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SPEAKERS

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U.S. Geological Survey

U.S. Department of the Interior
U.S. Geological Survey

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2013 USGS Congressional Briefing Series

Critical Minerals – Ensuring America's Future

Larry Meinert
Mineral Resources Program

U.S. Department of the Interior
U.S. Geological Survey

The New York Times

Chinese Civilian Boats Roil Disputed Waters

By EDWARD WONG
October 5, 2010

BEIJING — The diplomatic discord set off by Japan's recent detention of a Chinese fishing trawler captain points to what foreign military officials say is a growing source of friction along China's borders: civilian vessels plying disputed waters — and sometimes acting as proxies for the Chinese

The New York Times

China Is Said to Halt Trade in Rare-Earth Minerals With Japan

By KEITH BRADSHER
and HIROKO TABUCHI
September 24, 2010

HONG KONG — Akihiro Ohata, the Japanese trade minister, said Friday that his ministry
that Japanes
were compla
from China
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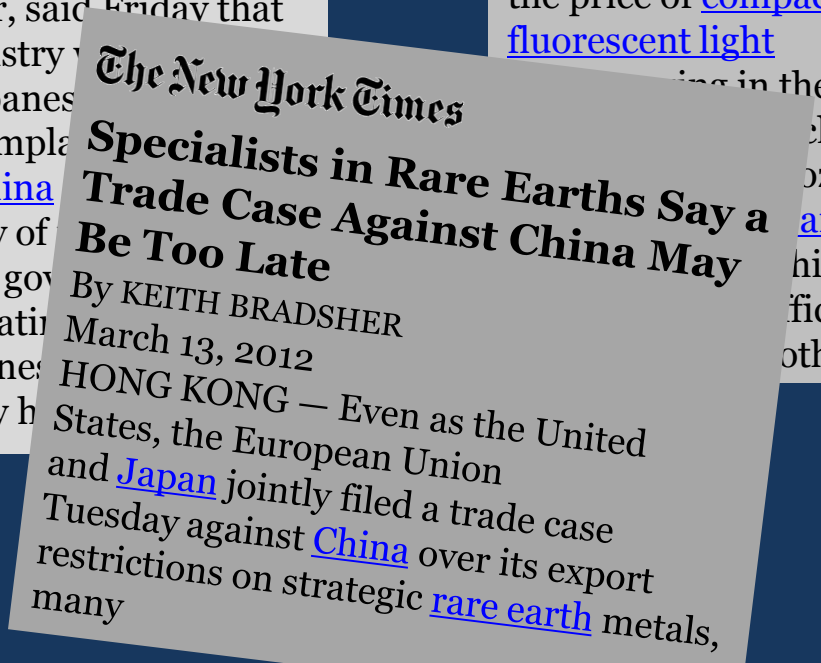
The Chines
Ministry h

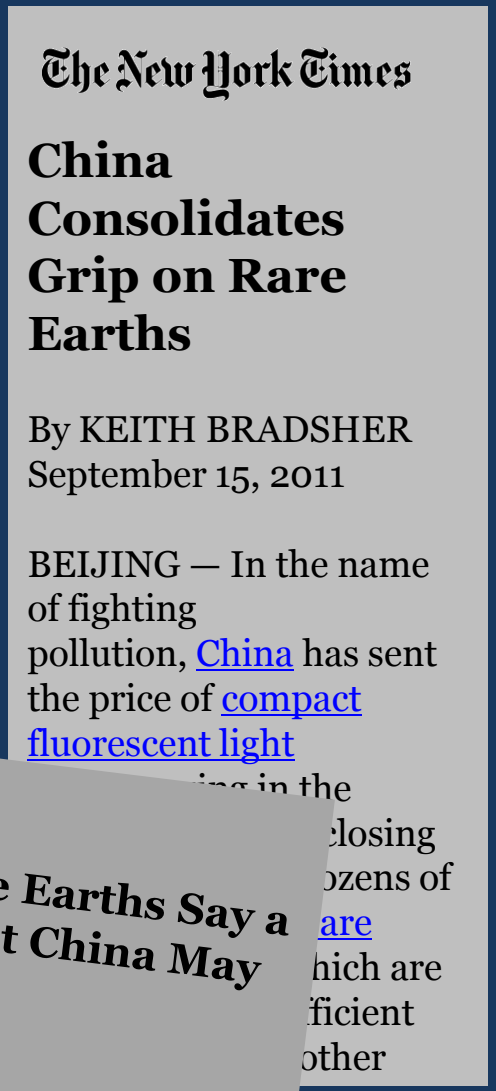


The New York Times

Specialists in Rare Earths Say a Trade Case Against China May Be Too Late

By KEITH BRADSHER
March 13, 2012

HONG KONG — Even as the United States, the European Union and Japan jointly filed a trade case Tuesday against China over its export restrictions on strategic rare earth metals, many



The New York Times

China Consolidates Grip on Rare Earths

By KEITH BRADSHER
September 15, 2011

BEIJING — In the name of fighting pollution, China has sent the price of compact fluorescent light
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closing
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are
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other

Historical Perspective

- **WWI & WWII**
  - War Dept., 1922: antimony, chromium, graphite, iodine, manganese, mercury, mica, nickel, platinum, potash, tin, tungsten, vanadium
  - 1939: plus aluminum, asbestos, cadmium, cryolite, fluorspar, titanium
  - *Strategic and Critical Materials Stock Piling Acts of 1939,1946*

- **Oil Embargo of 1970s**
  - Rising commodity prices
  - *Strategic and Critical Materials Stock Piling Revision Act of 1979*
  - *National Materials and Minerals Policy, Research and Development Act of 1980*

- **Resource War of 1980s**
  - Concern that USSR was denying access to strategic resources needed for U.S. economy and defense
  - Concern about increasing import dependence
  - Research by government and academia on Chromite, Cobalt, Manganese, …
  - International Strategic Mineral Inventory (ISMI)
  - *The National Critical Materials Act of 1984*

- **Rise of Developing Economies in the 21st Century**
  - Concerns about reliable supply
  - National critical mineral strategy development – multiple OSTP working groups
  - *Currently several bills pending in 113th Congress*

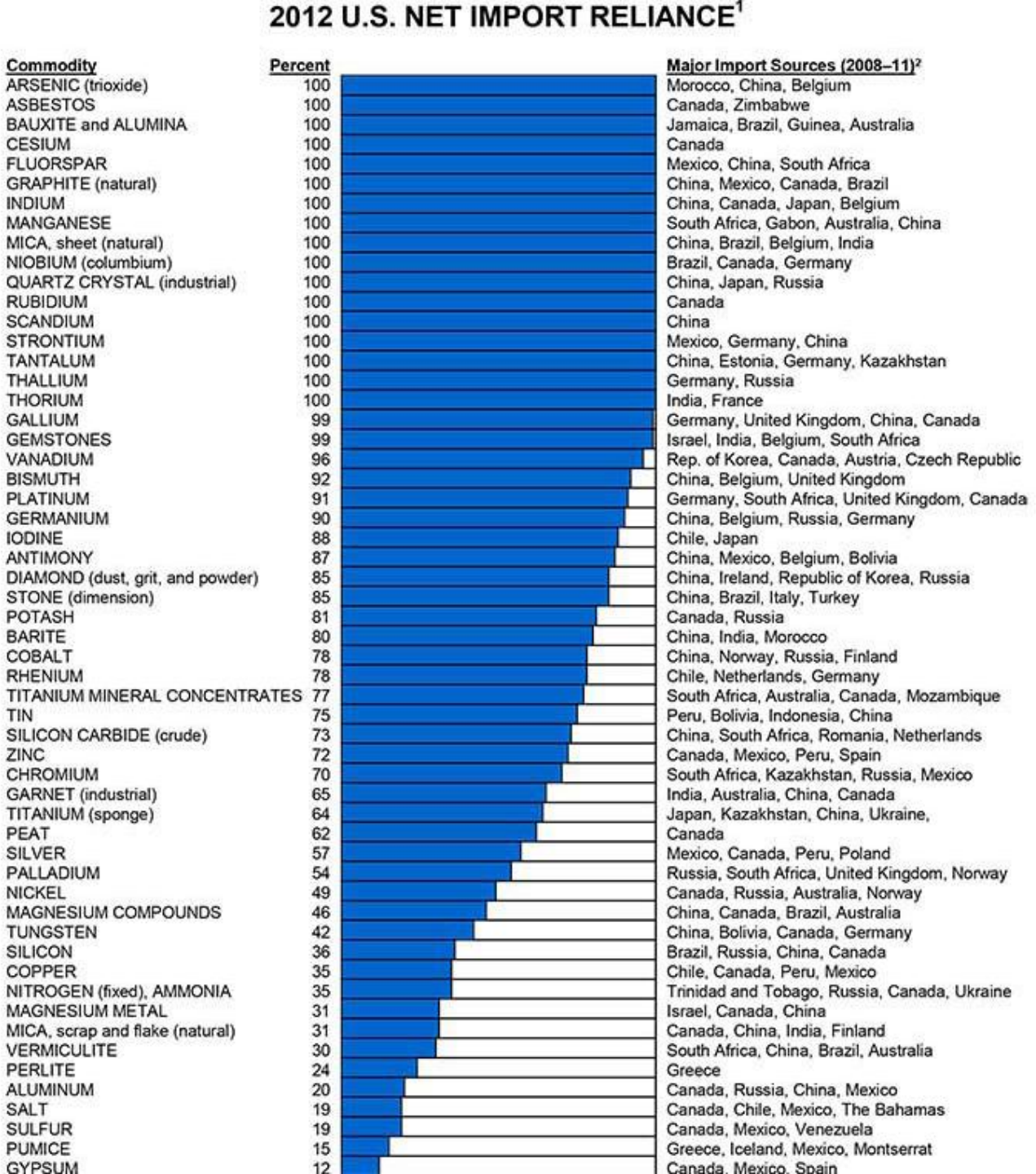
USGS

World Trade

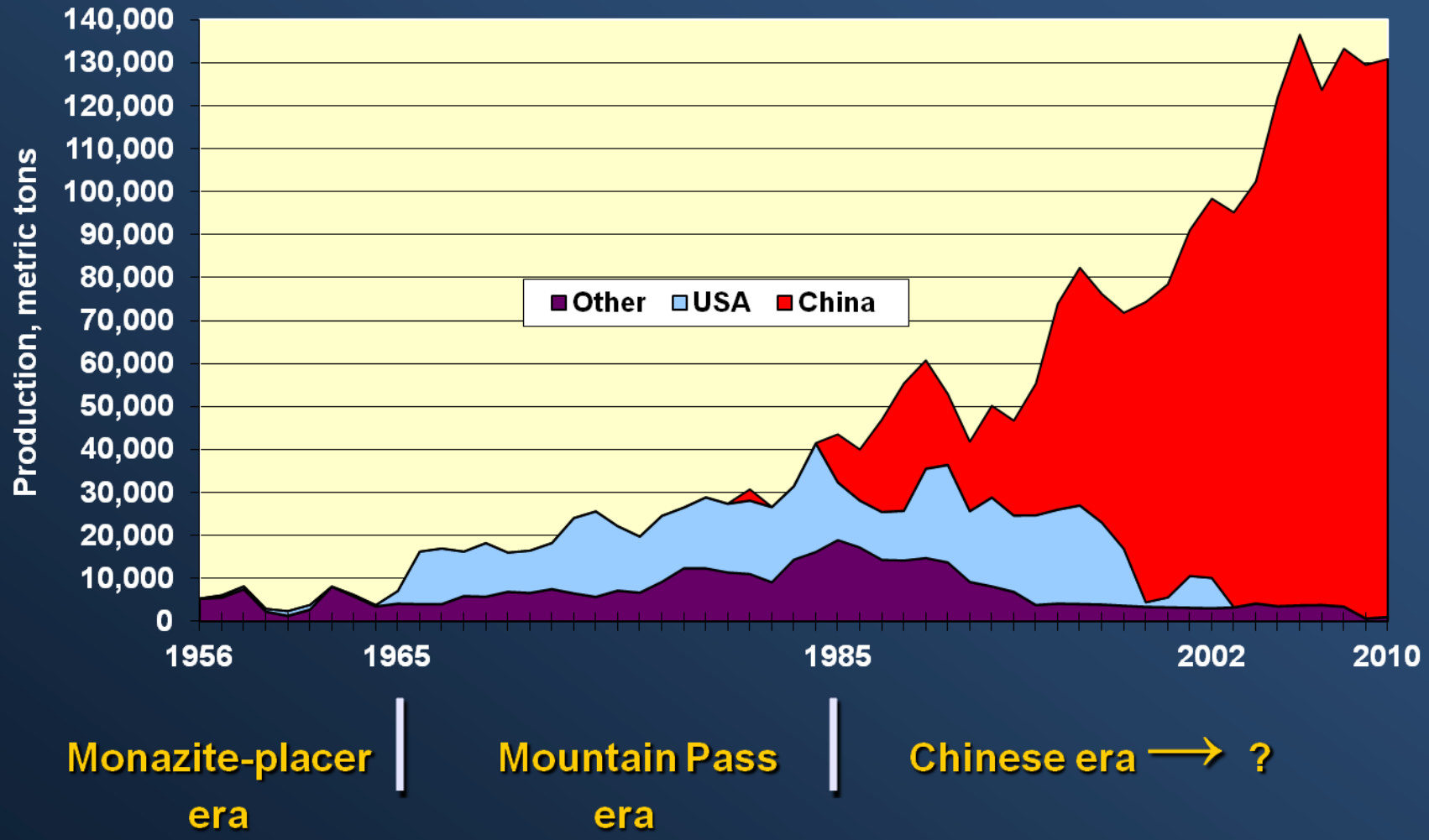
Although the US is a major producer and exporter of many commodities such as molybdenum and beryllium, it relies on world trade for most mineral resources and is >90% reliant on imports for 24 commodities, including REE

Source: USGS Mineral Commodity Summaries (2013)

USGS



REE Production Trends – 1956 to 2010



Sources: USGS Fact Sheet 087-02 updated with recent USGS Minerals Yearbook data

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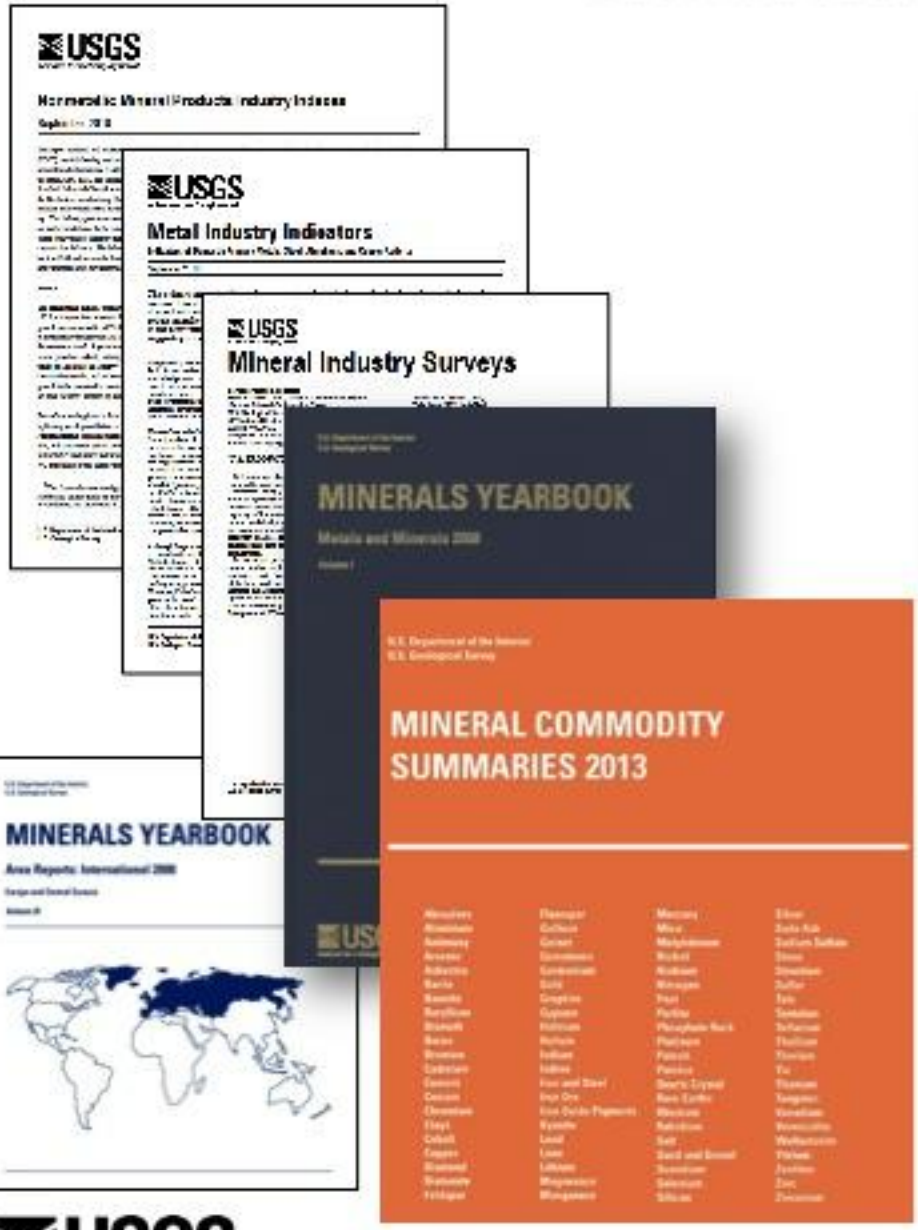
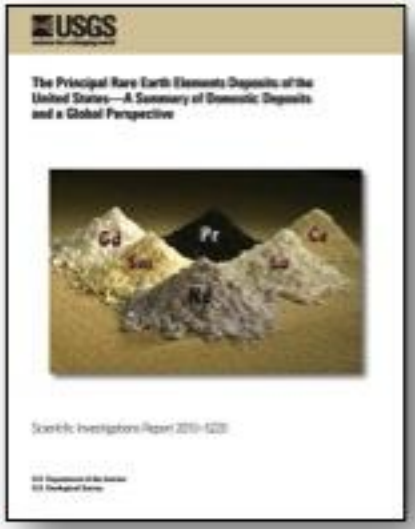
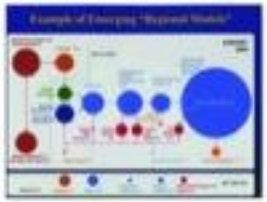
Information is Critical





The Global Flow of Aluminum From 2006 Through 2025: *USGS Open-file Report 2010-1256*

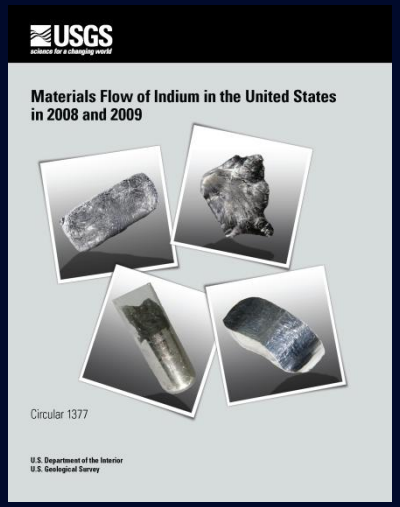


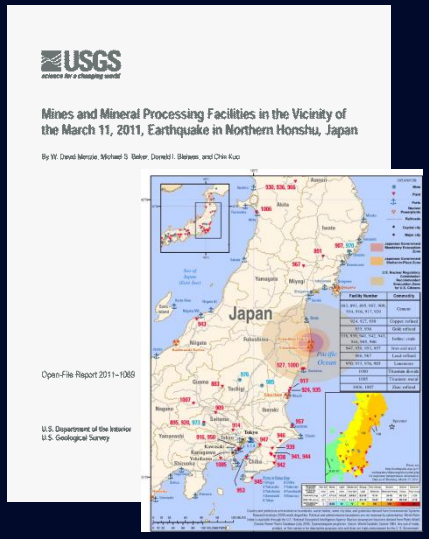
Mines and Mineral Processing Facilities in the Vicinity of the March 11, 2011, Earthquake in Northern Honshu: *USGS Open-file Report 2011-1069*

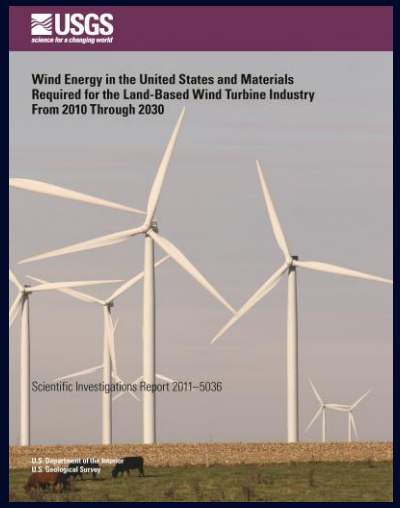
USGS

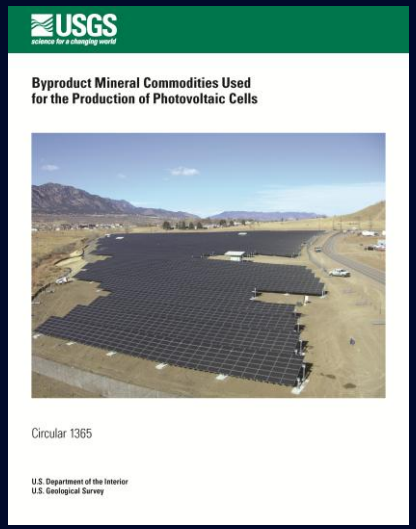
Minerals Information

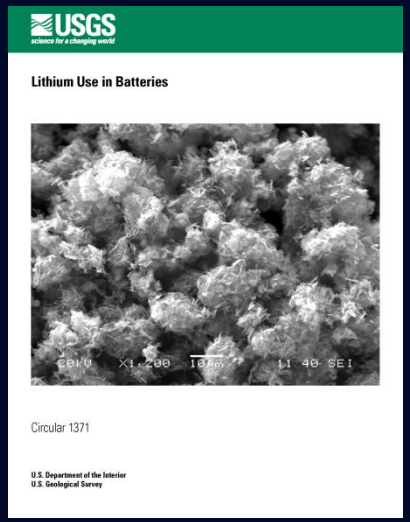
Materials Flow Studies











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Supply Disruption

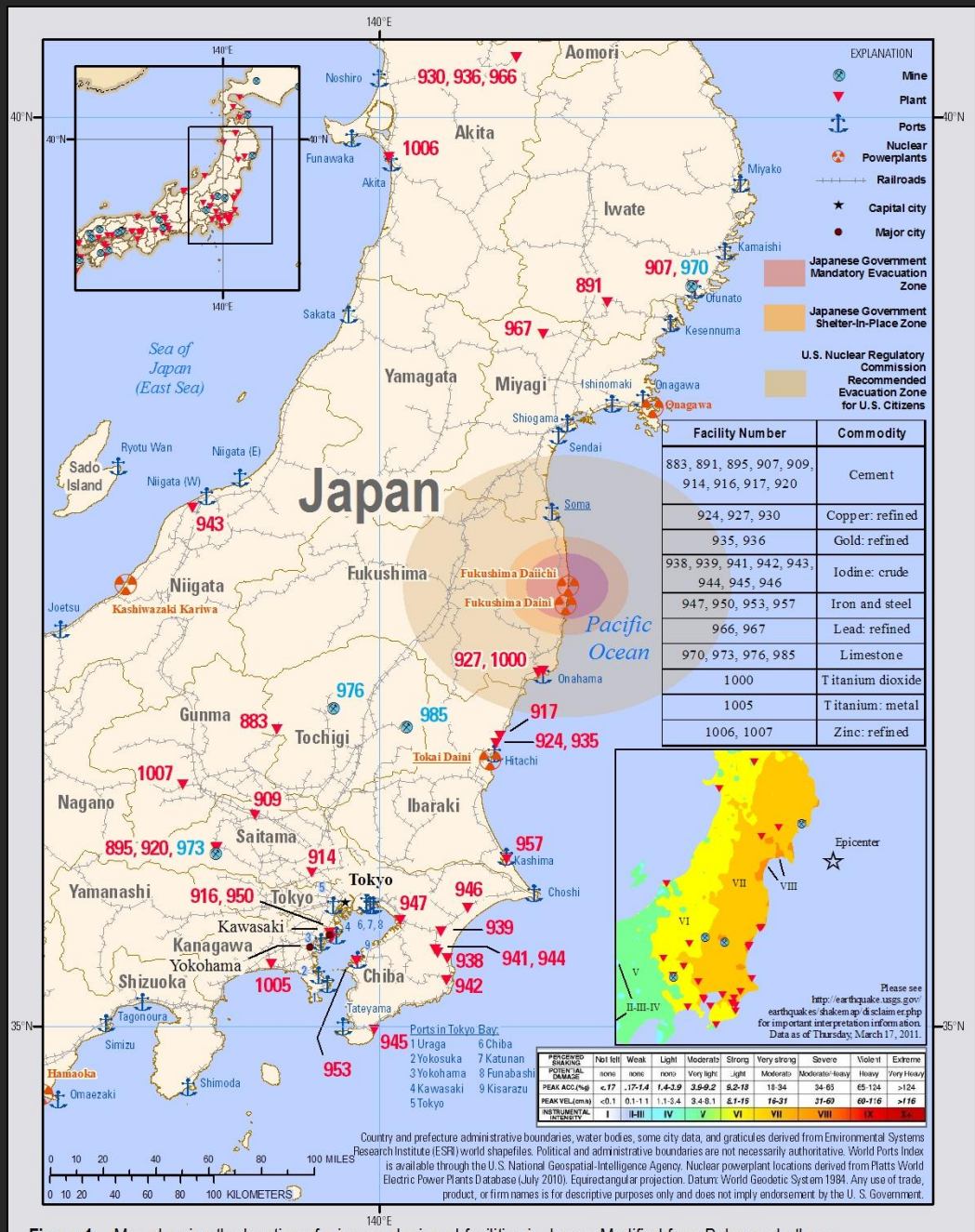
Facilities in impact zone of March 11, 2011, magnitude 9.0 earthquake and associated tsunami :

9 cement plants
4 iron and steel plants
3 copper refineries
2 lead refineries
1 titanium dioxide plant
1 titanium sponge processing facility.
8 iodine plants
4 limestone mines
2 gold refineries
2 zinc refineries

These facilities have the capacity to produce the following percentages of the world's nonfuel mineral production:

25 % of iodine (Japan is world's second leading producer (after Chile))
10 % of titanium sponge (metal)
3 % of refined zinc
2.5 % of refined copper
1.4 % of steel

The 9 cement plants produce 30% of Japan's annual cement production



Facility Number	Commodity
883, 891, 895, 907, 909, 914, 916, 917, 920	Cement
924, 927, 930	Copper: refined
935, 936	Gold: refined
938, 939, 941, 942, 943, 944, 945, 946	Iodine: crude
947, 950, 953, 957	Iron and steel
966, 967	Lead: refined
970, 973, 976, 985	Limestone
1000	Titanium dioxide
1005	Titanium: metal
1006, 1007	Zinc: refined

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Figure 1.—Map showing the location of mines and mineral facilities in Japan. Modified from Baker and others (2010).

Menzie, W.D., Baker, M.S., Bleiwas, D.I., and Kuo, Chin, 2011, Mines and mineral processing facilities in the vicinity of the March 11, 2011, earthquake in northern Honshu, Japan: U.S. Geological Survey Open-File Report 2011–1069, 7 p. (Available only at http://pubs.usgs.gov/of/2011/1069/.)

Inventory vs Assessment

Identified resources

Near- and medium-term supply

Often classified by commodity

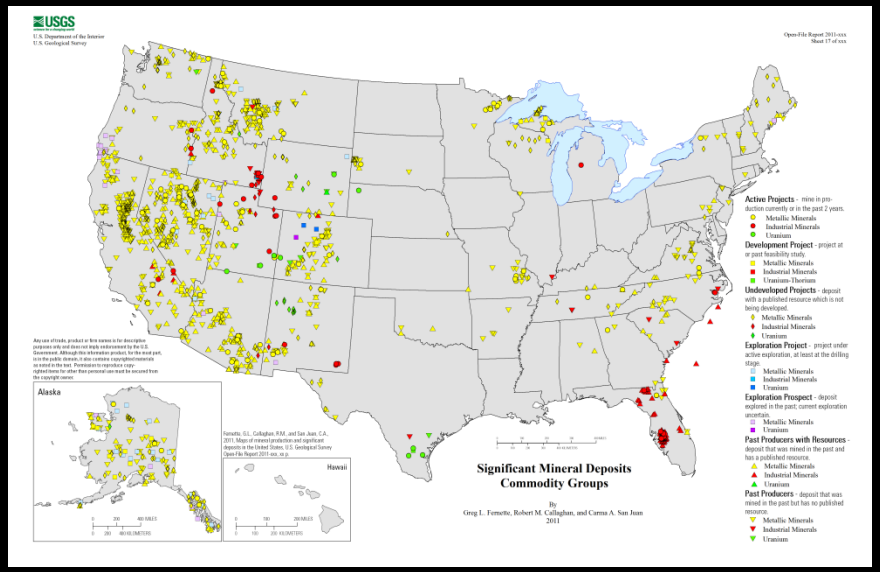
Important first step for assessment

Undiscovered resources

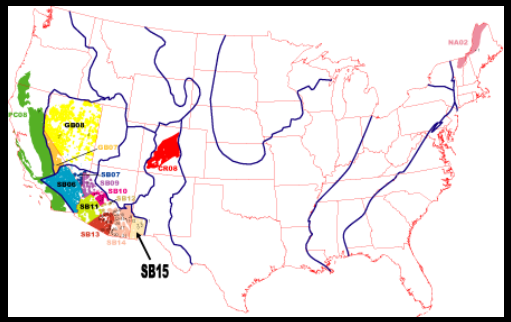
Long-term potential supply

Classified by mineral deposit type

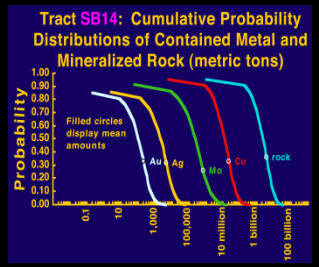
Qualitative and Quantitative



Where



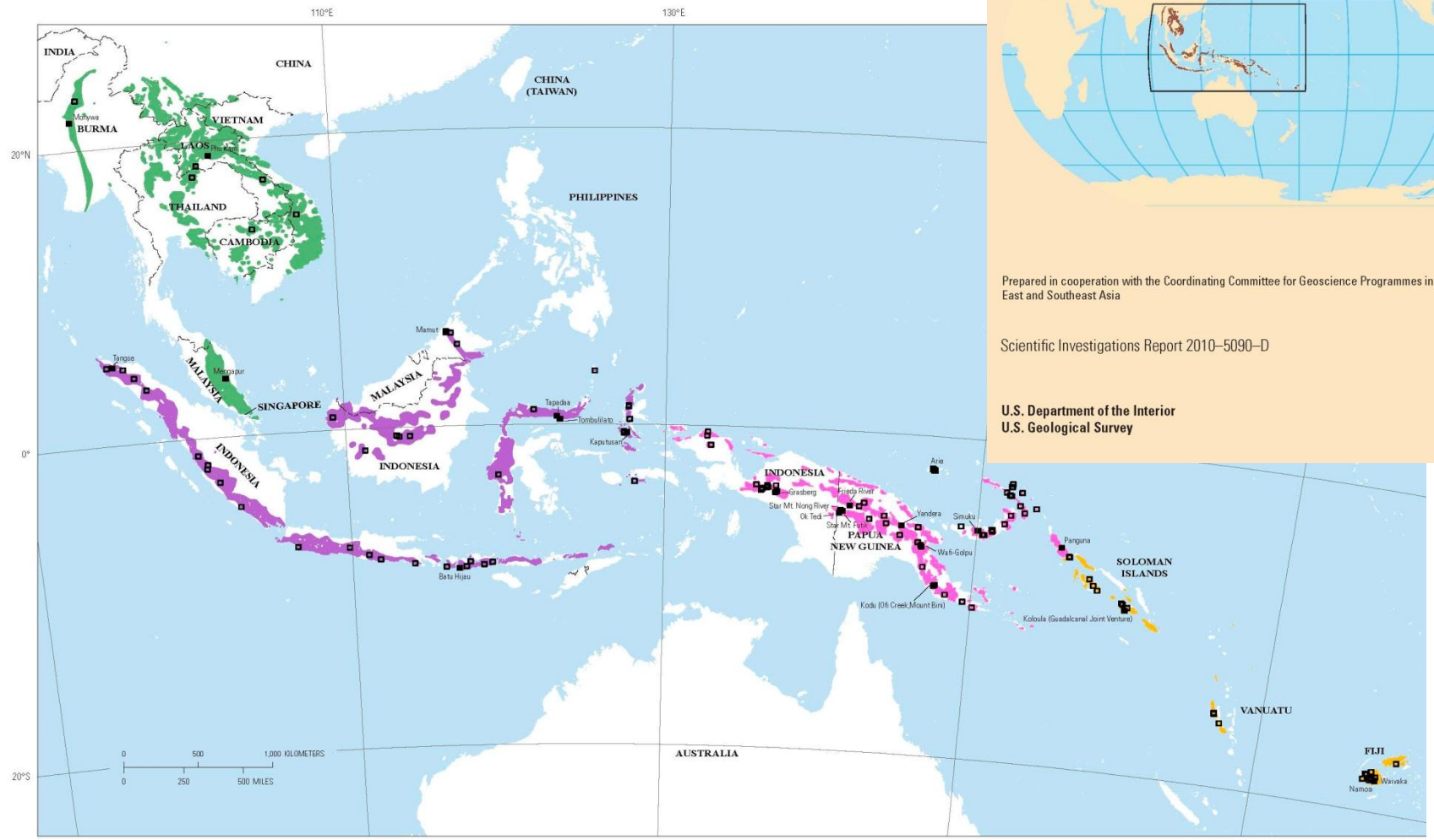
How much



Probabilistic

USGS

Indonesia is included in a report on parts of Southeast Asia and Melanesia



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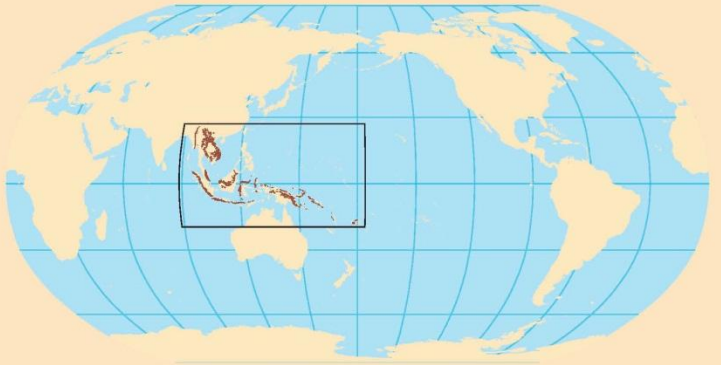
Global Mineral Resource Assessment

Porphyry Copper Assessment of Southeast Asia and Melanesia

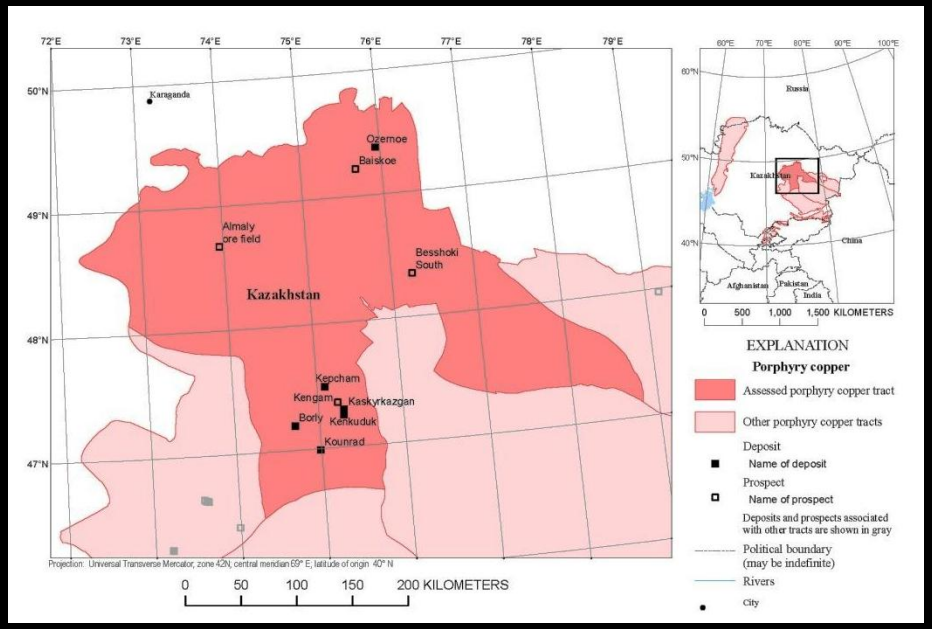


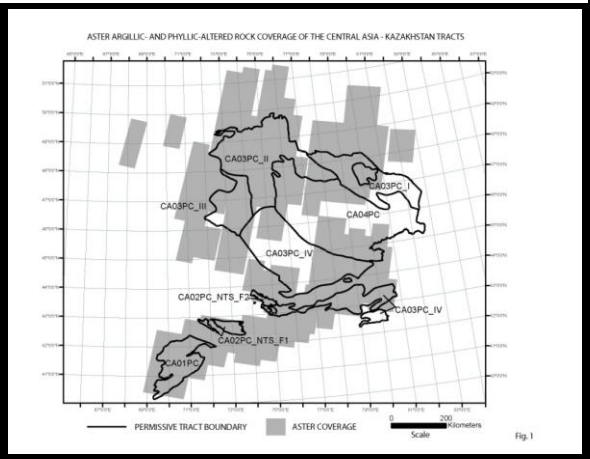
Prepared in cooperation with the Coordinating Committee for Geoscience Programmes in East and Southeast Asia

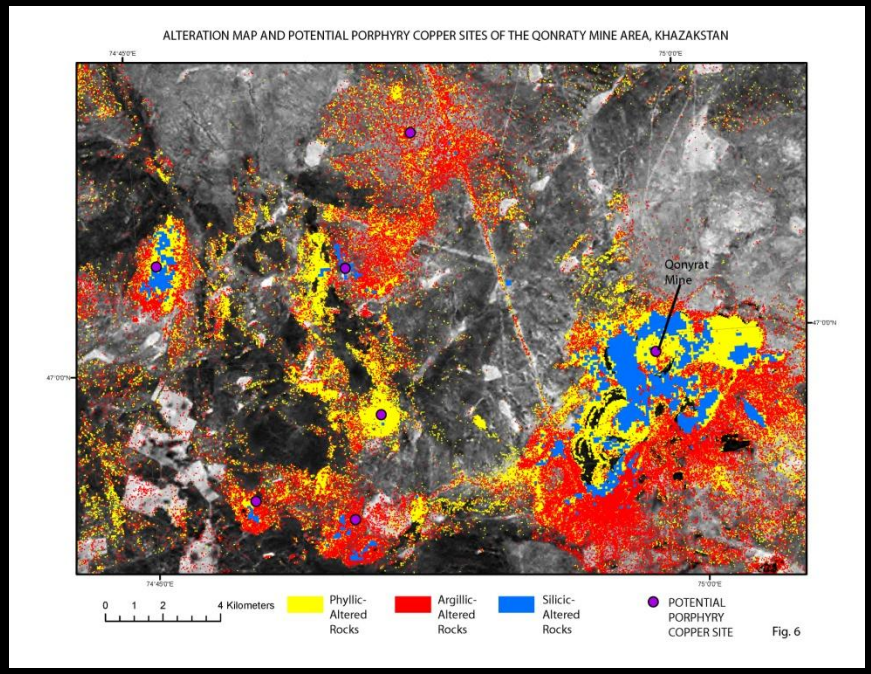
Scientific Investigations Report 2010–5090–D

U.S. Department of the Interior
U.S. Geological Survey

ASTER alteration mapping as a guide for porphyry copper estimates in Central Asia







Tract area: 79,500 km^2

5 known deposits

90-50-10 Estimate: 1-5-12

5.8 expected undiscovered

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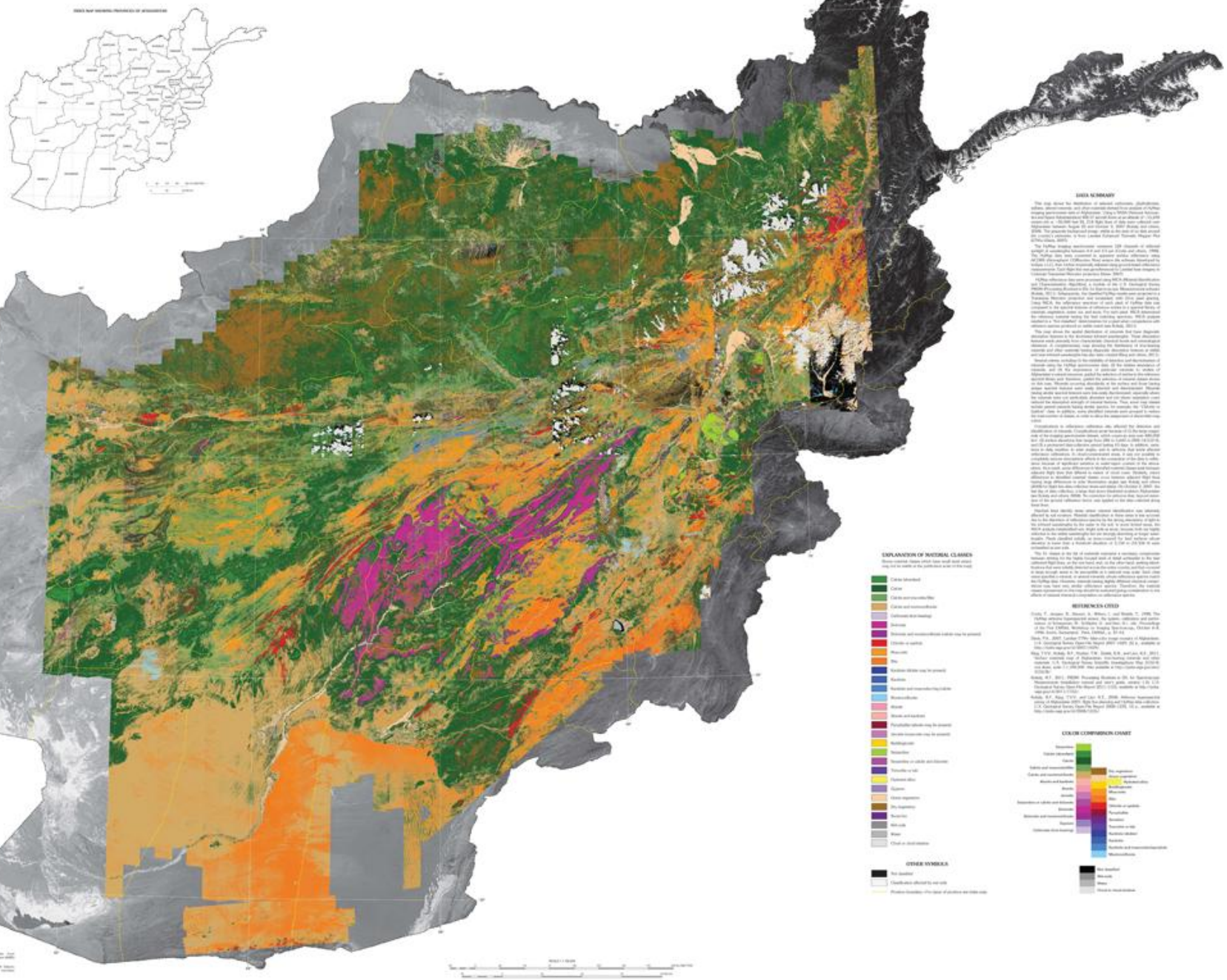
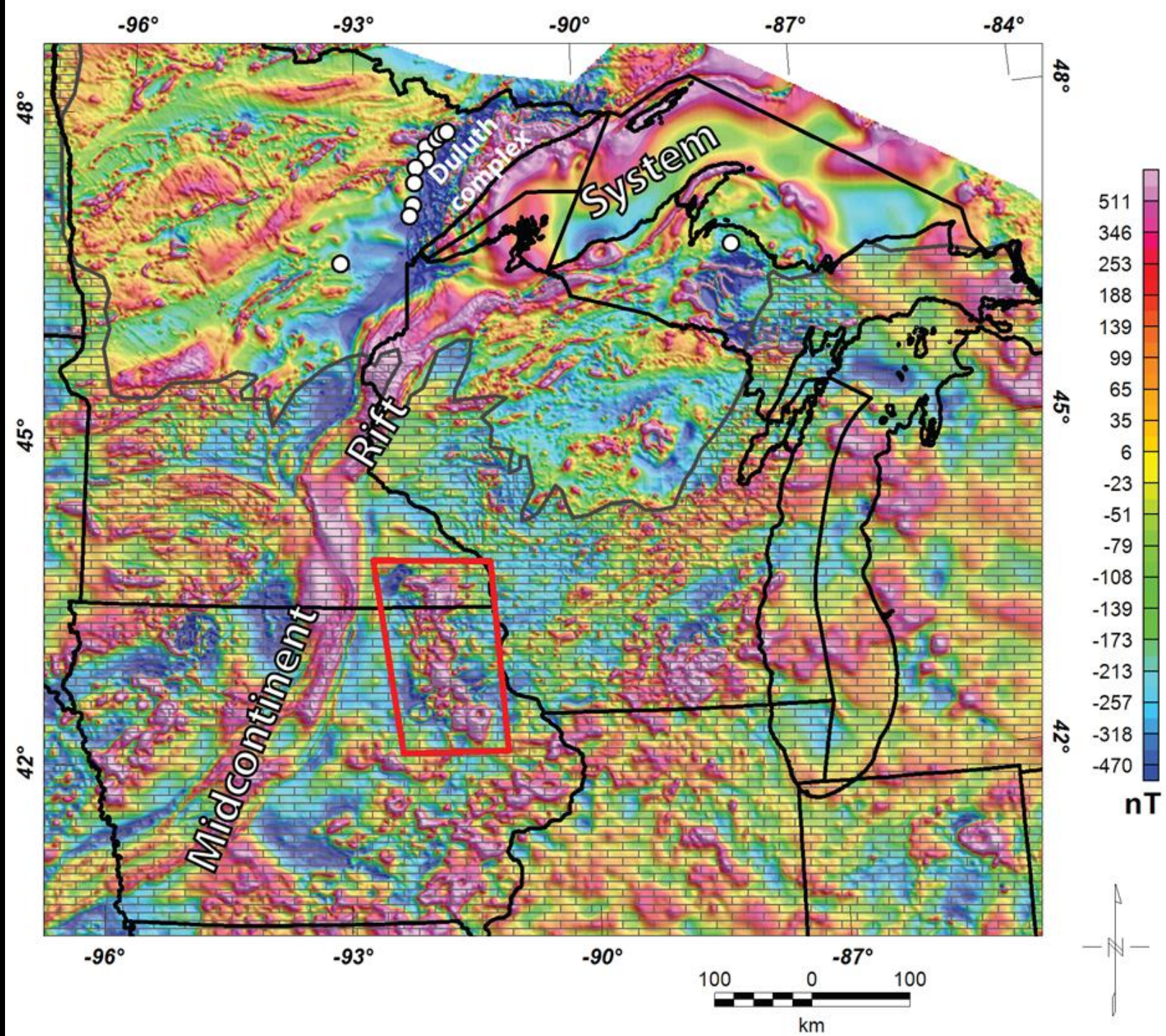


SURFACE MATERIALS MAP OF AFGHANISTAN: CARBONATES, PHYLLOSILICATES, SULFATES, ALTERED MINERALS, AND OTHER MATERIALS

By

Raymond F. Kokaly, Trude V.V. King, Todd M. Hoefen, Kathleen B. Dudek, and Keith E. Livo

2011


-96°
-93°
-90°
-87°
-84°
48°
45°
42°
Duluth complex
System
Rift
Midcontinent
511
346
253
188
139
99
65
35
6
-23
-51
-79
-108
-139
-173
-213
-257
-318
-470
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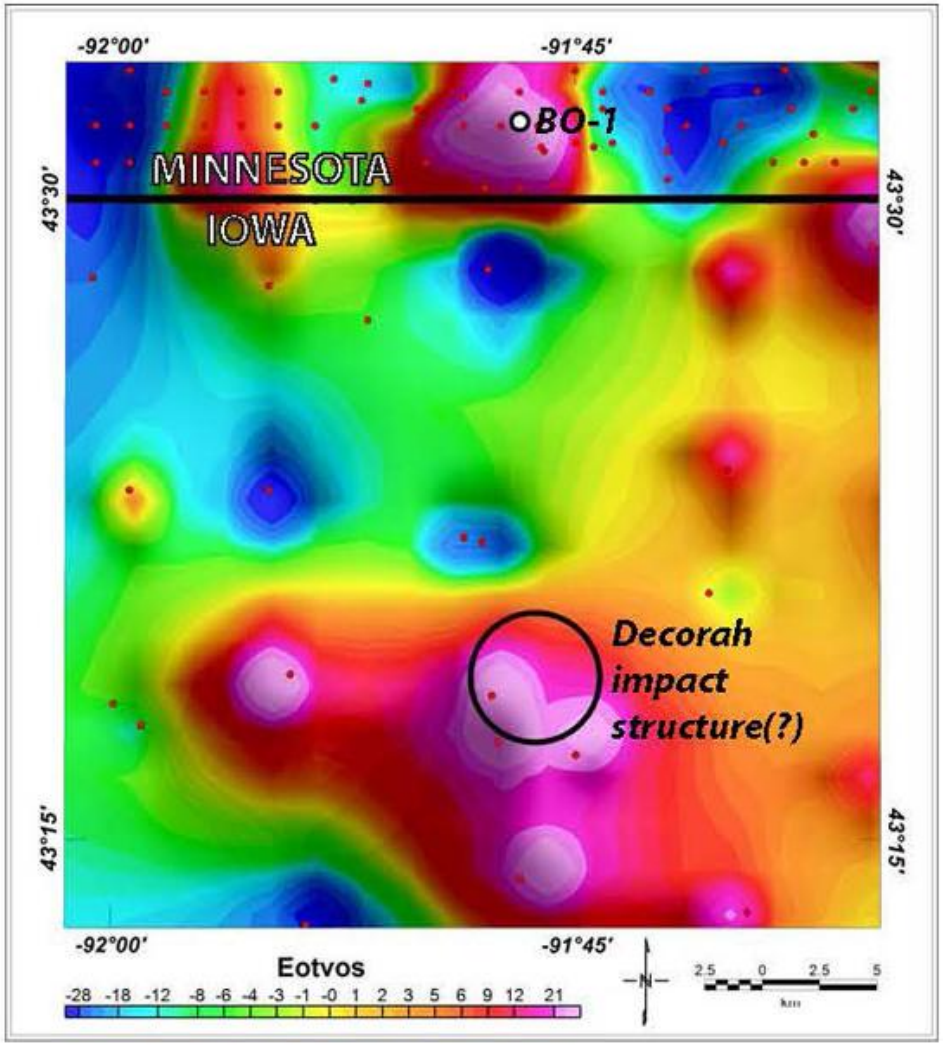
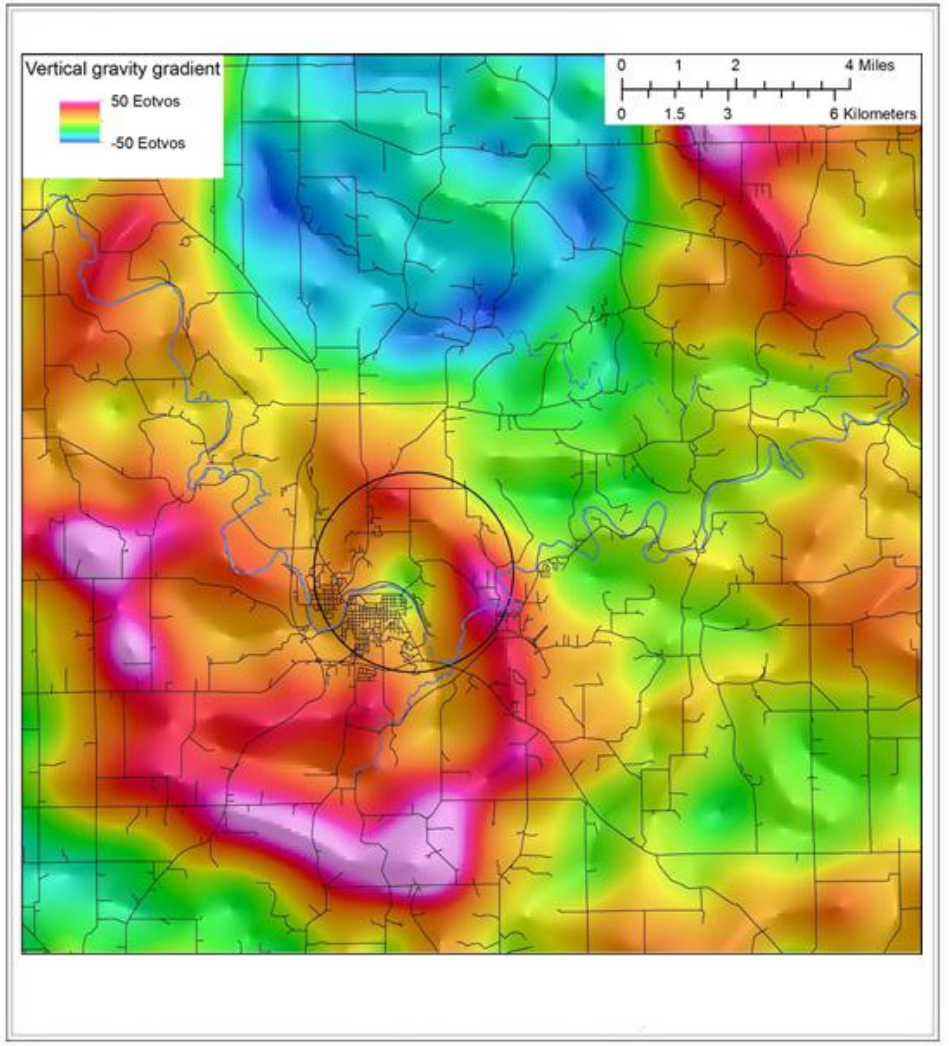


Old ground vertical gradient, calculated

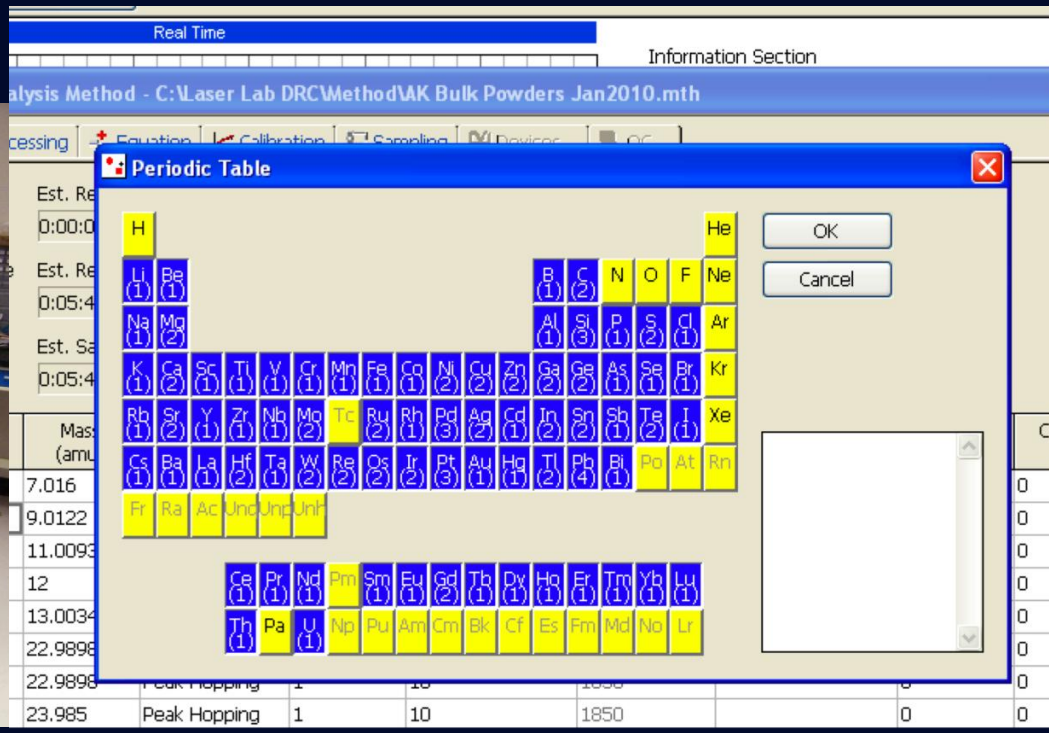


New airborne vertical gradient, measured

Inventory and Characterization of Byproduct Critical Mineral Resources

Critical Metal Content of Domestic Mineral Deposits

New USGS Laser Ablation Bulk ICP-MS Method



- Low cost, efficient, and accurate analytical method
- Entire periodic table (minus H, He, N, O and F) in a single rapid analysis
- Trace and ultra trace detection (ultra trace to less than 10 ppb in some cases)
- 100+ analyses per day

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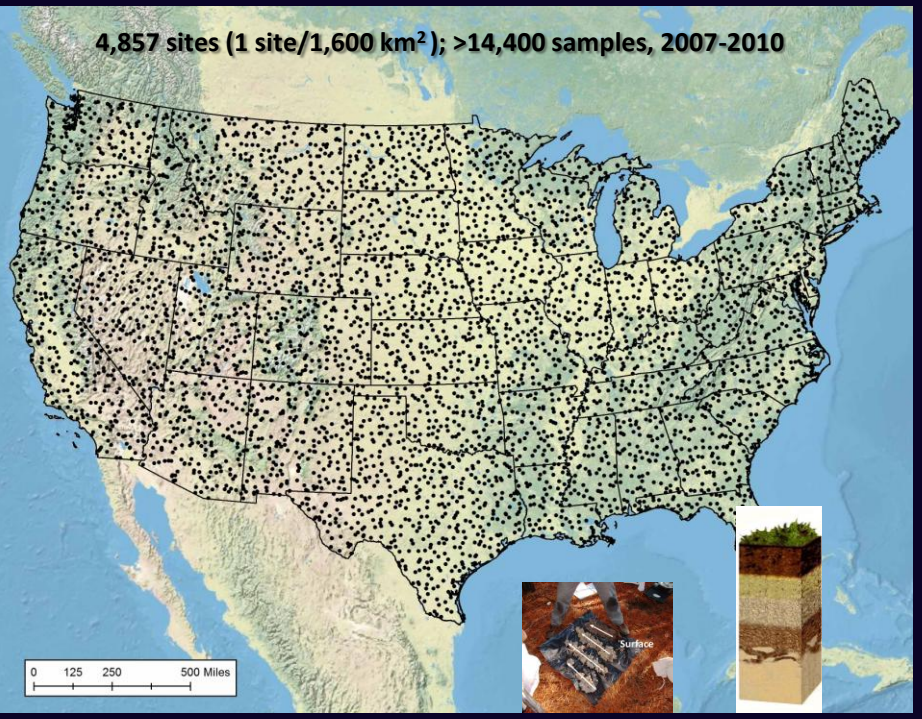
New National-scale Soil Geochemical and Mineralogical Data for the Conterminous United States



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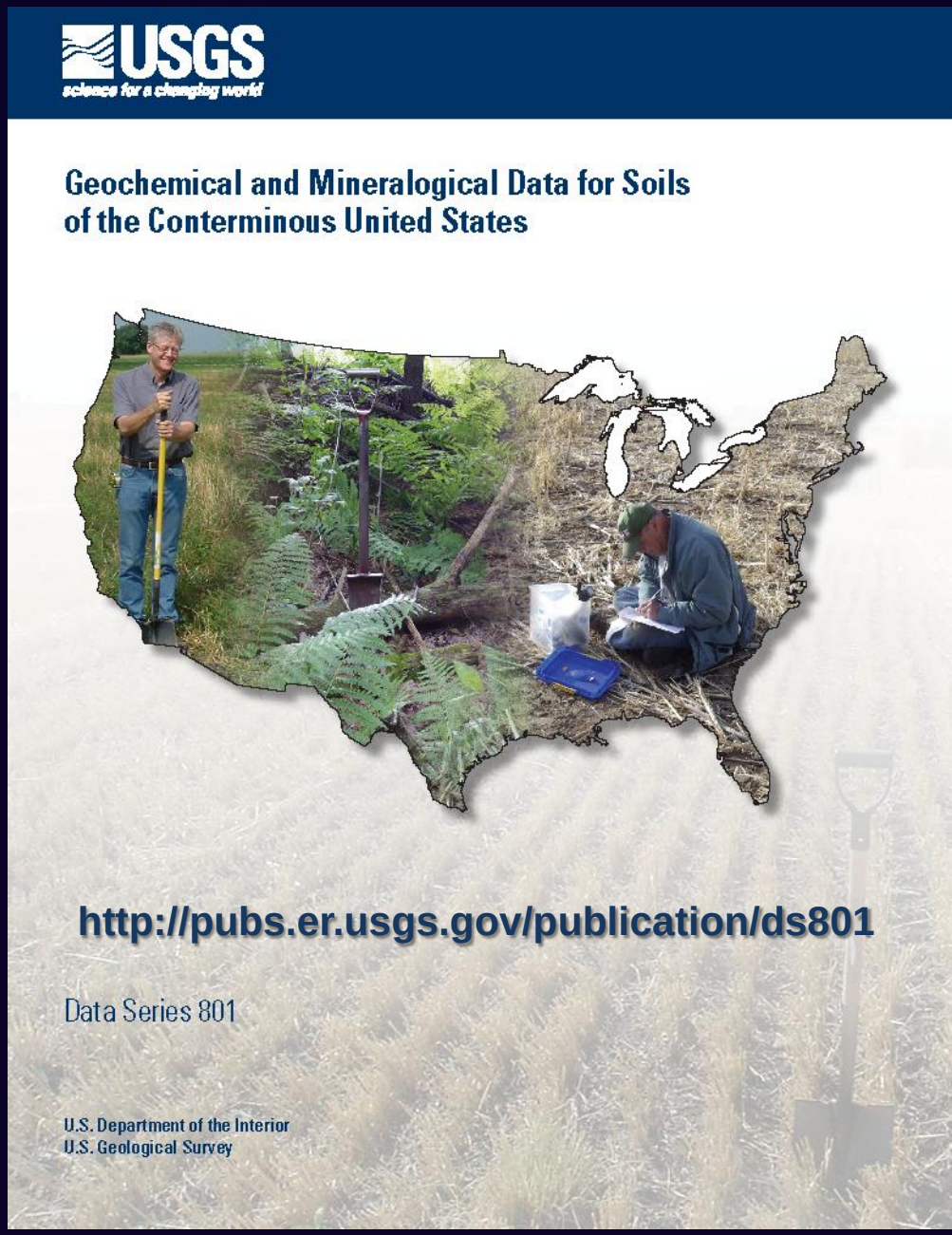
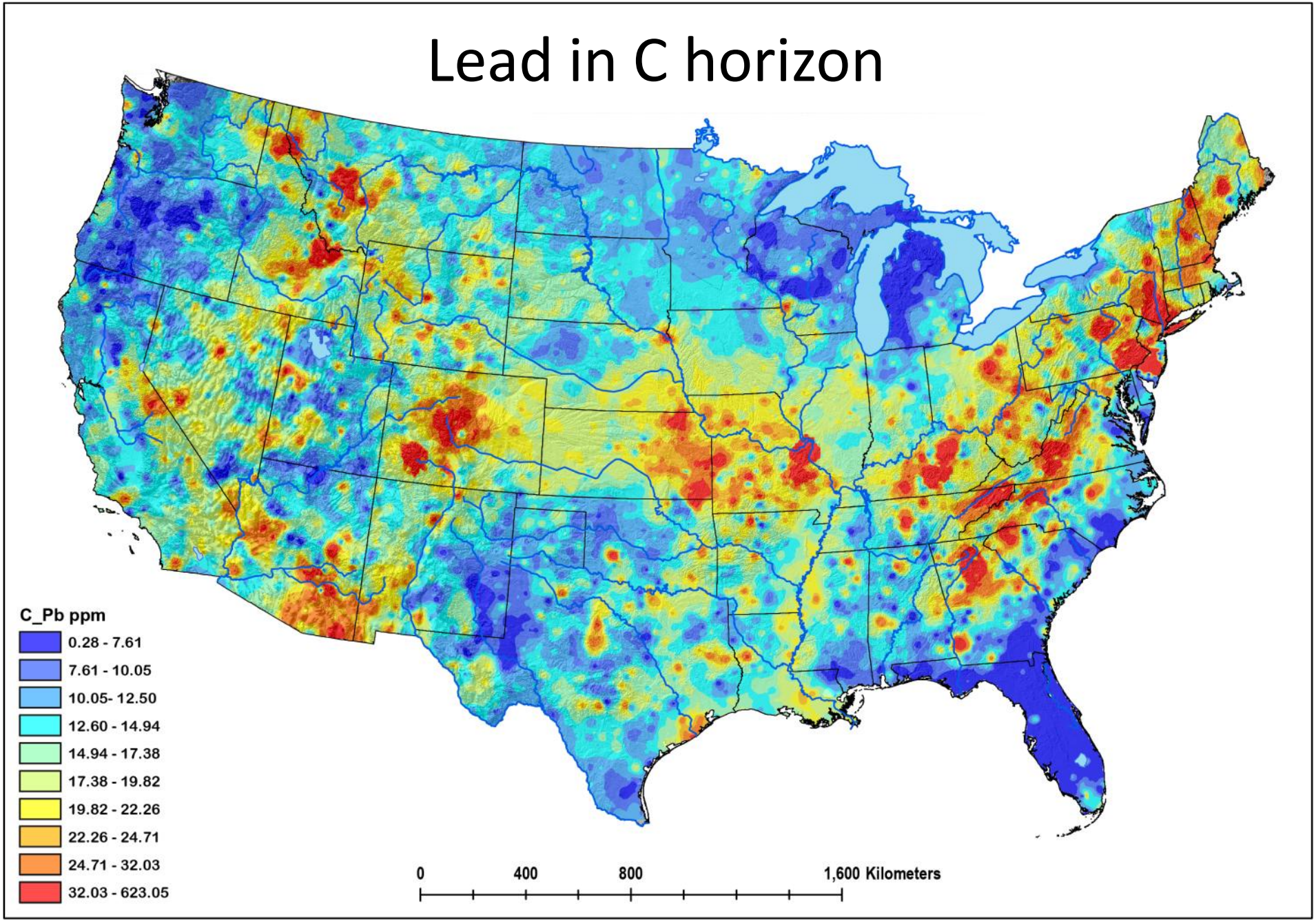
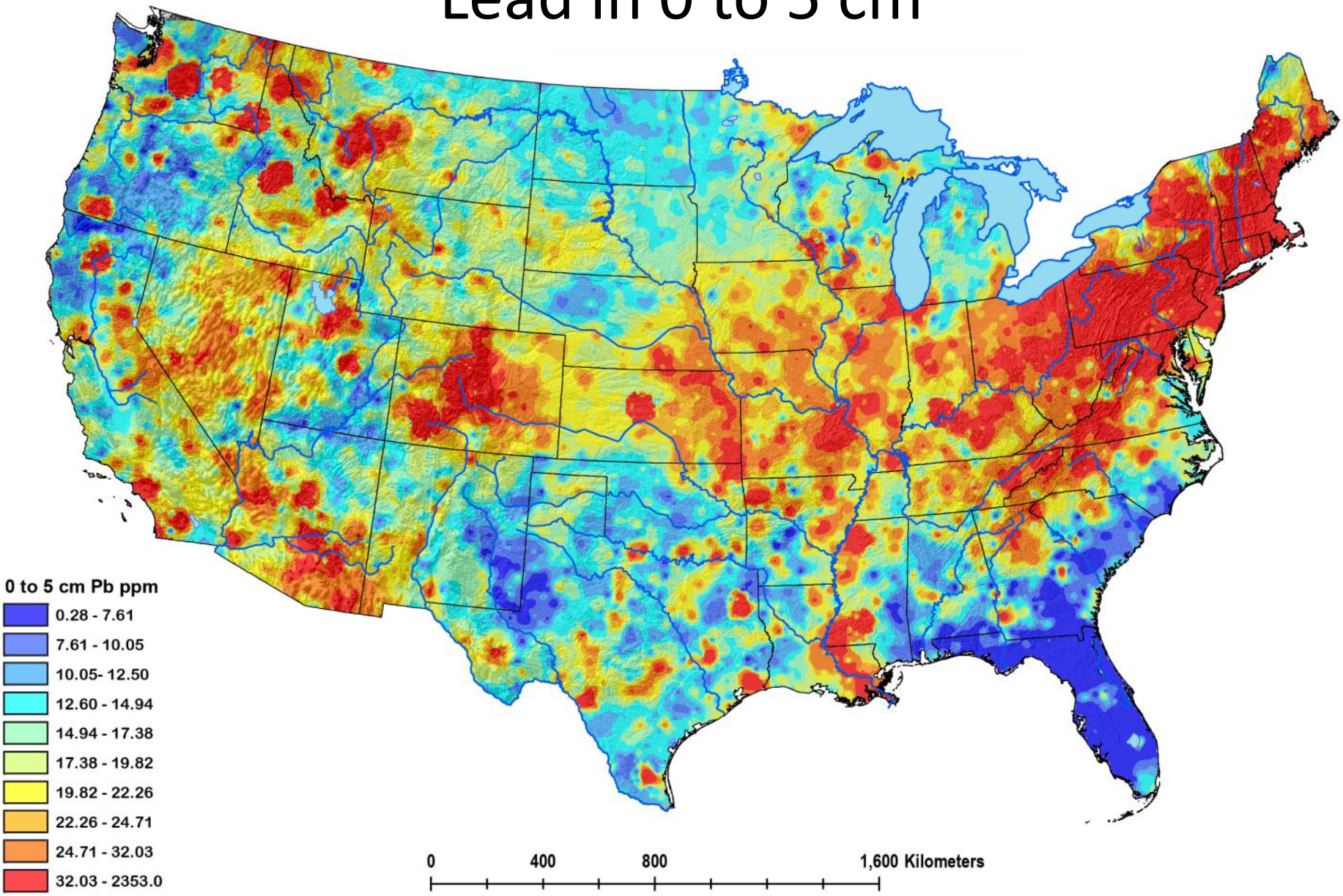


Lead in C horizon



Lead in 0 to 5 cm



General information:

minerals.usgs.gov/

Products available online at:

minerals.usgs.gov/global/
minerals.usgs.gov/minerals

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