

December 15, 2025

News and notes



Cedar Trees – December 13, 2025

This week, before going on to discuss the geology and mineral resources of [Mongolia](#), we will first look at some news items I thought were interesting. The picture above is from out my back window and shows recent snowfall on ornamental cedar trees (*Thuja occidentalis*).

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.

Geopolitics

- Venezuela:
 - [US wargames played out scenarios for Maduro's fall. None of them ended well for Venezuela.](#)
 - [Venezuela seeks withdrawal from International Criminal Court's Rome Statute.](#)

- [Venezuela's oil exports fall sharply after US tanker seizure as only Chevron ships sail – sources, data.](#)
- [US seizes oil tanker off Venezuela as Caracas condemns 'act of piracy'.](#)
- [The Trans-Siberian Railway Is Poised To Play A Pivotal Role In Joint Russian-US Projects;](#)
- On the other hand: [Russia could attack NATO within five years, says alliance chief in stark new warning.](#)
- Something is up: [Probably F-15s, F-16s, F-22s And F-35s : Dozens Of US Jets Now Converging On The Middle East.](#)
- [Ukraine's gloves are off in its energy war with Russia. How much can it increase the pressure?](#)
- [The Unraveling of Iran's Influence in Syria.](#)

Research and News

- [Analysis of Seismic Wave Amplification in Sedimentary Basins Using 3D Wavefield Simulations: Nenana Basin, Central Alaska.](#)
- [The Transition From Melt Accumulation to Eruption Initiation Recorded by Orthopyroxene Fe-Mg Diffusion Timescales in Late Holocene Rhyolites, South Sister Volcano, Oregon Cascade Range.](#)
- [Geochronology of the Whittlesey sedimentary succession, eastern England: The 'Pompeii' of the British late Middle Pleistocene to Holocene record.](#)
- [Palagonitization of Volcanic Rocks in Polar Climates: The Case of Deception Island \(Antarctica\).](#)
- [Sedimentary conditions drive modern pyrite burial flux to exceed oxidation.](#)
- [Lithium isotopes reveal enhanced weathering fluxes in North America during the Paleocene–Eocene Thermal Maximum.](#)
- [The Spatial and Temporal Evolution of Mixed Carbonate-Clastic Mud-Dominated Basin Fill Successions: The Middle to Late Devonian Shelf Margin, Western Canada.](#)
- [How Earth's mantle locked away vast amounts of water in early magma ocean; two referenced papers \[here\]\(#\) and \[here\]\(#\).](#)
- [Metaluminous to peralkaline syenites and granites in the late Palaeozoic Oslo Rift, Norway, formed by polybaric fractionation and accumulation processes.](#)
- [Reconstructing Eocene Antarctic river drainage from provenance analysis of Amundsen Sea embayment sediments.](#)
- Drill baby drill: [Geoscience Australia's deepest stratigraphic drilling campaign unlocking the secrets of the Adavale Basin.](#)

- [Effect of 3-D fault geometry on synextensional sedimentation around a Miocene metamorphic core complex, eastern California–western Arizona, USA.](#)
- [Super-hydrous arc magmas delay magnetite saturation and sulfide precipitation.](#)
- [Depth-dependent anisotropy in the Earth’s inner core linked to chemical stratification](#); Phys.org summary [here](#).

Plate Tectonics

- [Crustal Structure of the J Magnetic Anomaly at 31°N, Northern Central Atlantic.](#)
- [Toward Reconstructing Mantle Convection Using a Minimum-Continent-Motion Reference Frame.](#)
- [Tectonic Framework of the Arenópolis and Anicuns-Itaberaí Segments of the Goiás Magmatic Arc Based on 3D Magnetotelluric Inversion.](#)
- [Strain Rates Along the Alpine-Himalayan Belt From a Comprehensive GNSS Velocity Field.](#)
- [Seismic Anisotropy Analysis Across Southwestern Australia Reveals ENE-Trending Lithospheric Architecture Linked to Archean Yilgarn Craton Formation.](#)
- [Upper mantle temperatures illuminate the Iceland hotspot track and understanding of ice–Earth interactions in Greenland](#); Phys.org summary [here](#).

Paleontology

- Analogs for primordial life on Earth: [Abiotic Siliceous Botryoids on Iron Oxyhydroxide Filaments From Hydrothermal Vents in the Southwest Indian Ocean.](#)
- “King of the Riverside”, a multi-proxy approach offers a new perspective on mosasaurs before [their extinction](#); Phys.org summary [here](#); also discussed [Episode 171 of Paleocast](#).
- [Middle Triassic gastropods from the San Salvatore Dolomite of Lombardy \(Italy\) and Canton Ticino \(Switzerland\).](#)
- [Re-assessment of a large archosaur dentary from the Late Triassic of South Wales, United Kingdom.](#)
- [High abundance of Early Miocene sea cows from Qatar shows repeated evolution of seagrass ecosystem engineers in Eastern Tethys](#); SciTechDaily summary [here](#).
- [A new small-bodied longipterygid \(Aves: Enantiornithes\) from the Aptian Jiufotang Formation preserving unusual gastroliths](#); Earth.com summary [here](#).
- [Global distribution of marine bacterial BrGDGTs in sediments: patterns and implications.](#)
- [Inverse methods for extracting seasonality signals from ungulate tooth enamel.](#)

- [Biomechanics of the mandibular middle ear of the cynodont *Thrinaxodon* and the evolution of mammal hearing](#); Phys.org summary [here](#).
- [A new, Early Cretaceous carettochelyid turtle from South Korea provides insights into softshell evolution and aquatic ecology.](#)

Mining and Energy

- [Middle East Crude Prices Sink to Two-Month Low Against Brent.](#)
- [Hydrogen geology: Modelling Radiolytic Natural Hydrogen From a Fractured Basement: Generation, Migration, and Sequestration Potential \(Taranaki Basin–New Zealand\).](#)
- [Massive critical minerals deposit found in Utah.](#)
- Video: [Geothermal energy’s massive leap forward.](#)
- [The Rumor Mill News Reading Room: Samsung Just Dropped A "Silver Bomb" . . . Their New "Solid State" Battery Tech Breaks Global Silver Supply.](#)
- [EIA forecasts U.S. crude oil production will decrease slightly in 2026.](#)
- [Russia’s Oil and Gas Revenues Set to Plunge 50% to Five-Year Low.](#)
- Claim jumpers: [Illegal miners are digging gold at a \\$4.8B Newmont site in Peru.](#)
- [A decade of fighting over a controversial mining project in Manitoba - and still no decision](#); long article in the Winnipeg Free Press [here](#).
- [Visualizing the World’s Rare Earth Reserves.](#)
- [It’s the first ever seen in the world - France will power the AI with “fast neutrons” producing 500 MW.](#)
- [Oil Market Report - December 2025.](#)
- [Frontier Failures Force Eastern Canada to Rethinks Its Offshore Strategy.](#)
- Not over yet: [The Permian “Peak” That Isn’t.](#)
- [US holds first Gulf of Mexico oil and gas auction since 2023.](#)
- Ore deposit geology, Guinea: [Employing Principal Component Analysis and K-Means Clustering to Elucidate the Geological Compositional Process at N’Guérédonké Ultramafic Fe-Ti Deposit.](#)
- [China’s Oil Pumping Power Breaks All Records.](#)
- [AI finds “geothermal anomaly” in Nevada desert — Now experts think there’s a massive energy reservoir below.](#)
- [Turkey is in talks to buy small nuclear reactors from Bill Gates-backed TerraPower.](#)

- [Oil Trading Giant Warns Of Looming "Super Glut" Due To Supply Surge.](#)
- [Origin of Abundant Visible Gold in Orogenic Pyrite: New Micro- to Atomic-Scale Insights from the World-Class Jinshan Gold Deposit, China.](#)
- [Rosneft Oil Cargo Wanders for Weeks as Sanctions Mount.](#)
- Mine closures: [When Diamonds Are Not Forever.](#)
- [Earth's crust hides enough 'gold' hydrogen to power the world for tens of thousands of years, emerging research suggests.](#)
- [Cornell's deep-down and rocky quest to unlock geothermal for New York.](#)
- [Saskatchewan's Heavy Rare Earth Gambit: Substance, Spin, and What Investors Should Watch.](#)
- Research: [Germany Shifts To Nuclear Fusion After Fukushima-Era Fission Policy.](#)
- [Quebec and the U.K. sign agreement on critical minerals.](#)
- [The role of mantle melting and associated granitoid magmatism in the genesis of orogenic gold in the Laurentian Caledonides;](#) behind a paywall, Phys.org summary [here](#).

Environmental Geology and Hydrogeology

- Hydrogeology and karst topography: [Konya Closed Basin records 684 sinkholes as Türkiye updates regional risk maps.](#)
- PFAS: [Officials issue warning after discovering dangerous substances in US water supply: 'I jumped out of my chair when I saw the results'.](#)
- [Landscape Position and Burn Intensity Influence Heat-Induced Soil Chromium Contamination;](#) Phys.org summary [here](#).
- From IAH Canada: [Groundwater is critical to effective freshwater management in Canada.](#)

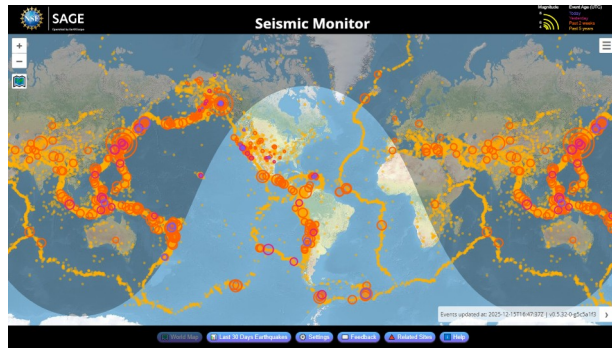
Glaciers and Climate Change

- [Binghamton University scientist seeks ancient climate clues under Antarctic ice.](#)
- [Glacier biogeochemical cycling and downstream impacts.](#)
- [Hundreds of iceberg earthquakes detected at the crumbling end of Antarctica's Doomsday Glacier.](#)
- ['Even the animals seem confused': a retreating Kashmir glacier is creating an entire new world in its wake.](#)
- [Assessing the intensity of Late Quaternary humid phases in the Nefud Desert, northern Arabia.](#)

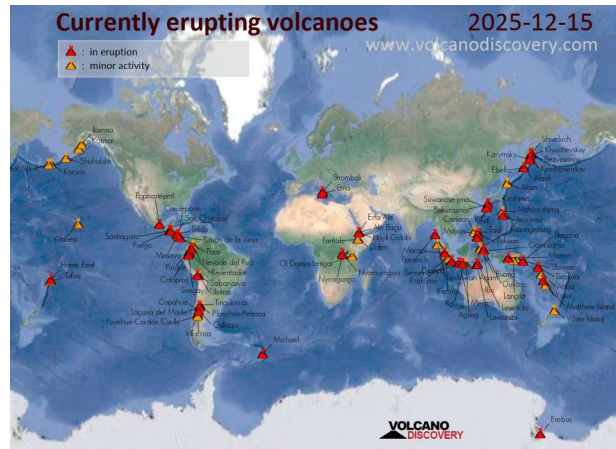
Bad Science

- From Retraction Watch: [Weekend reads: Springer Nature retracts papers using ‘bonkers’ dataset; preprint server welcomes AI authors; ethics editors’ COI disclosures ‘insufficient’](#).
- From Ugo Bardi: [The Fossilization of Science: Learning from Dinosaurs](#).

Volcanoes, Earthquakes and Geohazards



[Seismic Monitor](#)



[Active Volcano Map](#)

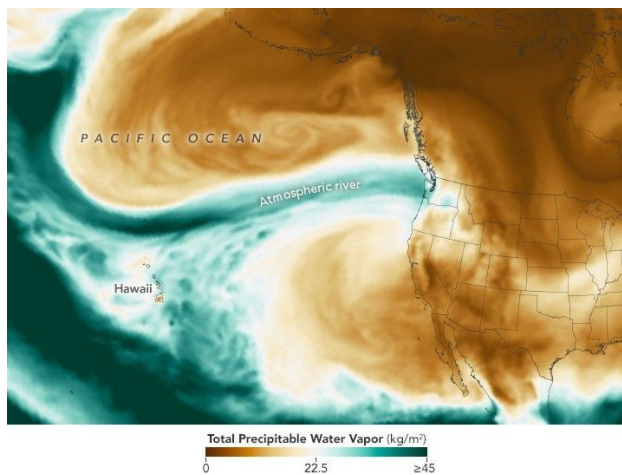
Volcanoes

- [Smithsonian / USGS Weekly Volcanic Activity Report](#).
- United States Geological Survey (USGS) Volcano Observatories:
 - Yellowstone Caldera Chronicles: [The case of the missing sulfur dioxide at Yellowstone](#).
 - [Cascades Volcano Observatory Weekly Update](#).
 - Volcano Watch – [\(Lava\) fountains of knowledge: announcing January 2026 Volcano Awareness Month events on the Island of Hawai‘i](#)
- [Melt Architecture Under East Asian Volcanoes Revealed by Anisotropic Tomography](#).
- Video: [Magma Related Earthquake Swarm Strikes Central Europe; Geologist Analysis](#).
- [Imaging the Shallow Structure Beneath Askja Volcano, Iceland, With Ambient Noise Tomography](#).
- [Cinder Cones Geomorphometric Dating in the Camargo Volcanic Field, Chihuahua, Mexico](#).
- Video: [Iceland's Magma Chamber Grows Larger: Eruption Day Draws Closer](#).
- [Bezmyianny Volcano: Dramatic Regrowth After 1956 Eruption](#).

Earthquakes

- [Euro-Mediterranean Seismological Centre \(EMSC\)](#).
- [Earthquakes Monitoring Live Worldwide](#).
- [Fluid Pressure Diffusion and Elastic Stress Transfer From Seismic Slip Control Slip Front Expansion in Fluid-Driven Swarm Seismicity](#).
- [People in northern Japan urged to stay vigilant as seismic activity remains high](#).
- [B-Value Evolution During the Strasbourg 2018–2022 Sequence of Induced Earthquakes](#).
- [Range-Parallel Extension of the Andes in the 2020 Mw 5.7 Humahuaca Earthquake](#).
- [Fault-Induced Hydration and Serpentinization of the Incoming Lithosphere Enhances Intra-Slab Seismicity Offshore Taltal \(~25°S\), Northern Chile](#).
- [Using Gridded Seismicity to Forecast the Long-Term Spatial Distribution of Earthquakes for the 2025 Puerto Rico and U.S. Virgin Islands National Seismic Hazard Model](#).
- [Progressive eastward rupture of the Main Marmara fault toward Istanbul](#); Phys.org summary [here](#).
- [Complex Multipatch Rupture and Aftershock Characteristics of the 2024 \$M_w\$ 4.2 Buan, Korea, Earthquake Sequence](#).
- [A Northwest megaquake could trigger the San Andreas Fault - and act as a signal for the Bay Area](#).
- [M7.6 earthquake strikes offshore Honshu, Japan](#); USGS summary [here](#); Japan Meteorological Agency summary [here](#); news report [here](#).
- [Mature fault mechanics revealed by the highly efficient 2025 Mandalay earthquake](#).

Geohazards



NASA Image of the day, December 12, 2025 - Pacific Moisture Drenches the U.S. Northwest
Credit: NASA, public domain

- [Current flood emergencies in British Columbia.](#)
- Washington State: [Governor Ferguson declares statewide emergency responding to major flooding.](#)
- [Increased rainfall-runoff drives flood hazard intensification in Central Himalayan river systems.](#)

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 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

- [January 14, 2026 from 9am to 4:30pm GMT, IAH \(Irish Group\) CPD Course: Groundwater, Hydrology and Climate Change.](#)
- [Feb. 16-18, 2026, Inaugural Mineralogical Society of America Annual Meeting, Tuscon AZ](#)
- [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.](#)
- [Society of Petroleum Engineers Distinguished Lecturer Schedule.](#)
- [American Geophysical Union List of Upcoming Meetings.](#)
- The Geological Society: [Events & Courses.](#)

December 15, 2025

Geology and Mineral Resources – Mongolia

Introduction



Figure 1a – Mongolia

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

Figure 1b – Location of Mongolia

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

The homeland of [Genghis Khan](#), [Mongolia](#) is a landlocked country of 3,281,676 people in [East Asia](#). The country has an area of 1,564,116 square kilometres and borders on [Russia](#) to the north and [China](#) to the south. The basic economic facts of the country are

- Mongolians are moderately well off with a per capita [GDP \(PPP\)](#) of \$20,450 and a high [Human Development Index](#) of 0.747.
- The traditional base of the [Mongolian economy](#) has been upon livestock herding and agriculture, but mining is now important.
- Other important industries in Mongolia include wholesale and retail trade and service, transportation and storage, and real estate activities.
- Mongolia's largest trading partner is China.

For more details on the country, check out the [CIA World Factbook on Mongolia](#) as well as the [Wikipedia article](#). Also, [Paul Cooper](#) has an excellent podcast discussing the rise and fall of the Mongol Empire [here](#), on YouTube.

Geology

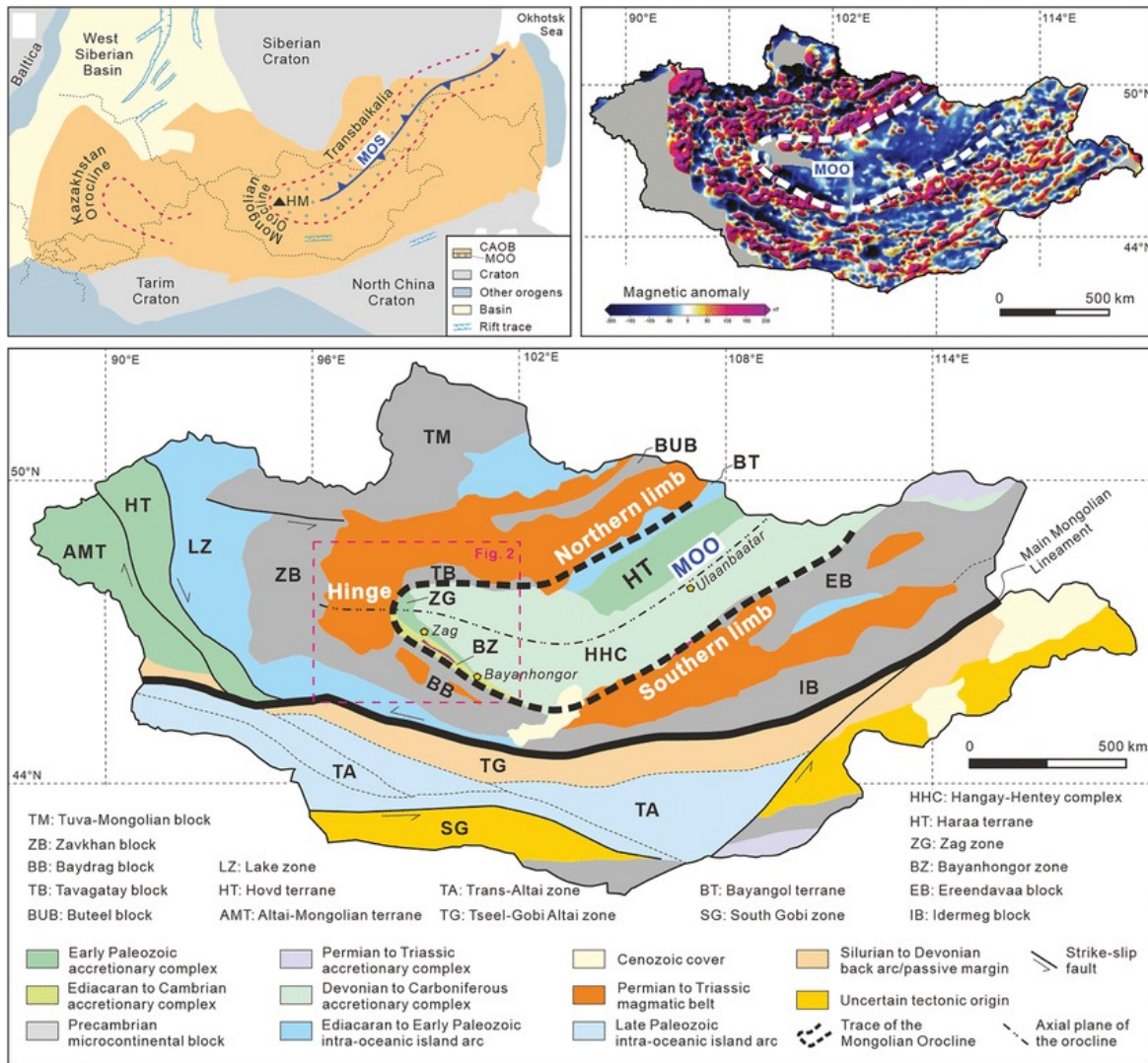


Figure 2 – Simplified Tectonic Map of Mongolia

Credit: Figure 1 in [Wang et al, 2021](#), [Creative Commons Attribution-Share Alike 4.0 International license](#)

Part of the larger [Central Asian Orogenic Belt](#), the [geology of Mongolia](#) was [formed](#) by the accretion of [island arcs](#), [ophiolites](#), [oceanic islands](#), [seamounts](#), [accretionary wedges](#), [oceanic plateaux](#) and [microcontinents](#) during the [Phanerozoic Eon](#). More specifically, Mongolia is located on the [Mongolian-Okhotsk Mobile Zone](#) between the [Siberian Platform](#) to the north, the [North Chinese Craton](#) to the south, the [West Siberian Basin](#) to the northwest, and the [Tarim Basin](#) to the southwest.

As you might guess from examining Figure 2, above, many terranes came together to make the present day bedrock of Mongolia. The [centre](#) of the Mongolian-Okhotsk Mobile Zone forms an [orocline](#) marking the [closure of the Paleo-Asian Ocean](#). The terranes include around this orocline include: some [Precambrian microcontinental blocks](#); an [Ediacaran](#) to [Early Palaeozoic](#) intra-oceanic [island arc](#); an Ediacaran to [Cambrian](#) accretionary [complex](#); an Early Palaeozoic [accretionary complex](#); a [Silurian](#) to [Devonian](#) back arc [passive margin](#); a [Devonian to Carboniferous](#) accretionary [complex](#); a [Late Paleozoic](#)

[intra-oceanic island arc](#); a [Permian](#) to [Triassic](#) accretionary [complex](#); a [Permian to Triassic magmatic belt](#); and a [Jurassic](#) aged [magmatic belt](#).

Here is a link to a paper published this past week that relates to the tectonic geology of Mongolia:

- [Two Cycles of Devonian–Triassic Extension and Compression in the Altai Accretionary Wedge: Insights From Tsogt Core Complex.](#)



Figure 4 – *Bagaceratops* Skull from Mongolia

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

Mongolia has also been an [important locale for paleontologists](#). Over 80 genera of dinosaurs have been discovered in Mongolia, especially in the Gobi Desert. Important finds include:

- From the [Djadokhta Formation](#), a [1971 fossil discovery of *Protoceratops andrewsi* and a *Velociraptor mongoliensis*](#) locked in combat;
- [Zavacephale rinpoche](#), a pachycephalosaur [discovered](#) in 2019;
- [Khankhuuluu mongoliensis](#), a tyrannosaur first discovered in 1970 but [reexamined in 2025](#);
- [Dinosaur eggs](#) discovered in 1922 at the [Bayanzag \(Flaming Cliffs\), Mongolia](#), believed to belong to [Oviraptor](#).
- [Velociraptor](#), discovered in 1923; and
- [Tarbosaurus](#), another tyrannosaur, discovered in the 1940's.

For more information on Mongolian paleontology, check out the [Institute for the Study of Mongolian Dinosaurs](#). Here is a link to a news item published this past week that related to fossils from Mongolia:

- [France returns stolen dinosaur skeleton to Mongolia.](#)

For further readings on the general [geology of Mongolia](#), you can followup on the links above as well as the national atlas of [geological setting and mineral resources](#).

Mineral Resources



Figure 4 – Fluorite and Quartz from the Gobi Desert of Mongolia

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

The [mineral industry of Mongolia](#) includes metallic minerals, industrial minerals, and fuel minerals. The major commodities are coal, copper, fluorite, gold, iron, rare earths, tungsten, uranium, and zinc.

Metallic Minerals

Major metallic mineral deposits mined in Mongolia include:

- Copper, gold, molybdenum and tungsten from the [Erdenetiin-Ovoo Mine](#); copper and molybdenum from the [Tsagaan Suvarga Mine](#); copper and gold from the [Oyu Tolgoi Mine](#).
- Gold from the [Boroo Mine](#) and the [Ulaanbulag Mine](#), gold, lead and silver from the [Altan Tsagaan Ovoo Mine](#).
- Iron ore from the [Tayan Nuur Mine](#); the [Bayangol Mine](#); the [Tumur Mine](#), the [Tumurtei Mine](#); and the [Bargilt Mine](#).

- Lead, silver, and zinc from the [Tsav Mine](#), lead and zinc from the [Tumurtiin Ovoo Mine](#).
- Tin from various placer deposits.
- Tungsten from the [Khovd River Mine](#).

While there is no current [uranium mining](#) in Mongolia, there are [plans](#) for exploration and development.

Industrial Minerals

Industrial minerals produced in Mongolia include cement and lime for construction. Fluorspar is mined from the [Chuluut Tsagaan Del Mine](#), the [Bor-Undur Mine](#) together with various small-scale artisanal producers.

Fuel Minerals



Figure 5 - [Sharyn Gol](#) Coal Mine

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

Coal and petroleum are both produced in Mongolia. Petroleum comes [from two fields](#): the [Zuunbayan Oilfield](#) in the southeast Gobi Basin, and the [Tamsag Basin Oilfield](#). In 2018, the USGS published “[Assessment of undiscovered continuous oil resources of the East Gobi, Nyalga, Tamsag-Hailar, Erlian, and Yingen basins of Mongolia and China](#)”.

Coal is produced from some 17 mines in Mongolia. Major mines include [Khuut](#), [Övdög Khudag](#), [Saikhan-Ovoo](#), [Tevshiin Govi](#), and [Baganuur](#). According to the International Energy Agency, 79% of [Mongolian coal production](#) is used for metallurgical (coking), 69% is of Mongolian coal production is exported – mostly to China – and 85% of electricity in Mongolia is generated by burning coal.

The most recent (2023) Mongolian mineral production statistics from the USGS are found [here](#). Figure 6 links to an interactive map of mineral deposits in Mongolia from [Mindat.org](#).

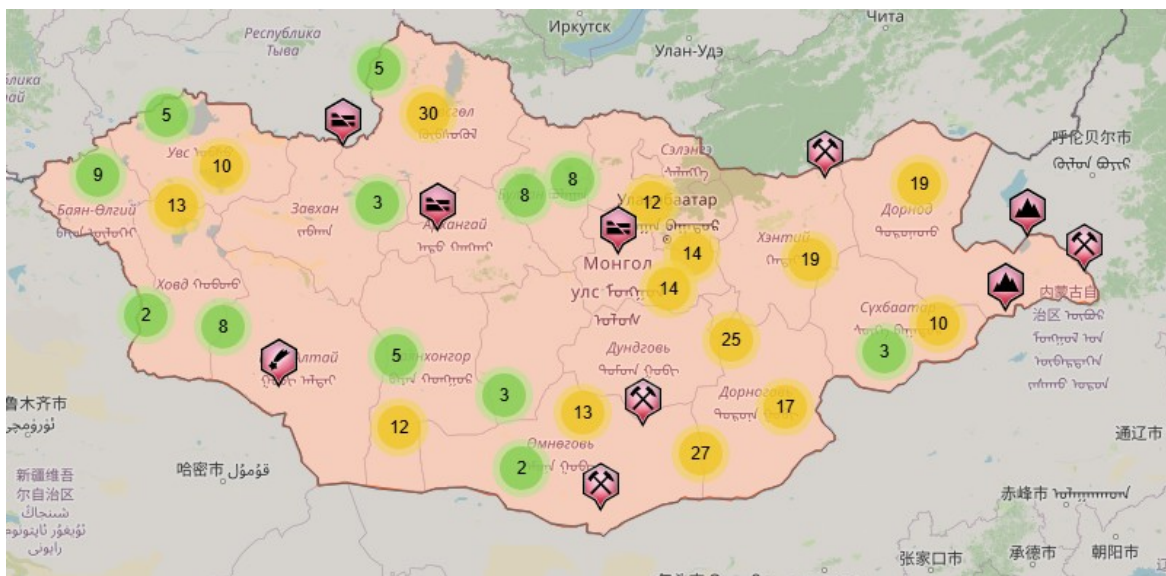


Figure 6 – Interactive Mineral Occurrence Map of Mongolia
 Credit: ©Mindat.org

Summary

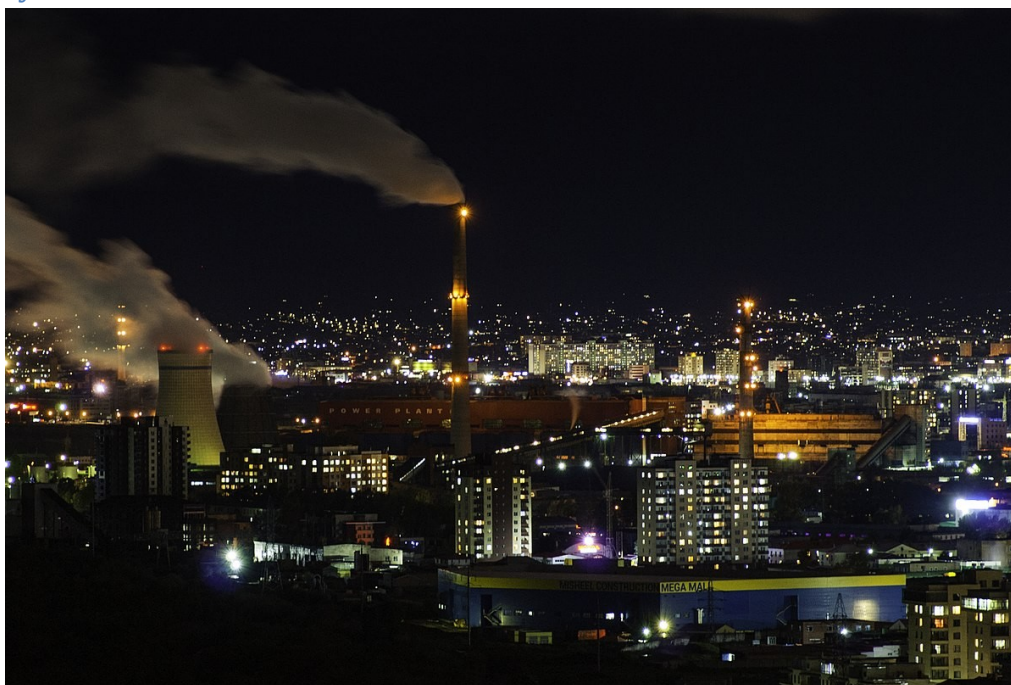


Figure 7 - Ulaanbaatar Coal Power Plant
 Credit: Sebacalka, [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/) license

With its complex geology, Mongolia looks to be an excellent candidate for future mineral exploration and development. It is also a promising place for paleontological research.

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.