



July 10, 2025

The USGS Earth Mapping Resources Initiative

The U.S. Geological Survey's (USGS's) Earth Mapping Resources Initiative (Earth MRI) is an effort within the USGS Mineral Resources Program (MRP, part of the Energy and Minerals Mission Area) to modernize mapping of the nation's surface and subsurface resources. Earth MRI collects geologic, geophysical, geochemical, topographic, and other data to provide a three-dimensional understanding of the nation's geology, in part to identify energy, mineral, and water resources; hazards (e.g., landslides, earthquakes); mine waste; abandoned wells; and other natural and human-engineered features. In 2021, Congress passed the Infrastructure Investment and Jobs Act (IIJA; P.L. 117-58), which established and authorized Earth MRI and required an initial comprehensive national modern surface and subsurface map and data integration by November 15, 2031, among other objectives (§40201 of P.L. 117-58; 43 U.S.C. §311). IIJA provided \$320 million in funding for Earth MRI to accelerate the USGS's resources and mapping mission while prioritizing finding critical mineral resources.

The executive and legislative branches also directed the USGS to prioritize identifying domestic critical mineral resources in mapping efforts. In December 2017, the first Trump Administration's Executive Order (E.O.) 13817, "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals," which preceded the USGS initiation of Earth MRI, made it the federal government's policy to identify new sources of critical minerals, directed the Secretary of the Interior to develop a critical minerals list, and directed the Secretary of Commerce to lead a coordinated federal government effort to develop a plan to "improve the topographic, geologic, and geophysical mapping of the United States" and make the data electronically accessible, among other tasks. In December 2020, Congress passed the Consolidated Appropriations Act, 2021 (P.L. 116-260). Section 7002 of the Energy Act of 2020 (Division Z of P.L. 116-260) directed the USGS to conduct a national assessment of critical mineral resources within four years of enactment, among other tasks.

The second Trump Administration issued E.O. 14154, "Unleashing American Energy," in January 2025. Section nine, "Restoring America's Mineral Dominance," through the Secretary of the Interior, directs the USGS to consider updating the 2022 critical minerals list and consider including uranium, as well as to accelerate geologic mapping with a focus on "locating previously unknown deposits of critical minerals." In response to E.O. 14154, the Department of the Interior's Secretarial Order 3418, "Unleashing American Energy," directed the department's Assistant Secretaries to review all agency actions and to submit a plan to the Secretary of the Interior that includes several actions. Such actions include updating the 2022 list of critical minerals with the potential to include uranium

and prioritizing efforts for mapping and identifying deposits of critical minerals.

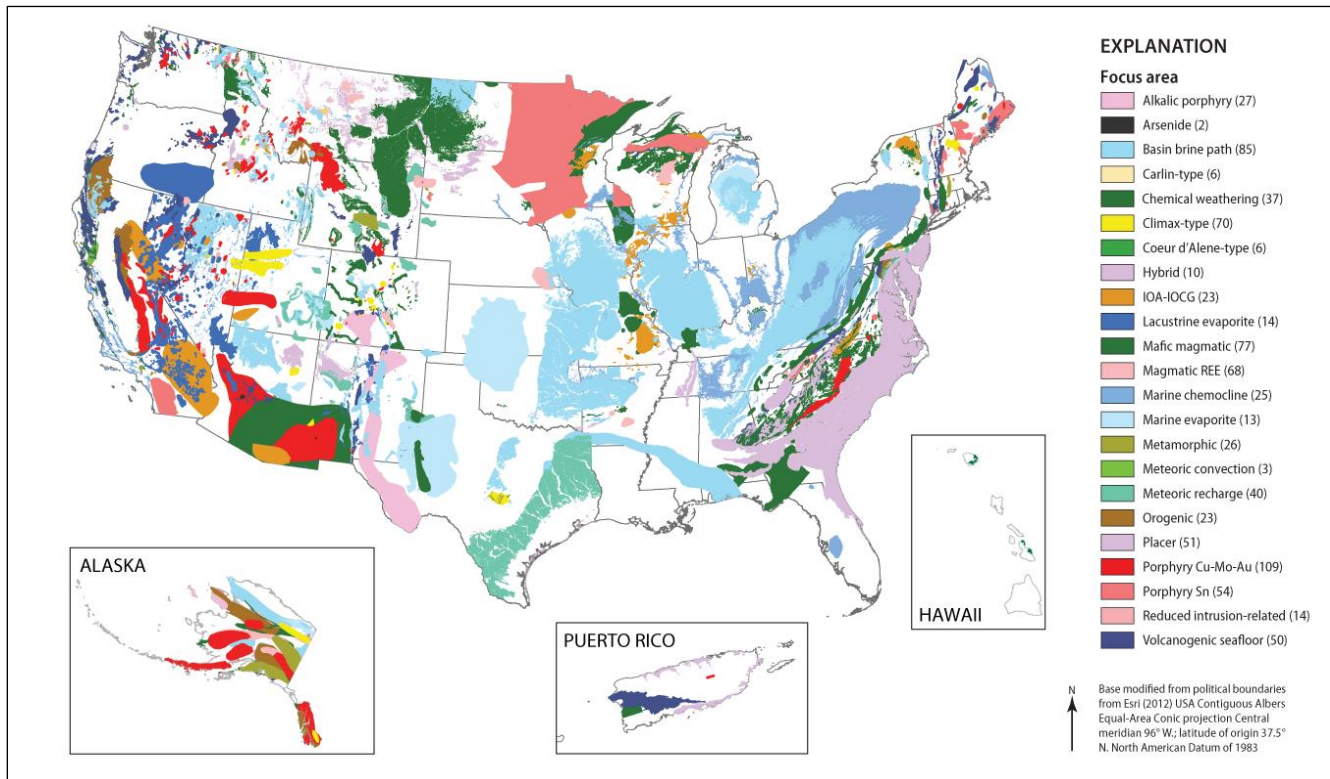
Pursuant to IIJA, Earth MRI is integrating data from other USGS programs, including a Mineral Deposit Database (USMIN Mineral Deposit Database), the National Cooperative Geologic Mapping Program (NCGMP), the National Geological and Geophysical Data Preservation Program (NGGDPP), and the 3D Elevation Program (3DEP) to advance research and mapping. In addition, the USGS is identifying potential sources of critical minerals in mine waste and potential critical mineral resources through analysis of samples archived by the NGGDPP.

Earth MRI identifies potential economic critical mineral resources by understanding and mapping

- how the rocks and minerals formed (such as from a volcanic eruption);
- geochemical composition (e.g., a high concentration of lithium);
- geophysical properties (e.g., density and magnetic properties); and
- geologic structure (e.g., multilayer, folded, faulted, on the surface, extending into the subsurface).

Earth MRI uses modern and emerging technology to collect high-resolution data over small-to-large areas. Data collection may include field work, laboratory analyses, and remote sensing. New data may be integrated with existing collections of samples, cores, and geologic, geochemical, and geophysical data maintained by the USGS and its partners. The USGS partners with state geological surveys, universities, and others in the private and public sector in mapping and data integration. The USGS contracts with technology companies to collect airborne topographic, magnetic, radiometric, hyperspectral, and other data. Earth MRI also may integrate satellite data collected by the USGS/NASA Landsat Missions and other satellite missions. IIJA directed the USGS to make the geospatial data and metadata collected and integrated by Earth MRI "electronically publicly accessible."

According to the USGS, from 2019 to 2023, Earth MRI has partnered with 40 states and territories and has tripled the national coverage of high-resolution geophysical surveys. During this period, Earth MRI provided \$21.9 million in funding to states for geologic mapping and spent \$129 million to acquire data. In 2019, the USGS published a report describing which areas of the United States may contain some critical mineral resources so that Earth MRI projects could focus on these areas. **Figure 1** shows a national map of focus areas with potential critical mineral resources from the 2019 report.

Figure 1. National Map of Focus Areas for Potential Critical Mineral Resources

Source: Jane M. Hammarstrom et al., “National Map of Focus Areas for Potential Critical Mineral Resources in the United States,” U.S. Geological Survey, USGS Fact Sheet 2023-3007, February 2023.

Notes: The maps show about 800 focus areas for 23 types of mineral systems that could host one or more critical mineral resources in Alaska, the conterminous United States, Hawaii, and Puerto Rico. Numbers in parentheses in the explanation refer to the number of focus areas for each mineral system. A mineral system hosts mineral deposits that formed in the same time and place.

The USGS maintains a list of data and data services that support Earth MRI objectives to integrate and make data accessible. Some potential critical mineral resources identified from Earth MRI activities include

- Rare earth element (REE)-enriched deposits identified in Hicks Dome across Illinois and Kentucky;
- An REE-niobium-zirconium-enriched deposit identified at Pennington Mountain in northern Maine; and
- Gallium-enriched deposits identified in mines, mine waste, and related mineral deposits near Bauxite, AK.

Congress provided \$9.6 million in FY2019 and \$10.6 million in FY2020 for Earth MRI through annual appropriations. IJA provided \$64 million in annual funding for FY2022-FY2026 for Earth MRI; \$8.7 million in funding for FY2022 for NGGDPP; and \$5 million in funding annually for FY2023-FY2025 for NGGDPP. P.L. 117-169 (commonly known as the Inflation Reduction Act of 2022, or IRA) provided \$23.5 million in funding for 3DEP (3DEP was established in P.L. 116-323), some of which was used to support Earth MRI.

President Trump’s FY2026 budget request states that the USGS shall “focus on achieving dominance in energy and critical minerals.” The USGS *Budget in Brief* (BIB) describes a new mission area in the FY2026 request—Geology, Energy, and Minerals—that would bring geologic data and mapping activities together with the existing Energy and Minerals Mission Area. The proposed funding

of \$137.1 million for the Geology, Energy, and Minerals Mission Area would specify \$36.9 million for the Energy Resources Program (an increase from \$34.7 in FY2025) and \$69.9 million for MRP (a decrease from \$75.4 million in FY2025). According to the BIB, the budget would support E.O.s 14154 and 14241, “Immediate Measures to Increase American Mineral Production.” E.O. 14241 defines *mineral* to mean “a critical mineral, as defined by 30 U.S.C. §1606(a)(3), as well as uranium, copper, potash, gold, and any other element, compound or material as determined by the Chair of the National Energy Dominance Council.” The request does not specify funding for Earth MRI, NCGMP, NGGDPP, and 3DEP but specifies FY2026 amounts that may include these programs from IJA and IRA.

Congress could consider whether the Earth MRI effort is accelerating the USGS resources and mapping mission, including for critical mineral resources, and whether appropriations for Earth MRI and related mapping activities are sufficient for the USGS to complete a national map and data integration by November 15, 2031. Congress may examine whether reorganization of any USGS programs would benefit geologic/geospatial data and mapping activities, energy resources activities, and other mineral resources activities under Earth MRI.

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