

May 4, 2026

News and notes

For lovers of Star Wars: [May the Fourth Be With You.](#)

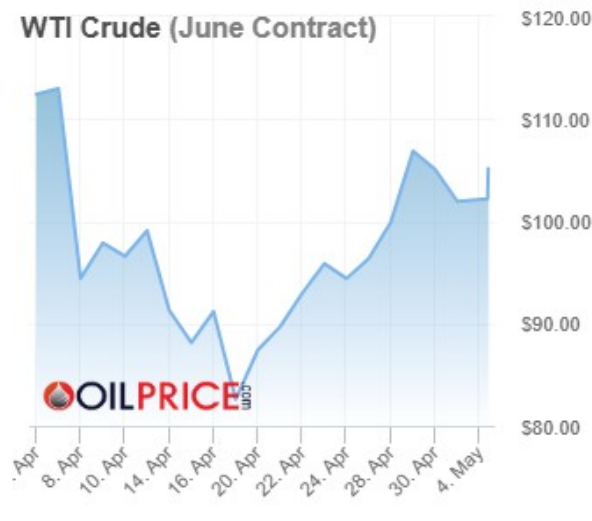
Here are some news items that I thought were interesting. For my news items, I try to stick to open access papers.

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.

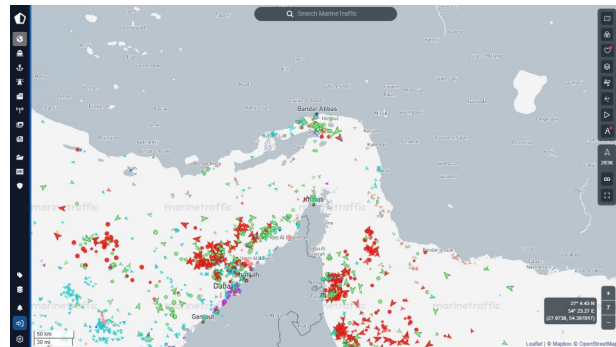
Comments

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



Oil prices up to May 4, 2026
Credit: [Oilprice.com](https://oilprice.com)



Marine Traffic in the Strait of Hormuz
Credit: marinetraffic.com

Iran War

- [Live Iran live updates: Trump's 'Project Freedom' begins Monday amid attacks in strait.](#)
- Raise the [Jolly Roger: Trump says US Navy acting 'like pirates' to carry out naval blockade of Iranian ports.](#)
- [Will Iran war fuel nuclear reactor construction?](#)
- [Spectre of renewed U.S. strikes on Iran drives wild oil price swings.](#)
- [Iran offers to reopen Strait of Hormuz if US lifts its blockade and the war ends, officials say.](#)
- [Fertilizer supply crisis deepens – phosphates.](#)

Other Geopolitics

- Under [Unrestricted Warfare: Two New Indictments Illuminate China's Unconventional War Against The U.S.](#)
- [Ukraine Hits Russian Black Sea Oil Port Four Times in One Week.](#)
- [The world is weeks away from oil rationing as prices rise: Eric Nuttall.](#)
- [DOE has released 17.5 million barrels from the Strategic Petroleum Reserve since March.](#)
- [Energy War Breaks OPEC: UAE Walks Away as Oil Supply Collapses.](#)
- [The Mechanistic Fallacy – Why the West so Often Fails at Geo-Politics.](#)
- [Mali Is on the Brink of Collapse—and Europe Should Be Worried.](#)
- [Uranium map: Who holds the world's reserves and who controls production — and shapes geopolitics.](#)

Research and News

- Geophysics: [Rayleigh Waves From OHANA OBSs in the Northeast Pacific Ocean Reveal Low Deep Shear Velocities and Pervasive Azimuthal Anisotropy.](#)
- [Geological mapping from the ocean floor to outer space.](#)
- [Deep-Earth map reveals a lost U.S. continent.](#)
- [May 2026 Edition of GSA News.](#)
- Significant geological landscapes: [Earth In 12 Chapters: Inside UNESCO's Newest Geoparks Around The World.](#)
- [Cryptic Paleomagnetic Complexity in the Ediacaran Egersund Dikes.](#)
- [Key New Evidence for the Hainan Mantle Plume Head: Ongoing Formation of a Large Igneous Province?](#)
- [Source-to-sink sediment transport reversals during glacial sea-level lowstands sustain soil formation on pericoastal carbonate terrains.](#)
- [Petrology of the late Cretaceous high-temperature–low-pressure metamorphic rocks on Donoussa, Cyclades, Greece.](#)
- [Bed-scale quantitative discrimination of hyperpycnites from intrabasinal turbidites—Results from a channelised slope system in the Upper Carboniferous Westward Ho! Formation, United Kingdom.](#) Definition of hyperpycnites [here](#).
- [Structural and partial melting history of the Ganderian Nashoba Formation in eastern Massachusetts: Evidence for channel flow and ductile extrusion?](#)

Plate Tectonics

- [Chemical Geodynamics of Granitoid Magmatism During a Pacific-Philippine Sea Plate Transition in Southwest Japan.](#)
- In Oliver Strimpel's Geology Bites podcast: [Alec Brenner on When Tectonic Plates First Moved.](#)
- [The Dynamics and Surface Signal of Slab Break-Off in Continental Settings: Insights From 3D Numerical Modeling.](#)
- [Paleolatitude.org 3.0: A calculator for paleoclimate and paleobiology studies based on a new global paleogeography model;](#) Science Alert summary [here.](#)
- [Influence of Inherited Rifted Margin Architecture on Continental Collision Dynamics.](#)
- [Enigmatic postsubduction lavas from a fossil slab remnant beneath Baja California, Mexico.](#)

Paleontology

- [Late Pleistocene pelagic gastropods of southern Taiwan: paleobiodiversity, first fossil records, and regional affinity.](#)
- [A new Eocene species of *Hydroides* \(Polychaeta, Serpulidae\) from the Cowlitz Formation, Lewis County, Washington State, USA.](#)
- [A partial skeleton of *Temnodontosaurus* cf. *trigonodon* in three-dimensional bone preservation from the upper Toarcian of Mistelgau, Germany;](#) Phys.org summary [here.](#)
- [An early burst of skeletal evolution at the origin of dinosaurs;](#) Phys.org summary [here.](#)
- [A Titanosaurian Sauropod with South American Affinities \(Lognkosauria: Argentinosauridae\) from the Late Maastrichtian of Morocco and Evidence for Dinosaur Endemism in Africa;](#) SciNews summary [here.](#)
- [Largest known madtsoiid snake from warm Eocene period of India suggests intercontinental Gondwana dispersal;](#) Science Daily summary [here.](#)

Ore Deposit and Energy Geology

- Geothermal energy geology: [High Temperature Friction and Strength of Felsite and Basalt: Implications for Supercritical EGS at Krafla, Iceland.](#)
- [Nickel-Zn-Pt-Pd-Re Hyper-Enriched Black Shale and Its Spatiotemporal Link With Clastic-Dominated Zn-Pb Mineralization at the Akie Property, Kechika Trough \(British Columbia\): Insights From Pyrite Chemistry and Geochronology.](#)

Mining and Energy

- [Venezuela Oil Exports Hit Seven-Year High.](#)
- [Former mining executive accused of manipulating gold assay results.](#)
- Visual Capitalist: [Coal Still Generates More Electricity Than Any Other Source.](#)

- [DRC copper exports to US set to surge amid warnings of corruption risk.](#)
- [Grid connection requested for US fusion power plant.](#)
- [New Chinese Iron Battery Lasts 16 Years.](#)
- Opinion: [Canada Should Be Leading a Geothermal Power Boom.](#)
- [Lithium Eastern States Could Replace Imports for a Century or More.](#)
- [American Ocean Minerals deploys deep-sea mining research vessel.](#)

Environmental Geology and Hydrogeology

- Thailand, contamination in sediment and water: [Arsenic risk in Salween basin.](#)
- [Integrated assessment of groundwater salinity sources and inter-aquifer mixing dynamics in Siwa Oasis, Egypt: A multi-method approach using self-organizing maps, isotopic tracers, and numerical modeling.](#)
- [Bangladesh struggles to choose between food security & stable groundwater table.](#)
- Whiskey's for drinking, water's for fighting: [This Summer, the American Water Crisis Becomes Real.](#)
- [Viciazines: Carbon materials with adjacent nitrogen functionalities for advanced CO2 capture;](#) SciTechDaily summary [here.](#)

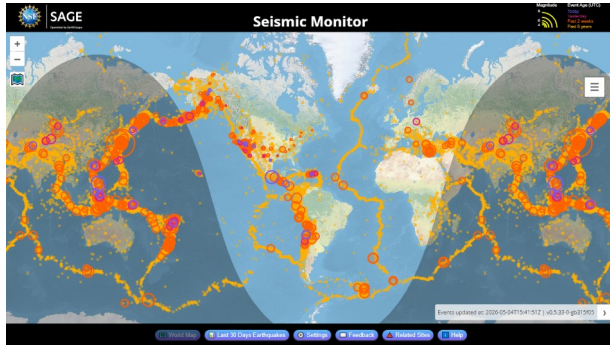
Glaciers and Climate Change

- Lots of recent papers on glaciers in [The Cryosphere](#) from the EGU.
- [Triple oxygen isotope constraints on the hydroclimate that sustained Pleistocene Lake Bonneville \(Utah, USA\).](#)
- [Volcanic forcing of global climate cooling at the Younger Dryas onset preserved in North American sediments.](#)
- [PRODEM-Xtract: A Python tool for extracting high-resolution annual ice elevations along Greenland flux gates.](#)

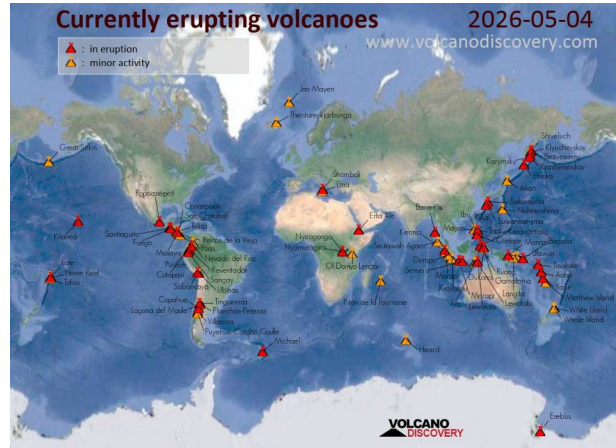
Bad Science

- [COVID Cover-Up: Hiding Star Researcher Ralph Baric's Ties to Global Pandemic.](#)

Volcanoes and Earthquakes



[Seismic Monitor](#)



[Active Volcano Map](#)

Volcanoes

- [Smithsonian / USGS Weekly Volcanic Activity Report.](#)
- United States Geological Survey (USGS) Volcano Observatories:
 - Yellowstone Caldera Chronicles: [Can a geological thermometer help forecast hydrothermal explosions in Yellowstone?](#)
 - [Cascades Volcano Observatory Weekly Update.](#)
 - Volcano Watch – [Kilauea summit eruptions outside of Halema'uma'u.](#)
- [Most active volcano in the Philippines spews giant ash column sky high.](#)
- [Satellite data synergy for volcano monitoring: The 2022 Mauna Loa eruption](#); Phys.org summary [here](#).

Earthquakes

- [Dynamics of non-self-similar earthquakes illuminated by a controlled fault asperity.](#)
- [Fault Volume Digital Twin to Reproduce the Full Slip Spectrum, Scaling, and Statistical Laws.](#)
- [Analysis of Rupture Directivity and Wave Propagation Effects on Simulated Ground Motion for \$M_w\$ 7 Earthquakes on the Hayward Fault](#); Phys.org summary [here](#).

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 IAH, 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

- [May 7-8, 2026 , Core Conference 2026, Alberta Energy Regulator, Core Research Centre, 3545 Research Way NW \(University Research Park\) Calgary, Alberta.](#)
- [GAC-MAC 2026 St. John's NL, St. John's Convention Center, May 25-28, 2026.](#)
- [PEG2026: 11th International Symposium on Granitic Pegmatites; 16th–19th August 2026, in Perth, Western Australia.](#)
- [14-18 September 2026 , IAH 2026, 53rd Congress of the International Association of Hydrogeologists; Budapest Congress Center.](#)
- [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 4, 2026

Geology and Mineral Resources – Paraguay

Introduction



Figure 1 – Paraguay

Credit: [Mapsland](#), [Creative Commons Attribution-Share Alike 3.0 Licence](#)

The [Republic of Paraguay](#) is a landlocked country of [7,439,863](#) people in [South America](#). The country has an area of 406,752 square kilometres and borders on [Bolivia](#) to the northwest and north, [Brazil](#) to the northeast and east, and [Argentina](#) to the southeast, south, and west. Oceangoing trade can reach Paraguay via the [Paraná–Paraguay Waterway](#) which leads to the [Rio de la Plata](#) and the [Atlantic Ocean](#).

Paraguay is a moderately wealthy country with a per capita [GDP \(PPP\)](#) of \$23,350 and a high [Human Development Index](#) of 0.756. [Paraguay's economy](#) is based upon agricultural production, export of agricultural commodities, and general trade, especially importing goods from China for re-export to nearby Brazil. Another important export is electrical power to Brazil from the [Itaipu Hydroelectric Project](#). Much of the trade that goes on within Paraguay is in the [informal economy](#), and for a long time Paraguay was renowned for [illicit trade](#) in drugs and weapons. In 2024, the [top exports](#) of Paraguay were soybeans, electricity, beef (both frozen and fresh), and soybean meal. The top destinations for exports were Brazil, Argentina, Chile, the United States, and Taiwan (Chinese Taipei). In 2024, the [top imports](#) of Paraguay were refined petroleum, telephones, cars, pesticides, and computers. The top origins for imports were China, Brazil, United States, Argentina, and Chile.

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

Geology



Figure 2 – West Gondwana during the Triassic Period
Credit: [Woudloper, Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license](#)

Paraguay sits on the [South American tectonic plate](#). The country also overlies parts of [Río del la Plata Craton](#), [Río Tebicuary Craton](#), and [Río Apa Craton](#). Overall, the [geology of Paraguay](#) consists of:

- A thick [Cenozoic](#) aged sedimentary deposits and [Mesozoic](#) aged sedimentary basins;
- The sedimentary rocks overlie older [Mesoproterozoic](#) aged crystalline rocks; and
- Mesozoic aged volcanic intrusions and [trap deposits](#).

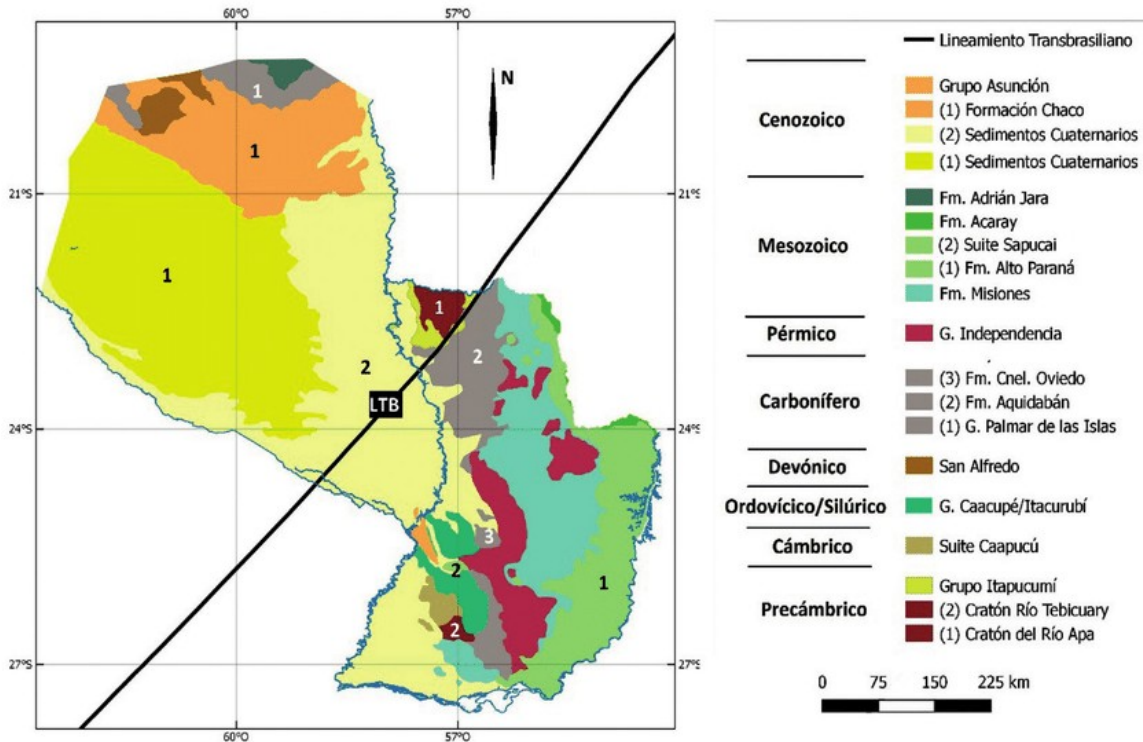


Figure 3 – Geological Map of Paraguay
Credit: Figure 6 in M. A. G. Villalba, 2021, CC BY 4.0

The oldest deposits in Paraguay are the Mesoproterozoic aged rocks of the [Río Apa Craton](#), the [Río Tebicuary Craton](#), and the [Itapucumí Group](#). The outcrops of the Río Tebicuary Craton in southern Paraguay are sometimes considered the northernmost extension of the [Río de la Plata Craton](#) and are called the [Caapucú High](#). The rocks of the Caapucú High are a suite consisting of [porphyritic granite](#), [orthogneiss](#), [paragneiss](#), [amphibolite](#), [migmatite](#), [talc schist](#), and [rhyolite](#) dykes.

The outcrops of the [Río Apa Craton](#) in north-central Paraguay are also called the [Apa High](#). The deposits of the [Apa High](#) include [Proterozoic](#) aged [granite](#), [metasediment](#), mafic [gneiss](#) and intrusions of [pegmatitic granite](#).

[Overlying the Apa High](#) deposits are rocks of the [Neoproterozoic](#) to [Silurian](#) aged [Itapucumí Group](#). The Itapucumí Group comprises, from base to top, [siliciclastic rocks](#) (Vallemi Formation), succeeded by [limestones](#) and [dolostones](#) (Camba Jhopo and Tagatiya Guazu formations), and which in turn are overlain by [marls](#) and [mudstones](#) (Cerro Curuzu Formation). Overall, the group represents three depositional sequences deposited in a large rimmed [carbonate platform](#). The [Itapucumí Group](#) includes [Ediacaran](#) aged shelly fossils and [treptichnids](#)

Next in age are the Neoproterozoic to [Cambrian](#), [Ordovician](#), and Silurian aged [deposits of the Caapucú Suite](#) which overlie the Río Tebicuary Craton and extend into Brazil. These are a mix of sedimentary and volcanic rock.

In central and western Paraguay is the [Phanerozoic](#) aged [Chaco Basin](#). The [Chaco Basin was formed](#) in a sequence of sedimentary deposition that began in the Neoproterozoic and continued into the [Quaternary](#). The deposits transition from marine to continental sediments and include evaporites in the final phases.

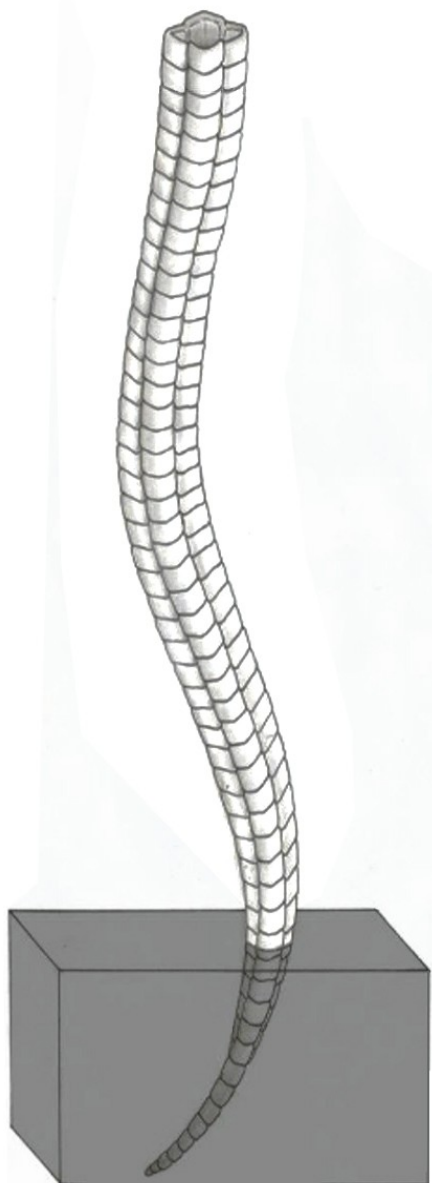
In eastern Paraguay, much of the Phanerozoic geology is part of the [Paraná Basin](#). The [intracratonic Paraná Basin](#) consists of sedimentary deposits spanning in age from the Paleozoic to the Cenozoic.

Overlying the sedimentary rocks of the Parana Basin are extensive basaltic flows of the [Paraná Large Igneous Province](#) (PLIP), Jurassic-Cretaceous age. The PLIP were deposited during the [opening of the South Atlantic Ocean](#). Also called the [Paraná and Etendeka Traps](#), the rocks of the PLIP consist of [tholeiitic basalt](#) and a variety of [silicic](#) volcanic deposits such as [ignimbrite](#), [quartz latite](#), and [pyroclastic](#) deposits.

Paleontology

[Fossils found in Paraguay](#) range in age from the Ediacaran to the [Pleistocene](#), quite a range in time. Lets look at a few of them.

Corumbella weneri



[Corumbella weneri](#) was a [sessile](#) animal that lived at the end of the Neoproterozoic during the Ediacaran Period. Its fossils have been found as burrows in the mud that later became rock. In Paraguay, the *Corumbella weneri* was found in the [Tagatiya Guazu Formation](#) of the Itapucumí Group.

Figure 4 - *Corumbella weneri*
Credit: Abner Santos, [Creative Commons Attribution 4.0 International](#) license

Arenorthis paranaensis

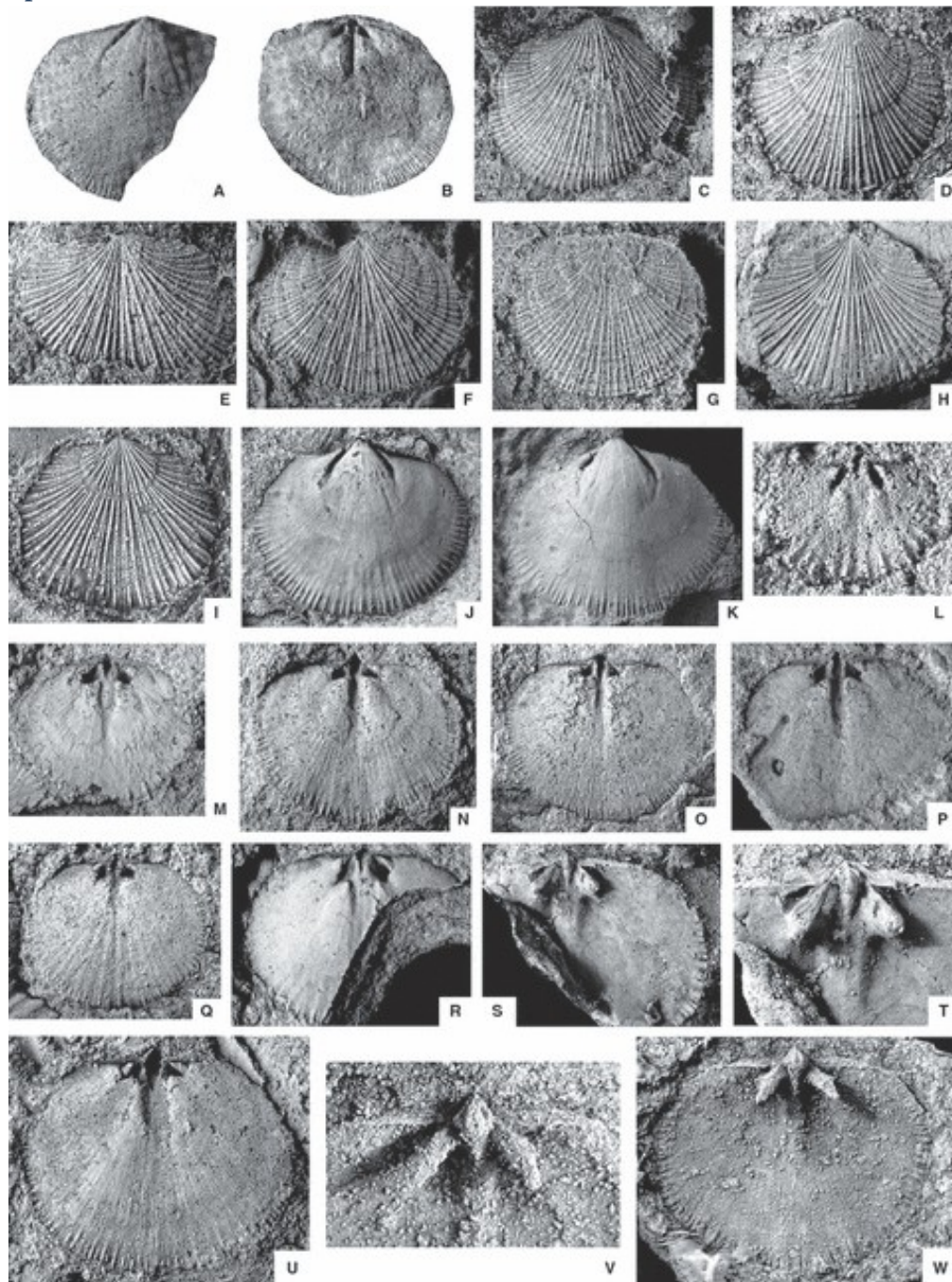


Figure 5 – Examples of *Arenorthis* including *Arenorthis paranaensis*
Credit: Figure 5 in [Bendetto et al, 2013](#)

[*Arenorthis paranaensis*](#) was a [brachiopod](#) that lived during the [Hirnantian](#) stage of the Ordovician Period in what is now the Parana Basin of Paraguay. *Arenorthis paranaensis* was first identified in the [Eusebio Ayala Formation](#) and published in [Bendetto et al, 2013](#).

Stegomastodon sp.

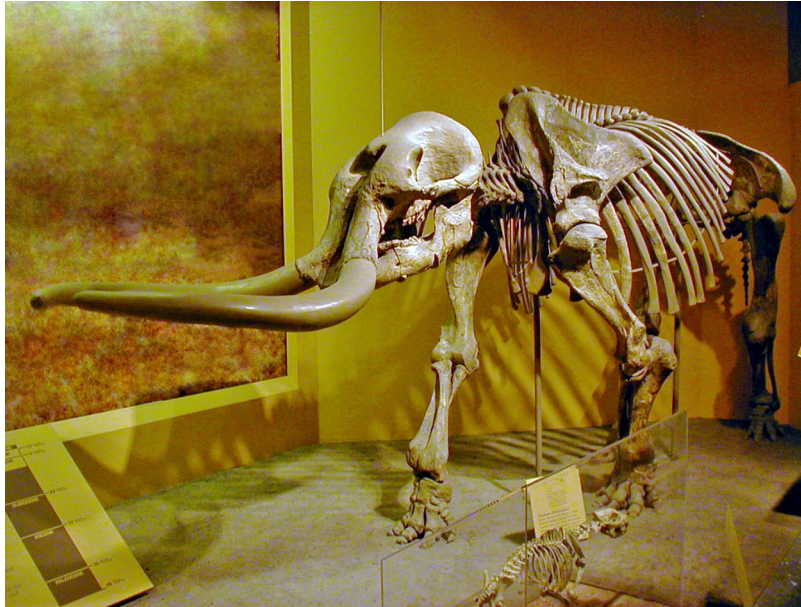


Figure 6 – *Stegomastodon* sp. Skeleton
Credit: [WolfmanSE](#), public domain

Stegomastodon sp. was a [gomphothere](#) elephant that lived throughout the Americas during the [Pliocene](#) and Pleistocene. Bones of *Stegomastodon* sp. were [found in 2008](#) in [Colonia Paratodo](#) in the [Paraguayan Chaco](#) region.

Mineral Resources

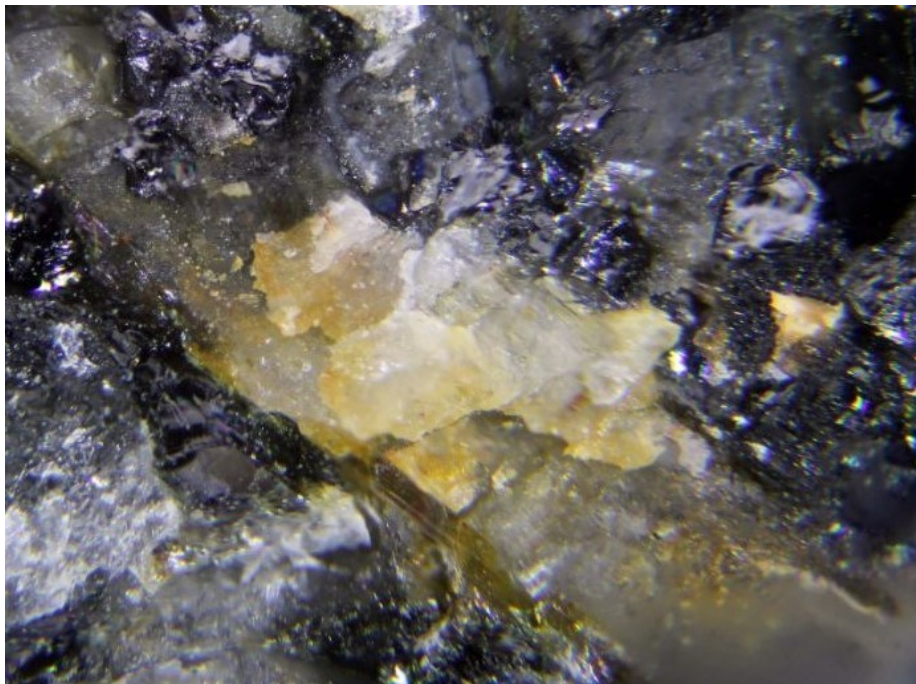


Figure 7 – [Strontiochevkinite](#) specimen from Paraguay
Credit: David Hospital, [Creative Commons Attribution-Share Alike 4.0 International](#) licence

According to the [USGS Minerals Yearbook for Paraguay](#), mineral production in Paraguay is pretty much limited to industrial minerals - [cement and lime production for construction](#) – and local refining of [iron and steel](#).

The [Uranium Energy Corp](#) has a project to mine and refine titanium in the Alto Parana region, but there are concerns that the [project may not go forward](#).

For oil and gas exploration, there appears to be good potential in the [Chaco](#) and [Parana](#) basins, but the petroleum industry of the [country remains underdeveloped](#).

Summary



Figure 8 - Sunset in the Mbatoví Eco Reserve Paraguay

Credit: [Eco reserva Mbatoví](#), [Creative Commons Attribution-Share Alike 4.0 International](#) licence

Paraguay has often been a destination for [people to escape](#) from issues they may be having in their own country. Some have principled reasons to get away, such as the Mennonites who just wanted to be left alone. If you look at the map of [Colonia Paratodo](#), you will notice some German sounding place names. This is because Mennonites, many from Manitoba, [settled the area](#) in the 20th Century.

Other people have [fled to Paraguay to escape criminal prosecution](#) in their own country. With its [weak public institutions](#) some people have been able to buy safe haven in Paraguay.

For geoscientists, while there appears to be great potential for mineral development in Paraguay, especially in the Chaco and Parana basins. However, those weak public institutions and [endemic](#)

[corruption](#) may make it difficult to operate in the country. So it might be a while before exploration geologists can send [Postcards from Paraguay](#).

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.