



DAVID SCHOFIELD

Unearthing the Power of Geological Survey Organizations: Leveraging Critical Raw Materials for the Energy Transition



British
Geological
Survey

The Critical Raw Material Challenge:

As the world moves toward technology based solutions for decarbonising energy and transport there is an intense focus on mineral resources needed for technology and batteries

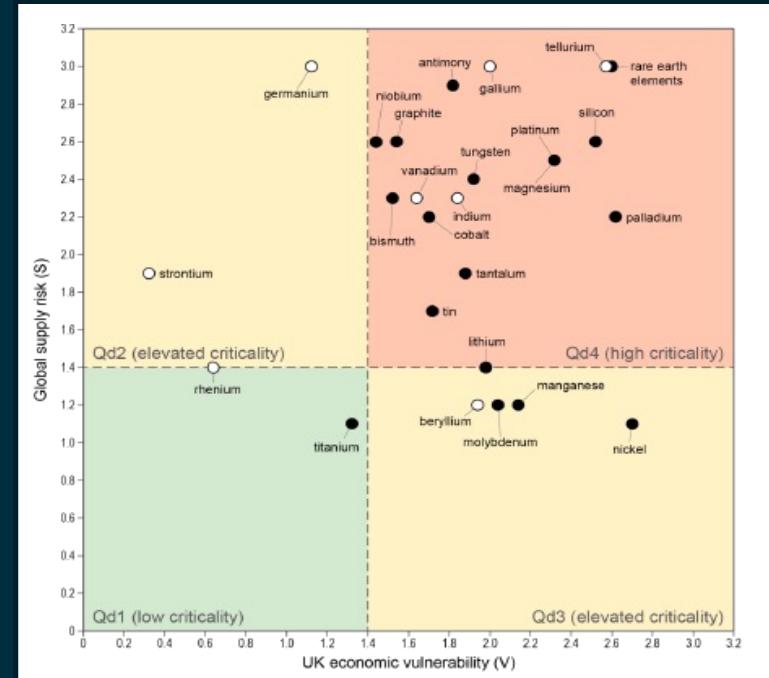
Many of these minerals are mined in small volumes or are bi-products of other commodities

There are often limited facilities for processing ores and hence there are concerns about security of supply for some jurisdictions

Many countries want the global energy transition to proceed against high environmental, social and governance standards

These issues are driving a need for increased global awareness of resource issues, improved data to understand resources better and better data management to help improve governance as well as advances in mineral exploration and ore processing.

Many of these issues fall into the responsibility of Geological Survey Organisations globally



The role of Geological Survey organisations:

The activities of GSOs in the mineral resource sector vary depending on their governance model, national priorities and foreign policy but typically incorporate aspects of the entire mineral resource lifecycle:

Gathering and managing baseline geological information in support of their domestic exploration sector and informing government on mineral resource issues

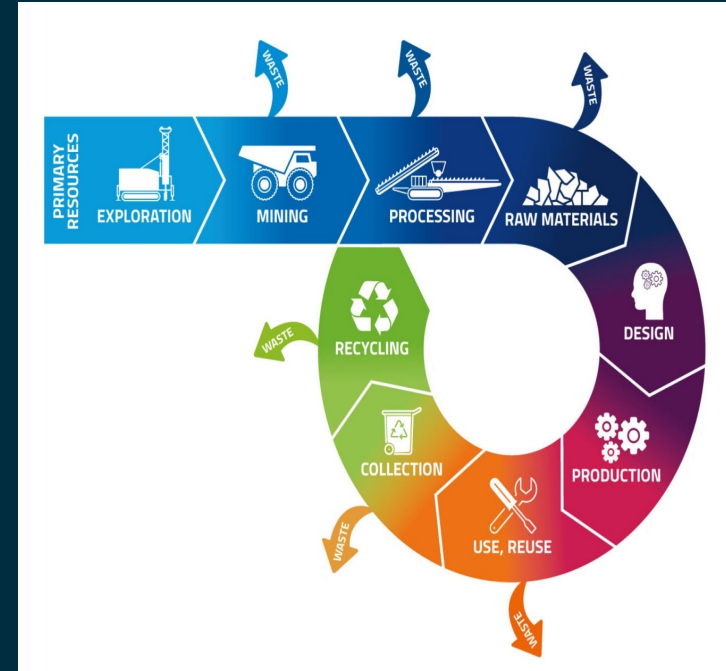
Providing intelligence on global mineral resources, production, stocks and supply chains

Carrying out fundamental research in to ore-genesis, exploration and ore processing and recycling, and supporting the circular economy

Carrying out research and development and providing advice on aspects of new energy technologies

Undertaking capacity strengthening, particularly with GSOs in LMICs and around energy technologies in carbon producing countries

Supporting transparency and helping to develop and deploy ESG strategies



An example from the British Geological Survey:

In the UK mining of metalliferous minerals is largely historic, however, the growing demand for Critical Raw Materials is driving growth in a domestic exploration and processing technology sector

Because of this, the UK does not have a central licensing authority for mineral exploration and mining, this is managed through local land use planning arrangements

However, the BGS has a long history in providing information and advice on the distribution and type and aspects relevant to planning decisions around minerals in the UK and globally

Indeed the original geological mapping of the UK was driven by a strategic need to understand the CRM for the energy transition of the early 19th Century –Coal

In response to the growing need for information and advice on current CRMs, The UK Government has established a **Critical Minerals Intelligence Centre** at the BGS to advise on domestic and global CRM issues



UK Critical Minerals
Intelligence Centre

UK Critical Minerals Intelligence Centre

Support the UK in securing **adequate and timely supplies of the critical minerals** it requires to ensure the success of the **net zero transition**, mitigate risks to **national security**, deliver economic prosperity, and create opportunities for UK businesses in **critical mineral supply chains** domestically and internationally.

Provide authoritative, impartial and independent up to date **data, information and analysis on stocks and flows** of critical minerals that are essential to the UK economy across whole value chains, to **guide decision-making** by government and industry, and make recommendations for **targeted interventions**.



UK mineral resources advice

Mineral science: understanding CRM-bearing mineral systems in terrestrial and marine environments. Understanding the changing use of minerals (e.g. in low-carbon cement).

Raw materials statistics and analysis: maintaining accurate, high-resolution time-series data relevant to understanding material cycles and their footprints to underpin minerals intelligence, including security of supply, and decision making.

A whole-systems approach to raw materials supply chains: working with partners to map primary and secondary material flows and stocks, and analysing interactions between the economy, environment and society to quantify trade-offs.

Advice and support: to governments and stakeholders globally.




UK Critical Minerals
Intelligence Centre

Potential for Critical Raw Material Prospectivity in the UK

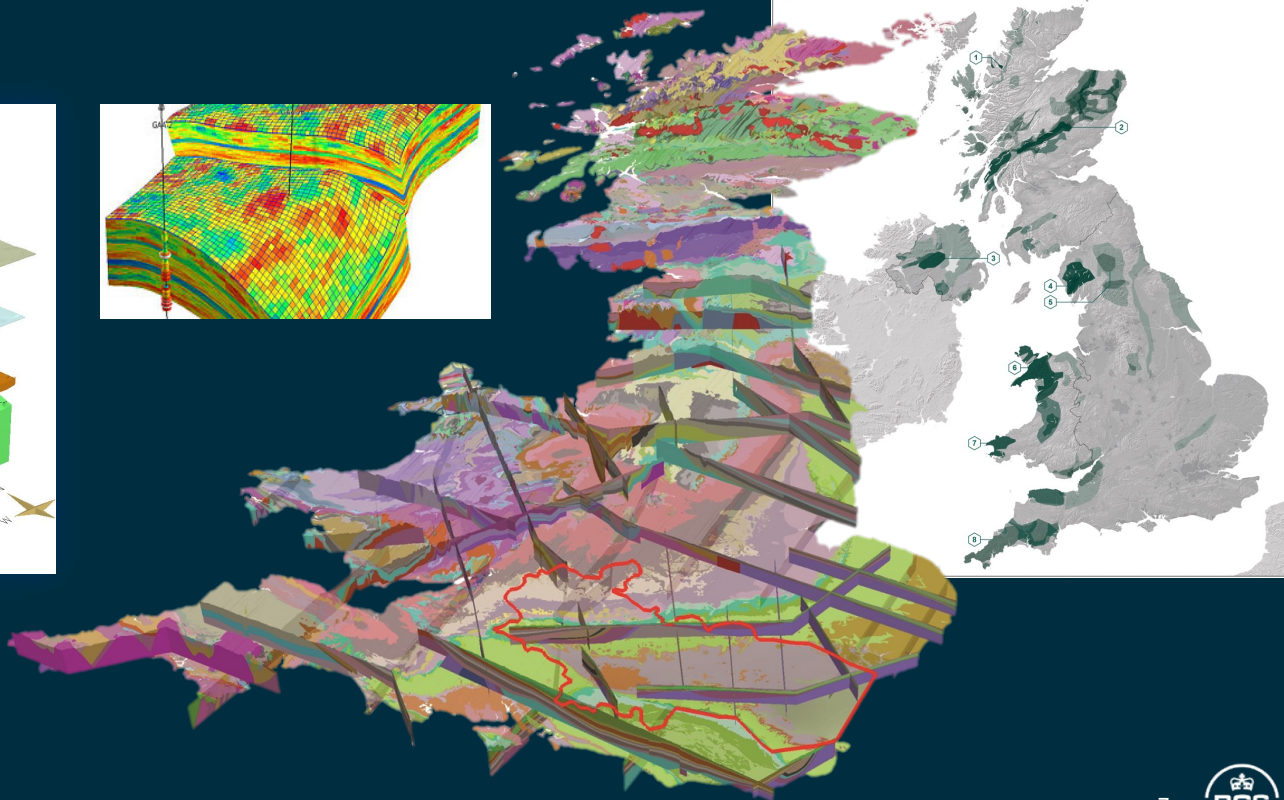
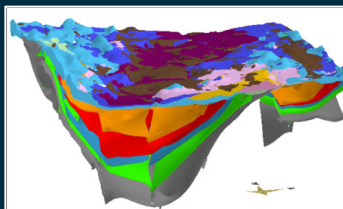
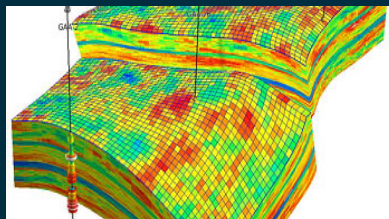
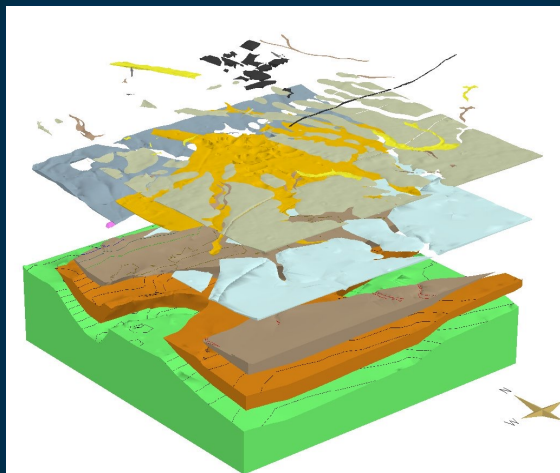
Decarbonisation and Resource Management Programme
Commissioned Report CR/23/024



 Department for
Business & Trade

 British
Geological
Survey

UK baseline geological information



BGS global reach:

Like many mature GSOs the BGS works globally in the mineral sector, amongst other geoscience disciplines

We see this as helping support UK foreign and trade policies

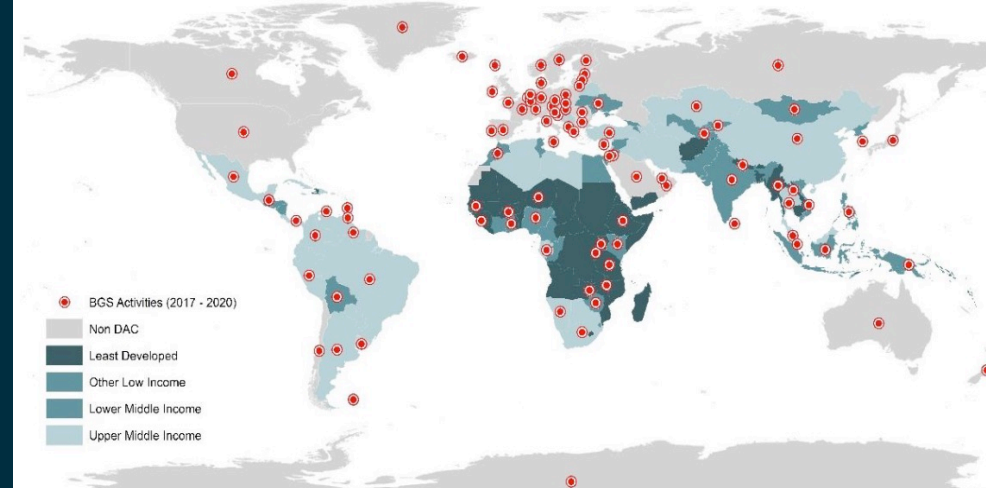
BGS has a powerful brand/reputation based on more than 100 years of International collaboration

BGS geologists are able to develop peer to peer relations with other Geological Survey Organisations and Ministries across the globe

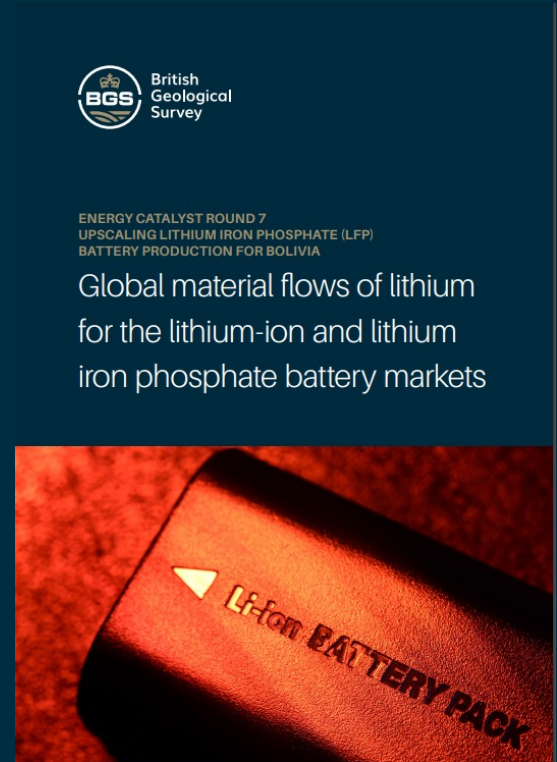
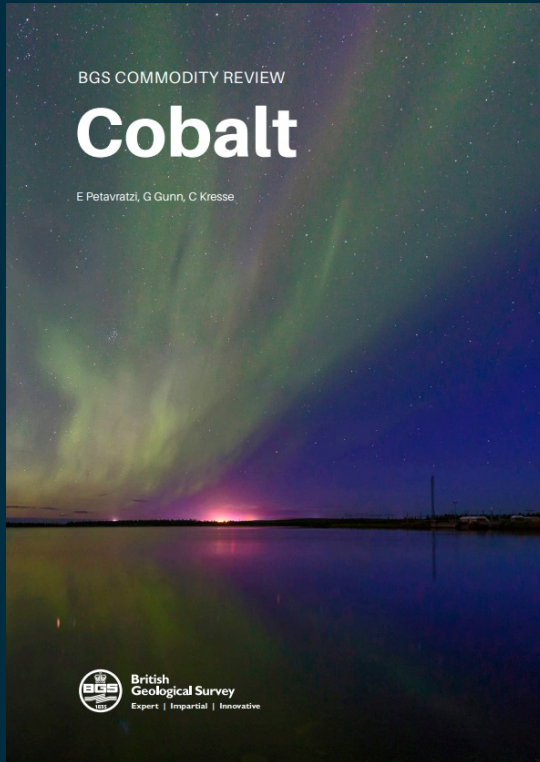
We undertake capacity strengthening in LMICs as a main stay of our global identity

We carry our fundamental research into ore genesis

BGS also advises UK and foreign governments on mineral resource issues



Global Minerals Intelligence and advice at BGS



Capacity Strengthening in Baseline Data/Geological Mapping

For many emerging economies, understanding mineral endowment is a key element in the good governance necessary for sustainable economic development.

This role is typically delegated to a geological survey organisation (GSO) tasked with geological mapping at a national scale, increasingly focussing on prospective regions, as well as managing and disseminating geological data and information from these surveys.

BGS has an enduring role in undertaking national and more focussed surveys, but increasingly helping strengthen capacity in GSOs around the world through training and mentoring activities, technical assistance and development of data management systems.

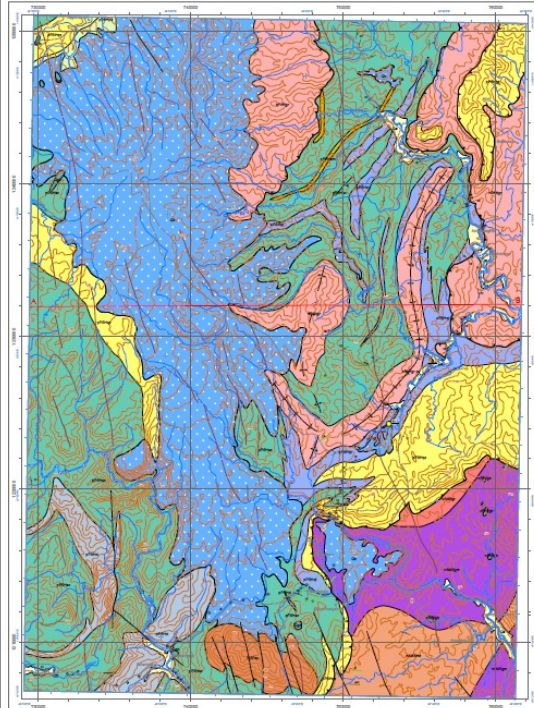
The principal benefits are strengthened institutions and governance in mineral exporting nations, increased security of supply and opportunity for businesses.



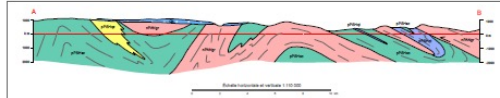


CARTE GÉOLOGIQUE DE MADAGASCAR 1:100 000

Feuille N° W37 - SAHANTAHA



Légende		Séquences Néotectoniques et Néotectoniques et les séquences tectoniques		Séquences Paléozoïques et les séquences paléozoïques		Séquences Mésozoïques	
CONCOULES	Grès	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques
	Argiles	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques
INFÉROCONCOULES	Grès	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques
	Argiles	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques
MOISSINS	Grès	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques
	Argiles	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Néotectoniques	Séquences Paléozoïques	Séquences Mésozoïques	Séquences Paléozoïques



Légende topographique

- Voies nationales
- Voies provinciales
- Voies régionales
- Voies locales
- Autres voies
- Chemin de fer
- Lacs et zones humides (Permanents)
- Lacs et zones humides (Saisonniers)
- Cours d'eau
- Village
- Localités sans zones d'habitat
- Localité de classe

MINISTÈRE DE L'ÉNERGIE ET DES MINES
Projet de Gouvernement des Ressources Minérales (PGRM)
 Contrat N° 1706 - MEMISGOGCOPRMS
 Contrat N° DA-3754 MRS / DMR Malagasy

Date: août 2016
 Adresse: A. LANGEVIN 010, St. Michel, 101, Madagascar 101, TANA

Management de projet:
 Coordinateur: J. RANJANAMANANTAN
 Superviseur régional: A. RAHARISON
 A. RANJANAMANANTAN
 A. RANJANAMANANTAN

Cartographe: M. RANJANAMANANTAN
 M. RANJANAMANANTAN (PDRM)

Rédaction et dessin cartographique: A. J. RANJANAMANANTAN
 MRS: A. TANAHARIAN, R. CHANANAN
 Échelle au: 1:100 000
 Région: Madagascar, Madagascar
 Madagascar, Madagascar, Madagascar

USGS



CARTE GÉOCHIMIQUE DE MADAGASCAR

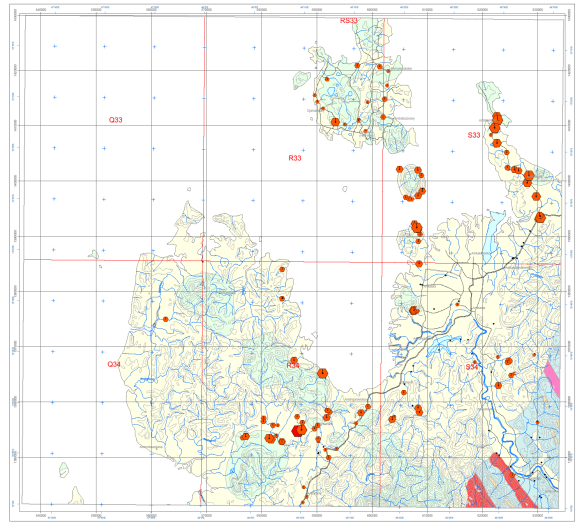
STREAM SÉDIMENT



Feuille de Nossi-Be (A7)

Echelle 1200 000

Arsenic (As)



MINISTÈRE DE L'ÉNERGIE ET DES MINES
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Légende Géochimique

Stream Sédiment

As (mg/kg)

- 13.1
- 8.4-13.1
- 5.4-8.3
- 3.2-5.3
- 1.5-3.1
- 0.7-1.4
- 0-0.6

Statistiques de résumé

Moyen: 2.7
 Médian: 1.4
 Minimum: <0.1
 Maximum: 85.2
 Écart type: 6.7
 Limite de détection: 0.1
 Nombre d'échantillons: 176

Légende Géologique

- Northern Bermanian Supracrustal Rocks
- Phanerozoic Sediments
- Mesozoic to Recent Igneous Rocks
- Mesozoic-Cenozoic Granite Intrusions
- Bermanian Belt
- Antananarivo Complex

Légende Topographique

- Roads Nationaux
- Roads provinciales
- Roads régionales
- Roads locales
- Chemin de fer
- Cours d'eau
- Lacs et zones humides
- Chief-Lieu Commune
- Chief-Lieu Department
- Chief-Lieu Region



Global capacity strengthening in data management: What do investors look for?

Attracting investment in mineral exploration and development by establishing stable governance, law, regulation, tax/ royalties, infrastructure, workforce/ skills, security

Demonstrating mineral potential

A GeoData Centre represents the long-term national geoscience knowledge base – essential for demonstrating mineral potential



Geodata management

Geological data are the heart of any GSO

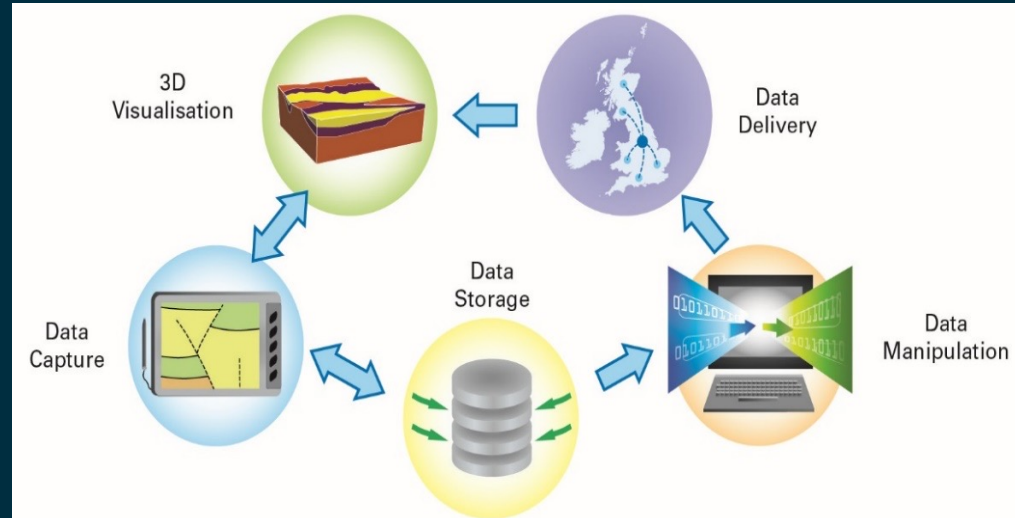
Many GSOs will have physical collections of legacy data that represent an irreplaceable knowledge base

Digital capture of such data is vital

Staff must have the skills and knowledge to acquire, manage and interpret such data

New data must then be integrated with the legacy datasets in a continuous process

Centralised digital Geodata centres allow wider access for data & information, addition of new data & analysis of datasets



Well-managed digital geodata represent a vital baseline for de-risking extractives investment, infrastructure & environmental management

Nigeria GeoData Centre - 2019 to 2023

Nigerian Geological
Survey Agency (NGSA)

National Steel Raw
Materials Exploration
Agency (NSRMEA)



Nigeria GeoData Centre - Digital data stores

Asset register database of NGS& & NSRMEA held data and information – 1033 records

Mineral Occurrence Database – 1272 records

Geochemistry Database – 5176 records (analyte determination of 9609 samples)

Borehole / Core Logs Database – 1206 records

Carbonate Map Sample Database – 821 records

Nigerian GeoData Centre Mineral Occurrences

1 #29

Geochemistry Data Carbonate map - Limestone Carbonate map - Marble Boreholes

ID	29
Name	Mbarakeh-Enyigba
Type	Prospect
Commodities	Lead (Primary) Zinc (Primary)
Status	
Mine status	Not applicable
Licence type	Not entered
Verified	true
Location	
State	Ebonyi
Location WGS84	6.1850, 8.1425
Long. accuracy	±0°
Lat. accuracy	±0°
Source	Derived from pre-existing record
Scale of capture	Not entered
Occurrence details	
Strike	Not entered
Dip	Not entered
Dip direction	Not entered
Geological maps	
Geologic map unit	Not entered
1:2M map unit	Not entered

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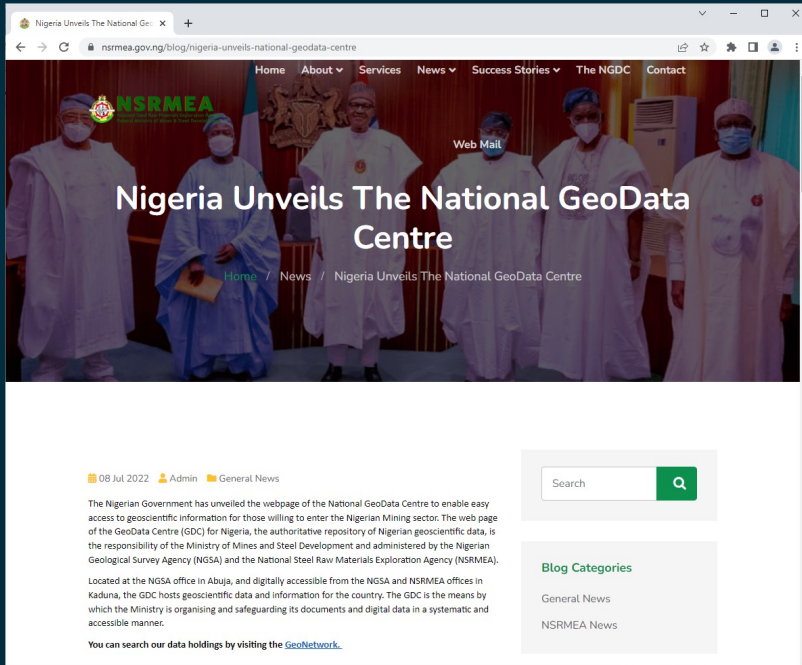
ID	Name	State	Type	Commodities	
1	29	Mbarakeh-Enyigba	Ebonyi	Prospect	Lead & Zinc
2	65	Oferekepe-Inyimagu	Ebonyi	Prospect	Lead & Zinc
3	82	Oiva	Ebonyi	Prospect	Lead & Zinc
4	95	Nweke Agu Oshiri	Ebonyi	Prospect	Lead & Zinc
5	302	Igweledeoha-Ameka	Ebonyi	Prospect	Lead & Zinc
6	662	Agu-Umuobuna Uburu	Ebonyi	Deposit	Lead & Zinc
7	791	Nkpuma-Ekwo-Uko	Ebonyi	Deposit	Lead & Zinc

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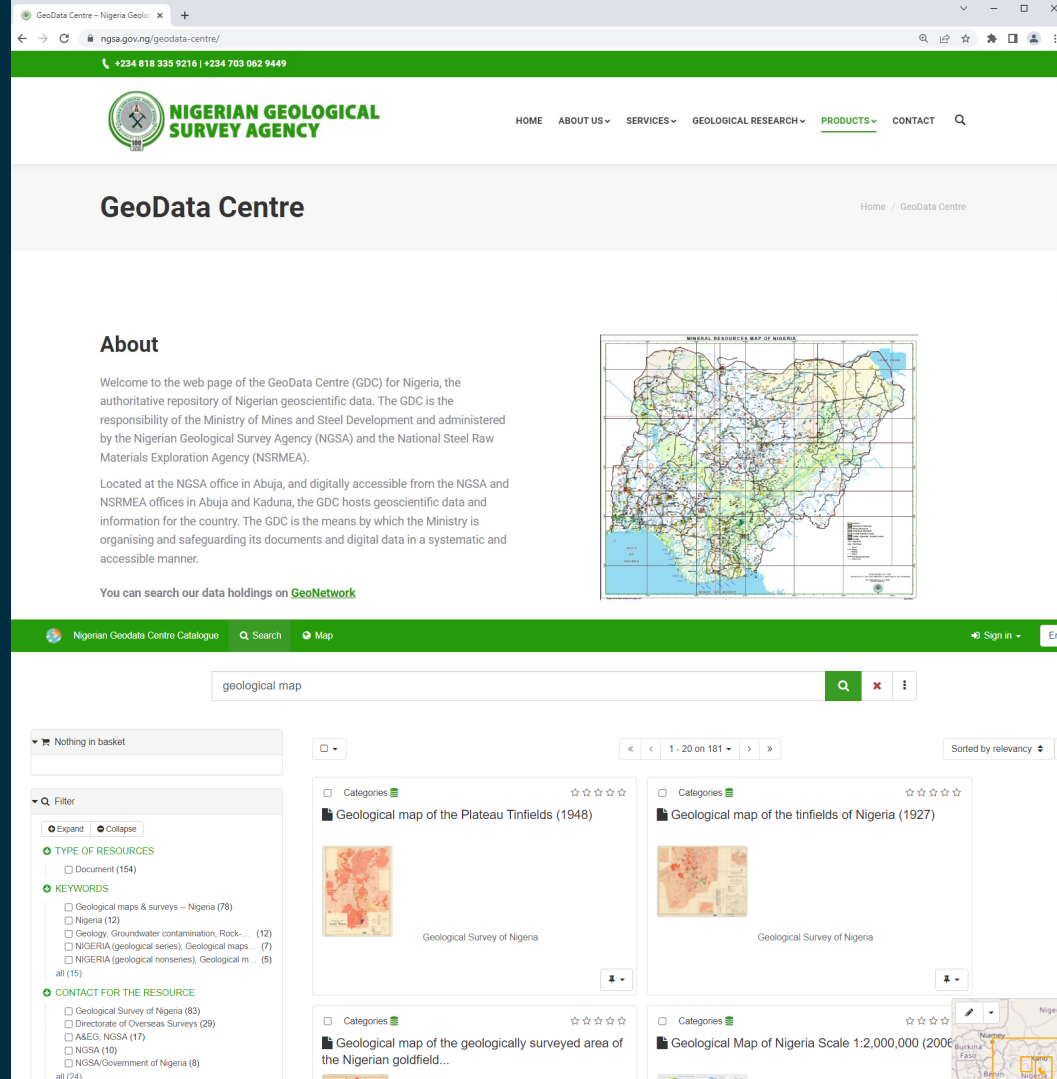
Download results as:

GWF2023 D I SCHOFIELD

Nigeria GeoData Centre - Metadata searchable on-line



The screenshot shows a news article on the NSRMEA website. The main headline is "Nigeria Unveils The National GeoData Centre". Below the headline, there is a sub-headline "Nigeria Unveils The National GeoData Centre" and a "Web Mail" button. The article text states: "The Nigerian Government has unveiled the webpage of the National GeoData Centre to enable easy access to geoscientific information for those willing to enter the Nigerian Mining sector. The web page of the GeoData Centre (GDC) for Nigeria, the authoritative repository of Nigerian geoscientific data, is the responsibility of the Ministry of Mines and Steel Development and administered by the Nigerian Geological Survey Agency (NGSA) and the National Steel Raw Materials Exploration Agency (NSRMEA). Located at the NGSA office in Abuja, and digitally accessible from the NGSA and NSRMEA offices in Kaduna, the GDC hosts geoscientific data and information for the country. The GDC is the means by which the Ministry is organising and safeguarding its documents and digital data in a systematic and accessible manner. You can search our data holdings by visiting the [GeoNetwork](#)."



The screenshot shows the Nigeria GeoData Centre website. The header includes the logo of the Nigerian Geological Survey Agency (NGSA) and the text "NIGERIAN GEOLOGICAL SURVEY AGENCY". The navigation menu includes "HOME", "ABOUT US", "SERVICES", "GEOLOGICAL RESEARCH", "PRODUCTS", and "CONTACT". The main content area features the title "GeoData Centre" and a sub-section "About" with the following text: "Welcome to the web page of the GeoData Centre (GDC) for Nigeria, the authoritative repository of Nigerian geoscientific data. The GDC is the responsibility of the Ministry of Mines and Steel Development and administered by the Nigerian Geological Survey Agency (NGSA) and the National Steel Raw Materials Exploration Agency (NSRMEA). Located at the NGSA office in Abuja, and digitally accessible from the NGSA and NSRMEA offices in Abuja and Kaduna, the GDC hosts geoscientific data and information for the country. The GDC is the means by which the Ministry is organising and safeguarding its documents and digital data in a systematic and accessible manner. You can search our data holdings on [GeoNetwork](#)."

Below the "About" section, there is a "Nigerian Geodata Centre Catalogue" section with a search bar containing "geological map". The search results are displayed in a grid format, showing various geological maps such as "Geological map of the Plateau Tinfields (1948)", "Geological map of the tinfields of Nigeria (1927)", and "Geological map of the geologically surveyed area of the Nigerian goldfield...".

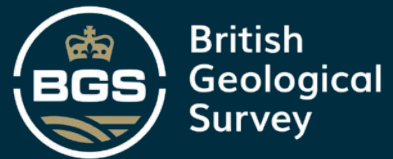
Summary

The global demand for Critical Raw Materials for the energy transition is driving a renaissance in the mineral resource sector

Geological Survey organisations are highly experienced in the areas of mineral resource assessments and have a critical role to play in underpinning global intelligence, resource understanding, transparency and equitable development

Good acquisition, management & dissemination of geological data, coupled with knowledge & skills, provides the fundamental baseline for natural resource management in all countries





THANK YOU