, especially with their neighbour [China in the South China Sea](#). There are [regular incidents](#) between Chinese and Philippine maritime forces in the [disputed areas](#) of the sea. Besides the usual issues of national pride, there are [potential oil and gas deposits under the South China Sea](#) (see Figure 13, below) and China is anxious to [secure access to the resources](#). The Philippines is also pursuing new energy deposits, [especially offshore of Palawan](#). There is a possibility that [current difficulties](#) will encourage [peaceful cooperation on the matter](#). I don't think that we can rule out anything at this point.



**Figure 13 - South China Sea Energy Exploration and Development**  
 Credit: ©2026 [Center for Strategic & International Studies](#)

In addition to possible petroleum development, a [potential that has been known for a long time](#), the Philippines also has a [good chance](#) to get in on the current [boom in rare earth minerals](#). While well developed, there may also be potential for new development in both precious and base metals. The current [high demand for copper](#) could spur exploration for that commodity in the Philippines. [Developing their mineral resources in a responsible manner](#) is another challenge for the Filipinos.

Overall, I am optimistic for the people of the Philippines. There are still great opportunities for natural resource and other economic development. More importantly, they have good people, and that counts for a lot.

## 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.