

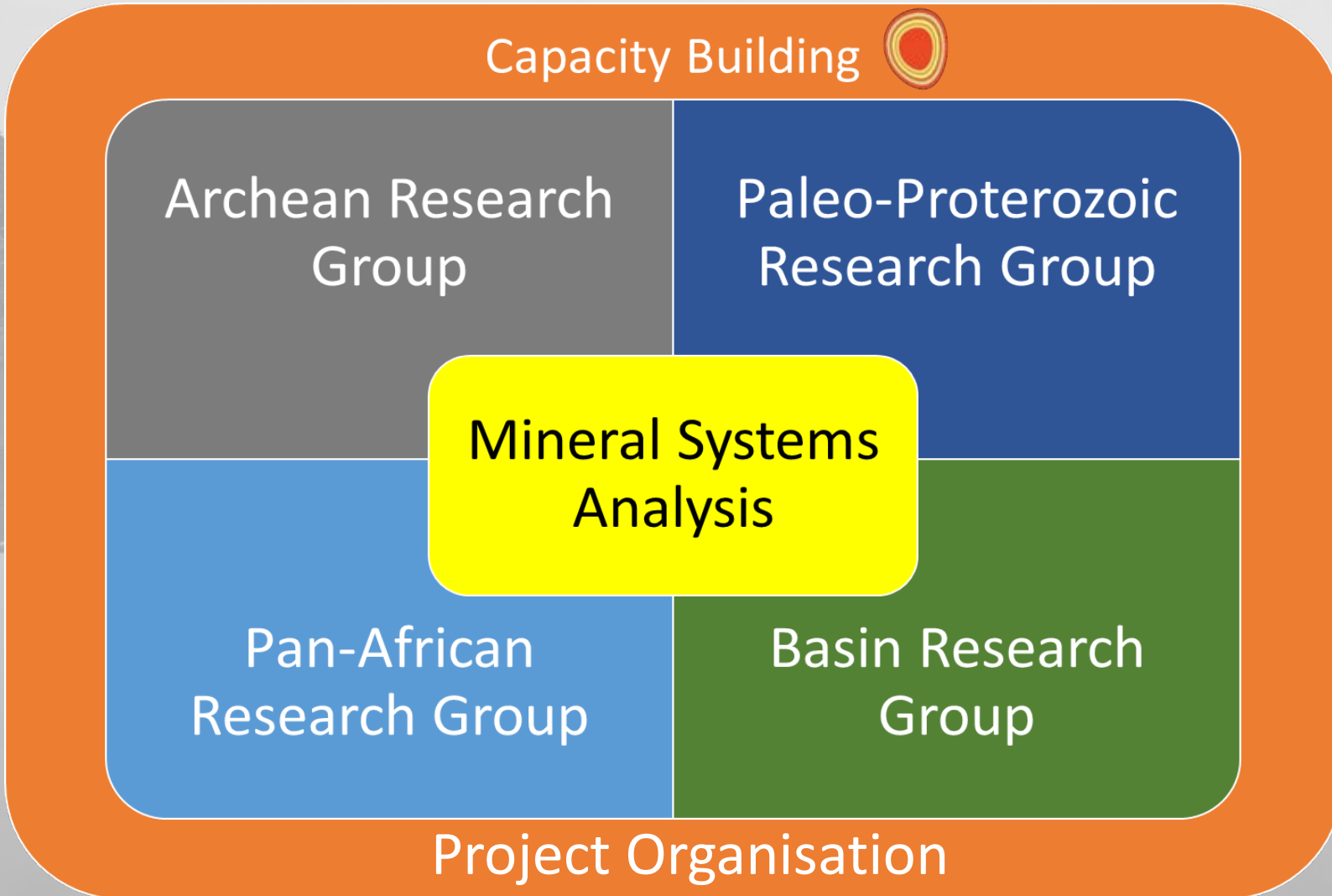


WAXI

West African Exploration Initiative

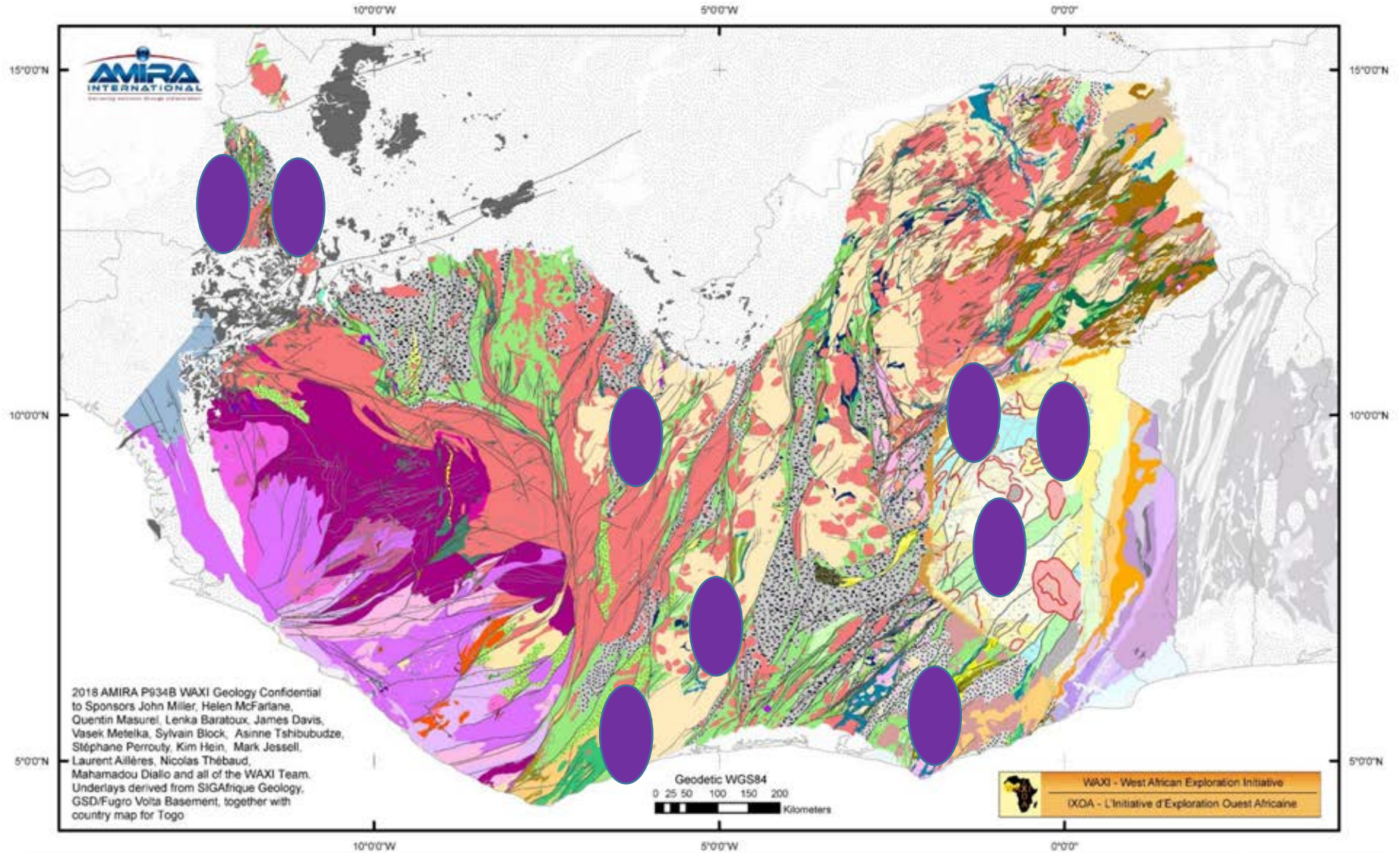
Stage 4

WAXI 4- West African Mineral Systems



The overarching philosophy is to characterise and evaluate the role of both the lithospheric and crustal architecture on the development of mineral systems through time

Fieldwork
March-June
2023

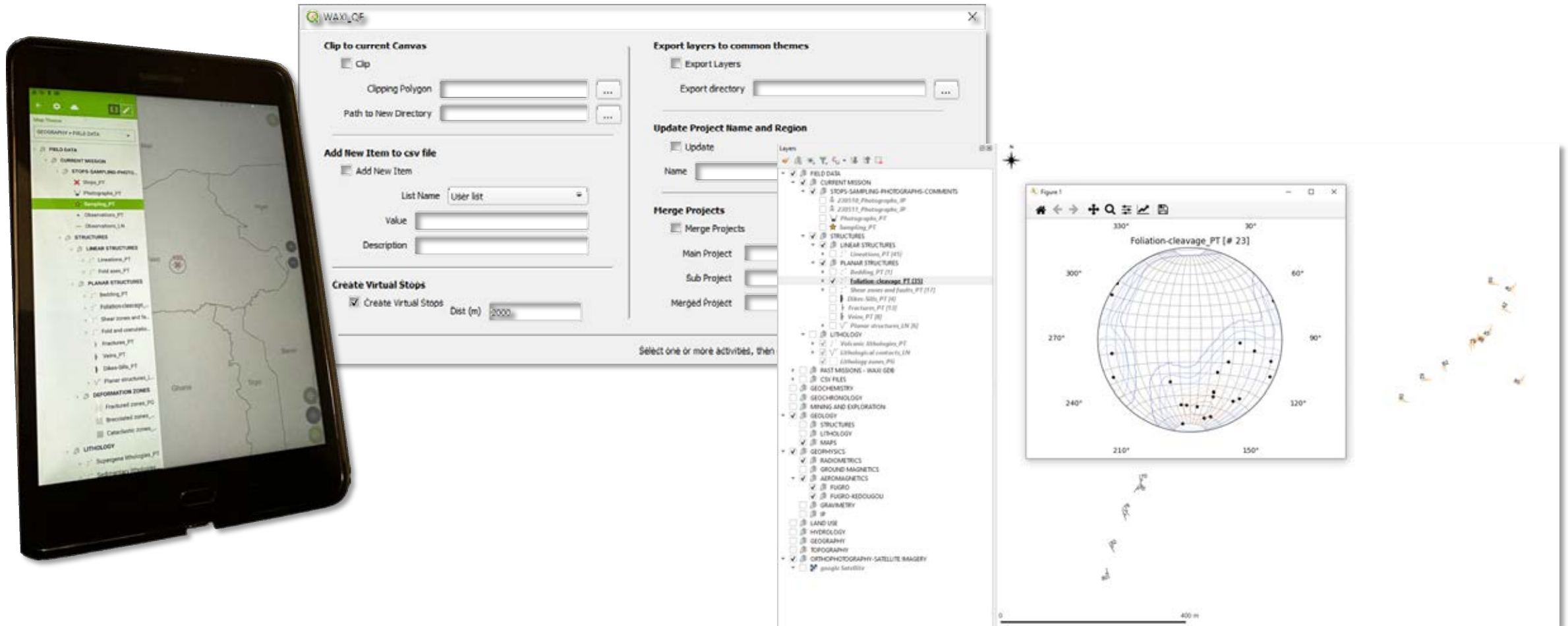


WAXI_geol_09_2018											
Amphibolite	Basalt, andesite	CC mig	Composite gneiss	Detrital sediments, phyllite	Diabase	Gabbro gneiss	Gabbroite	Lamprophyre	Migmatite	Subvolcanic intrusion	Un differentiated gneiss
Amphibolite	Basalt, gabbro	CC orthogneiss	Detrital sediments, basal formation	Detrital sediments, sandstone, minor conglomerate	Diabase	Gabbro with apatite	Gabbroite	Late stage Mt. gneiss	Ortho gneiss	Shear zone	Un differentiated gabbro
Andesite	Basalt	CC paragneiss	Detrital sediments, Harri formation	Detrital sediments, sandstone, minor siltstone	Diabase	Gabbro north P	Gabbroite	Leucocratic gneiss	Pink gneiss	Stratiform formation	Un differentiated gabbro
Andesite, pyroclastic flow	Basalt gneiss	CC ortho-schist	Detrital sediments, Kourou formation	Detrital sediments, highly magnesian	Diabase	Gabbro, apatite	Gabbroite	Mt. gneiss	Quartz diorite gneiss	Uplift	Un differentiated schist
Andesite	CC ortho-schist	Carbonate units	Detrital sediments, Taharian-type	Detrital sediments, conglomerate, minor sandstone	Diabase	Gabbro	Gabbroite gneiss	Mt. schist	Quartzite	Tonalite, orthogneiss, granodiorite	Un differentiated schist
Angite, pyroclastic flow	CC granite	Charcoalite	Detrital sediments, conglomerate, minor sandstone	Detrital sediments, conglomerate, minor sandstone	Diabase	Gabbro	Gabbroite, diorite	Metavolcanic gneiss	Quartzite	Ultramafic rock	Un differentiated schist
Basalt andesite, pyroclastic flow	CC mafic gneiss	Composite gneiss	Detrital sediments, conglomerate, sandstone	Detrital sediments, conglomerate, sandstone	Diabase	Gabbro	Gabbroite, granite	Mt. schist	Phyllite, slate	Ultramafic rock	Volcanic sedimentary schist, andesite, pyroclastic
											Volcanic sedimentary schist

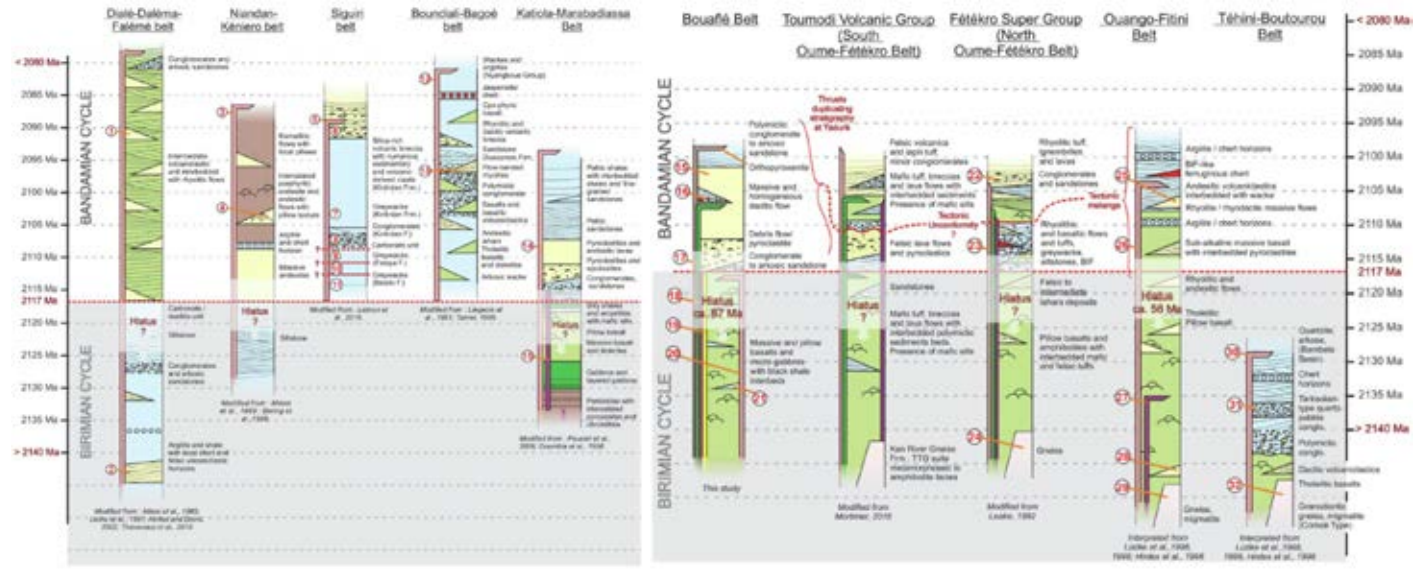
WAXI GIS Field Data Collection system for QFIELD/QGIS

A beta-version of a WAXI standard tablet-based digital mapping template for QGIS/QFIELD has been developed by Julien Perret from UWA, and is being field tested by the WAXI field teams.

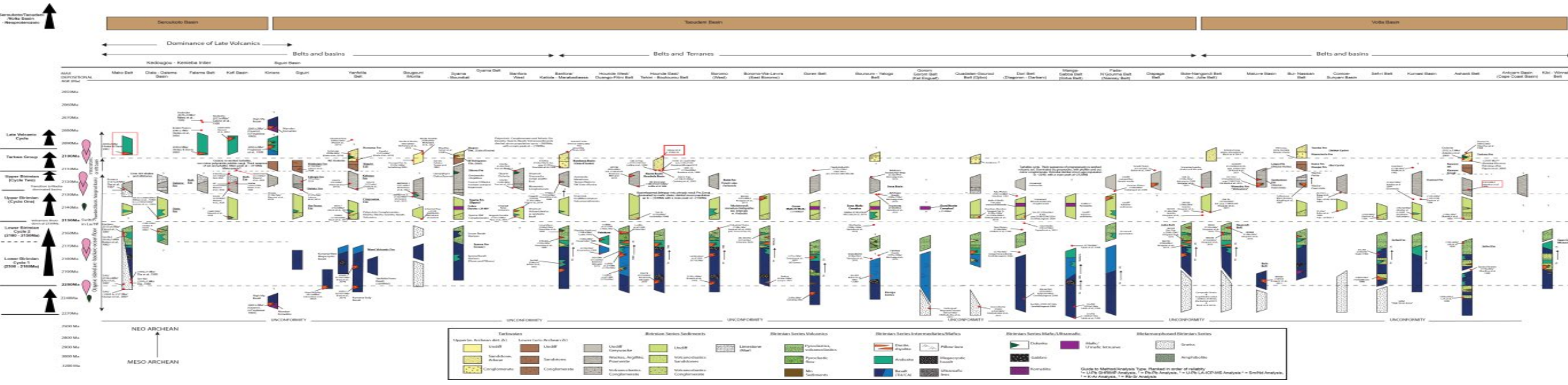
It comes with WAXI-specific plugins for QGIS to manage the template, as well as a Geosoft grid reader for QGIS.



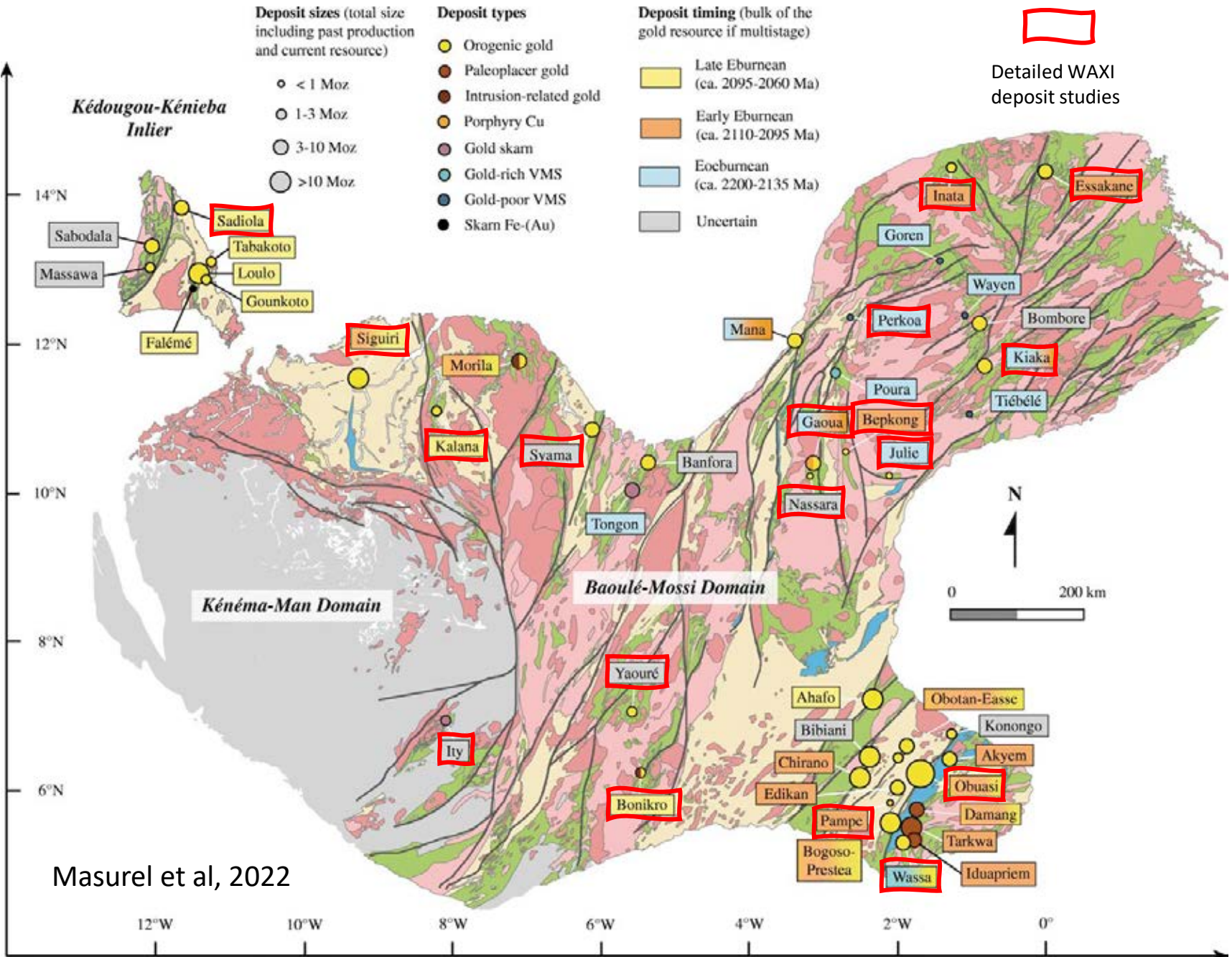
1. Crustal & belt architecture & inheritance



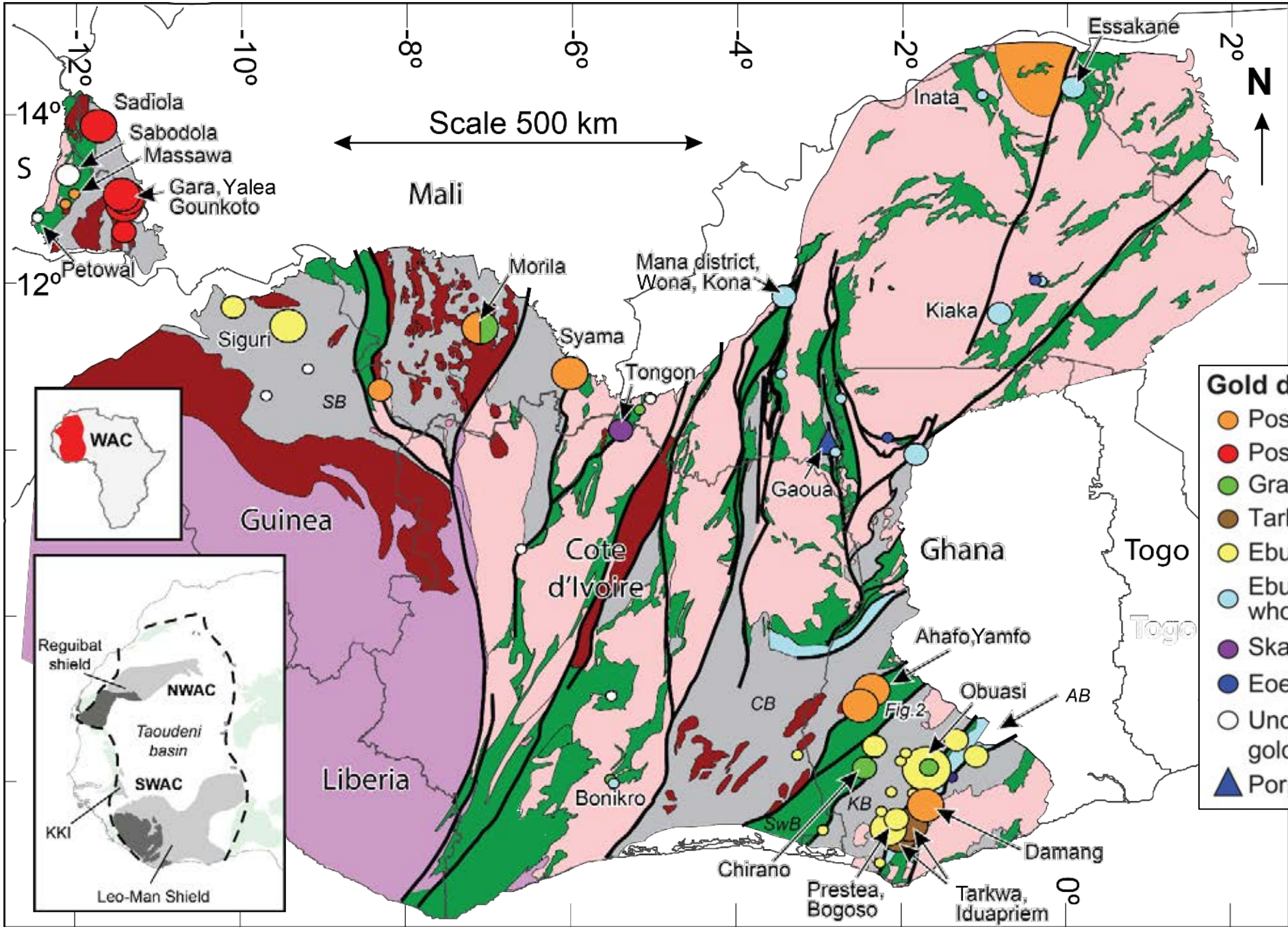
Meriaud et al. 2020



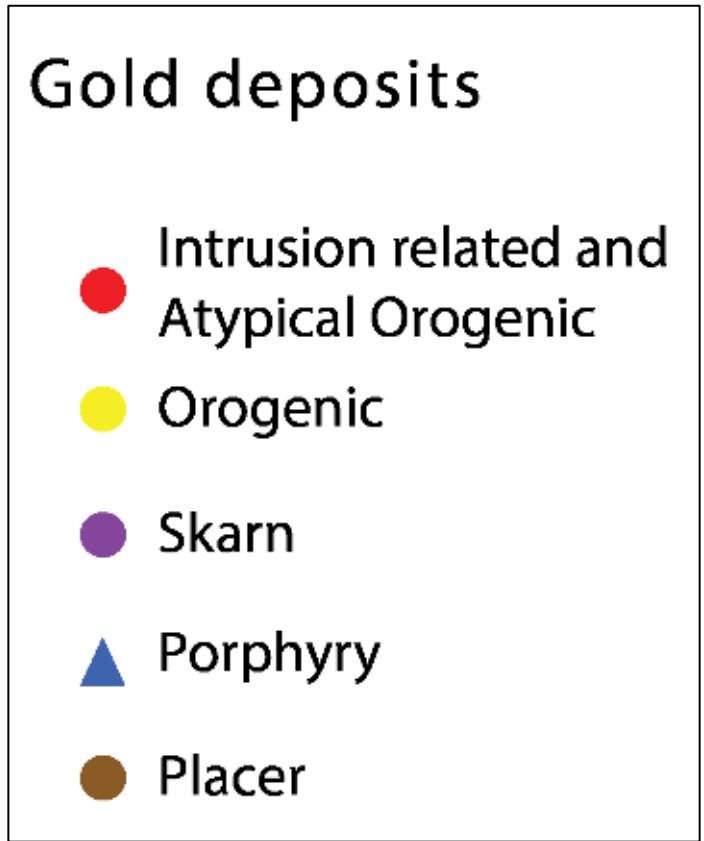
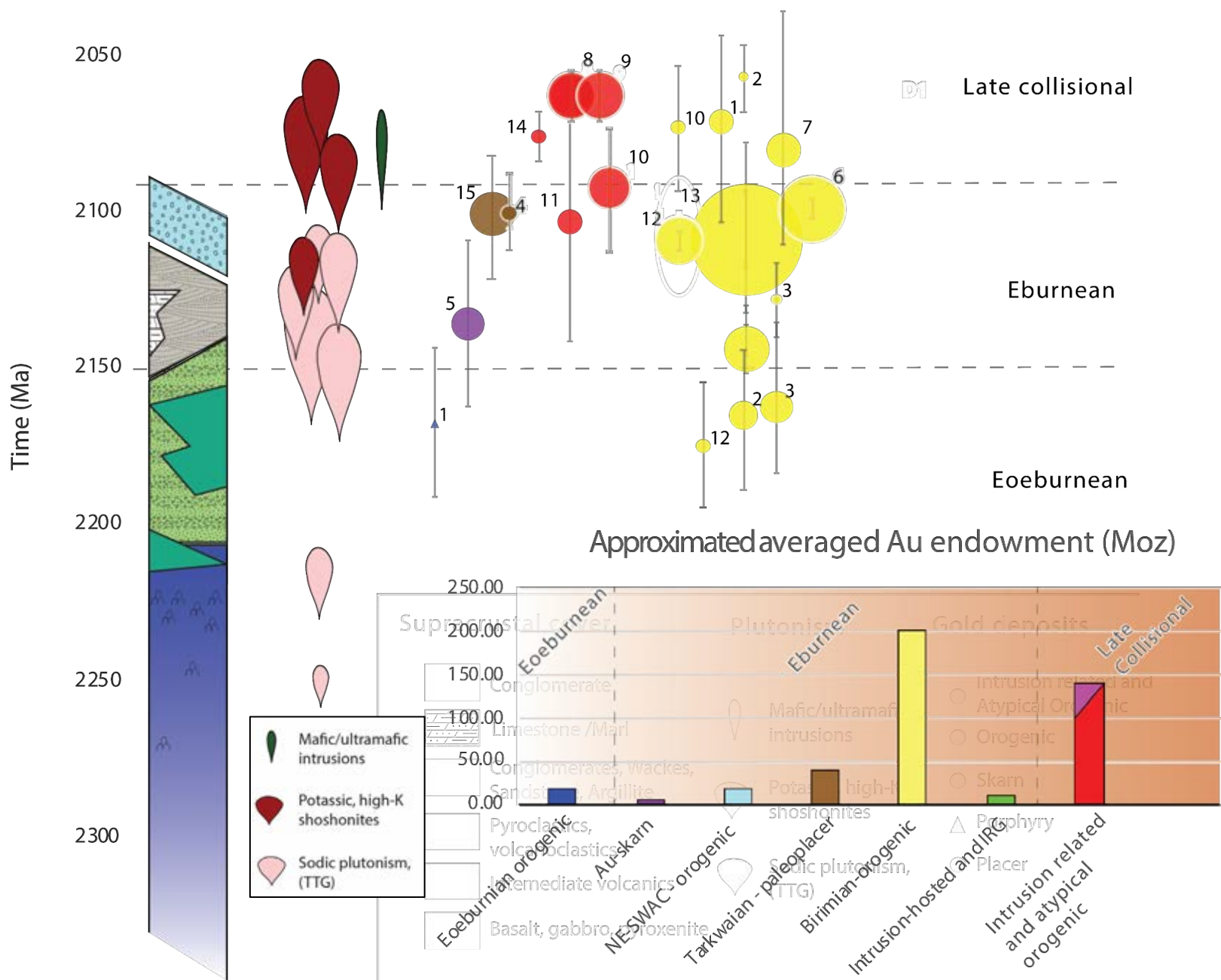
Belt to deposit scale mineral systems



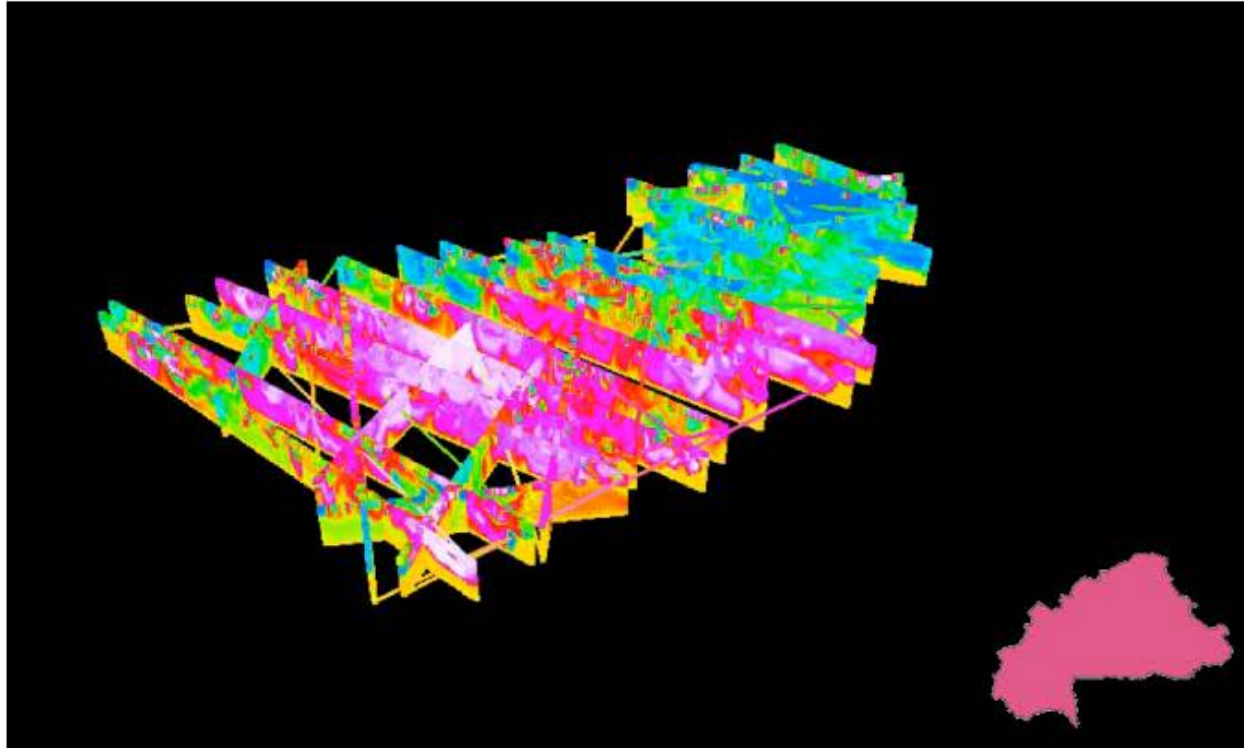
Masurel et al, 2022



- Gold deposit styles**
- Post-collision, orogenic
 - Post-collision, Loulo/Falémé
 - Granitoid-hosted
 - Tarkwaian paleoplacer
 - Eburnean basin orogenic
 - Eburnean orogenic, part or wholly hosted by Eoeburnian rocks
 - Skarn
 - Eoeburnean orogenic
 - Undifferentiated/poorly documented gold deposits
 - ▲ Porphyry Copper deposits

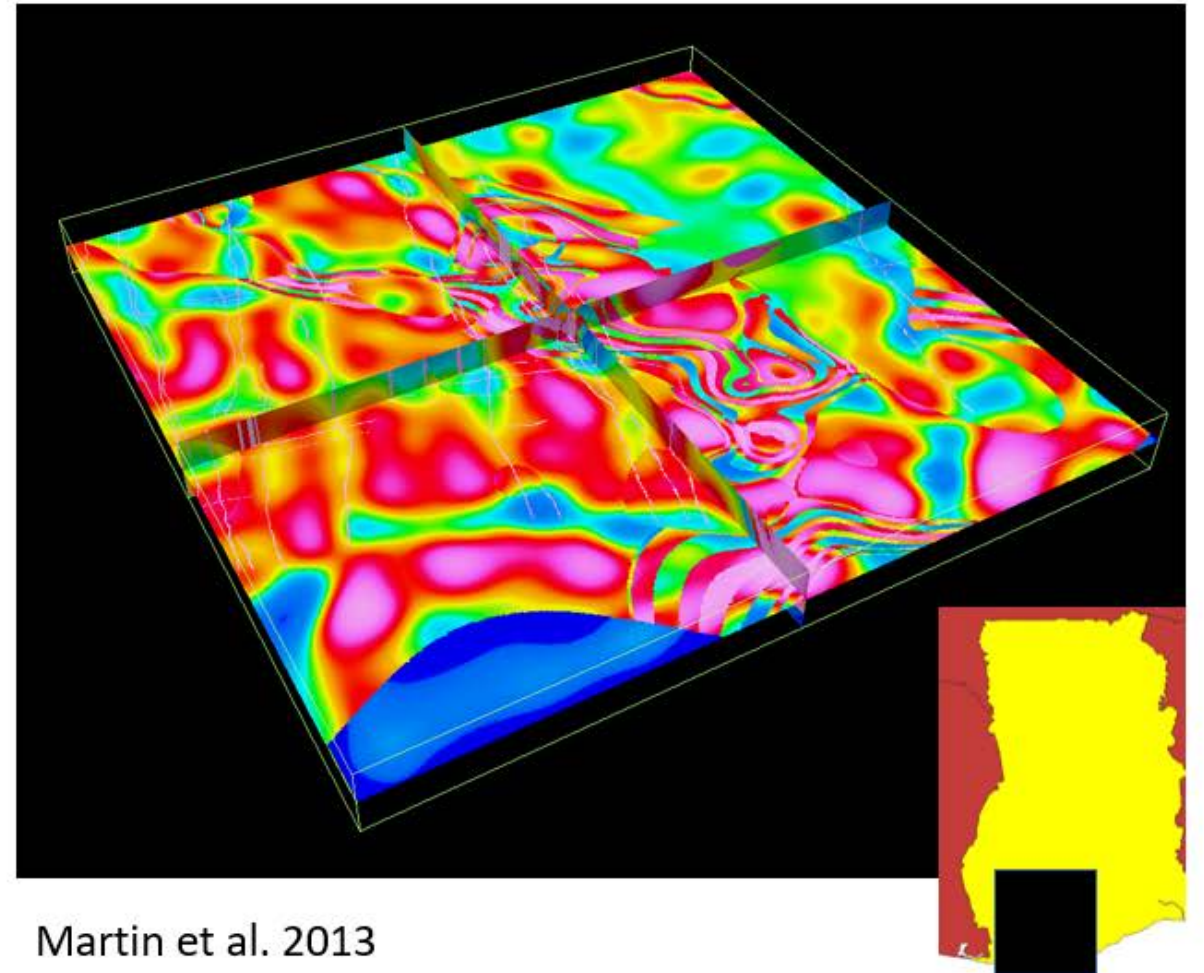


Gravity/Magnetics Inversion for Burkina Faso



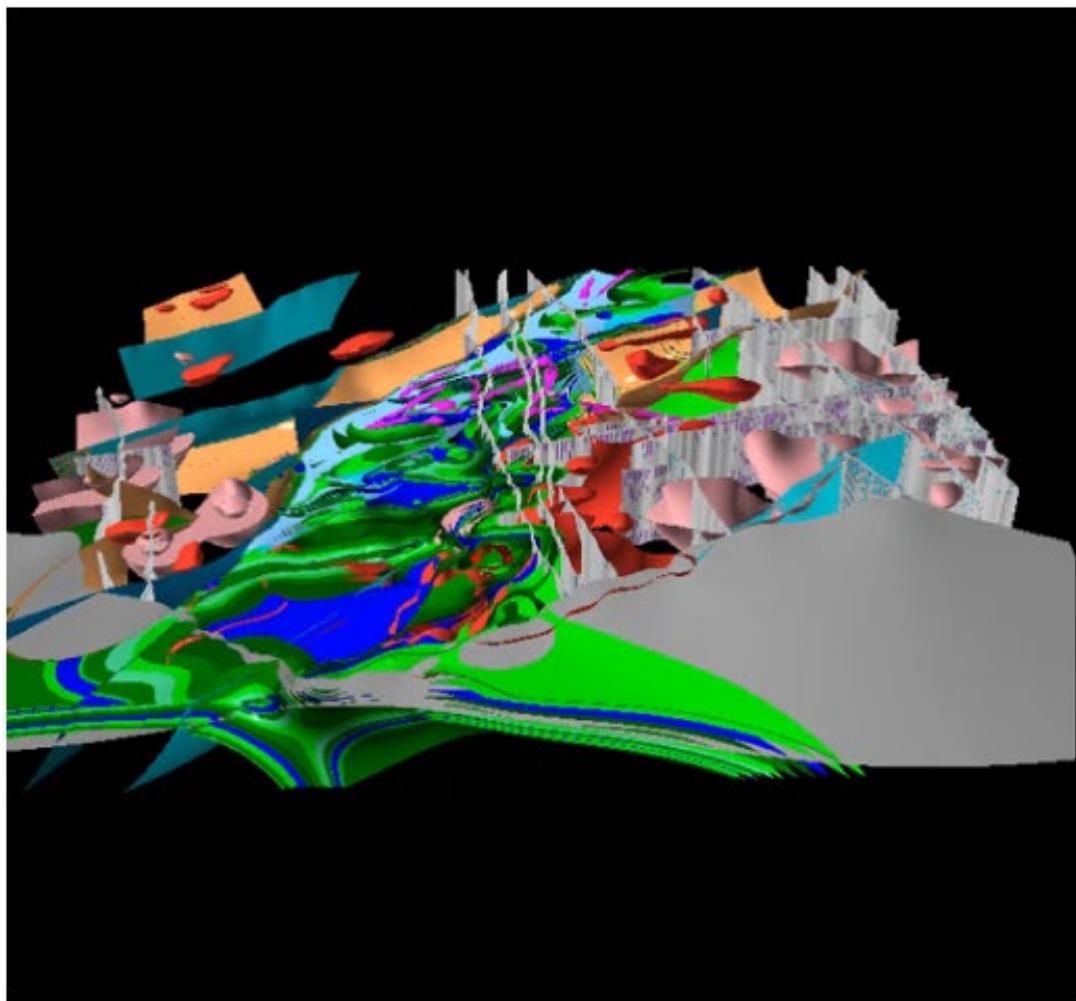
Gallardo unpublished

Gravity Inversion for SW Ghana

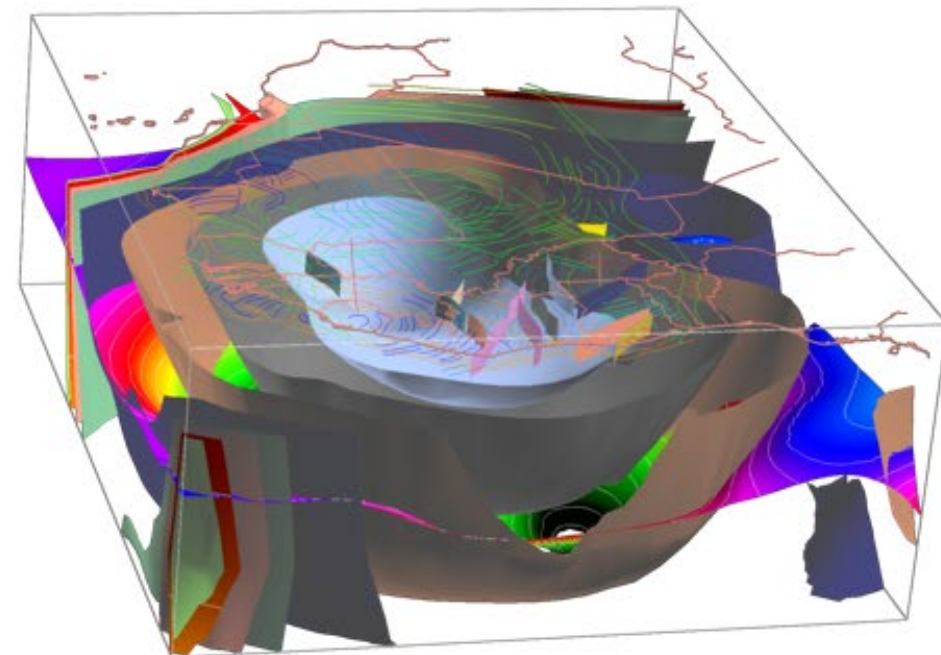


Martin et al. 2013

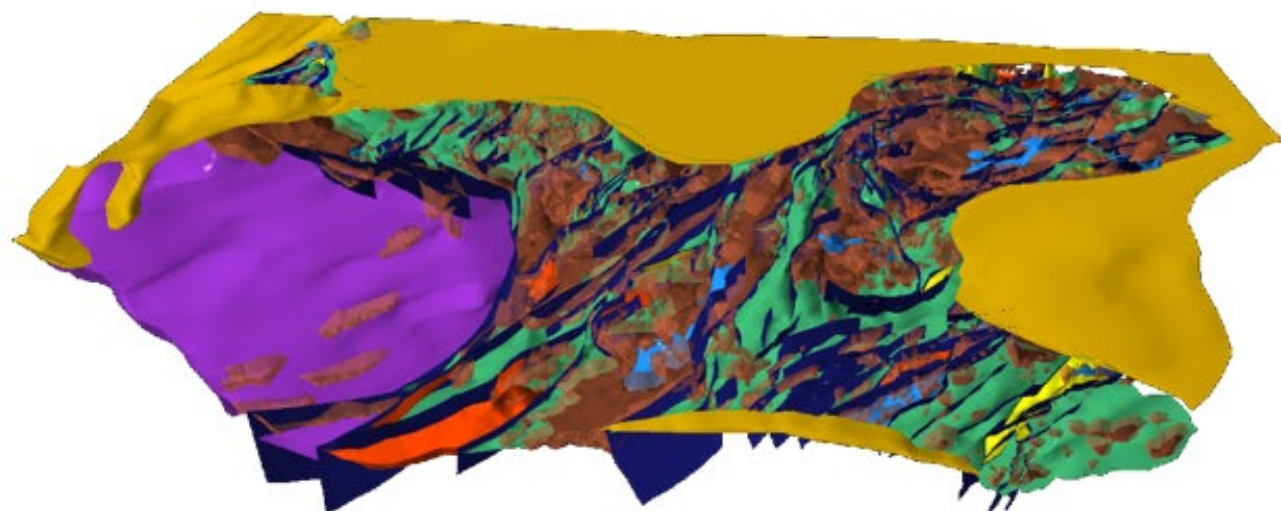
3D Model(s) of Craton



Perrouty et al, 2015



Jessell et al. 2016



van den Hove, 2018 unpublished

4. Tectonic scenarios

Geodynamic Atlas

Metamorphic Grade

Mineral Deposits

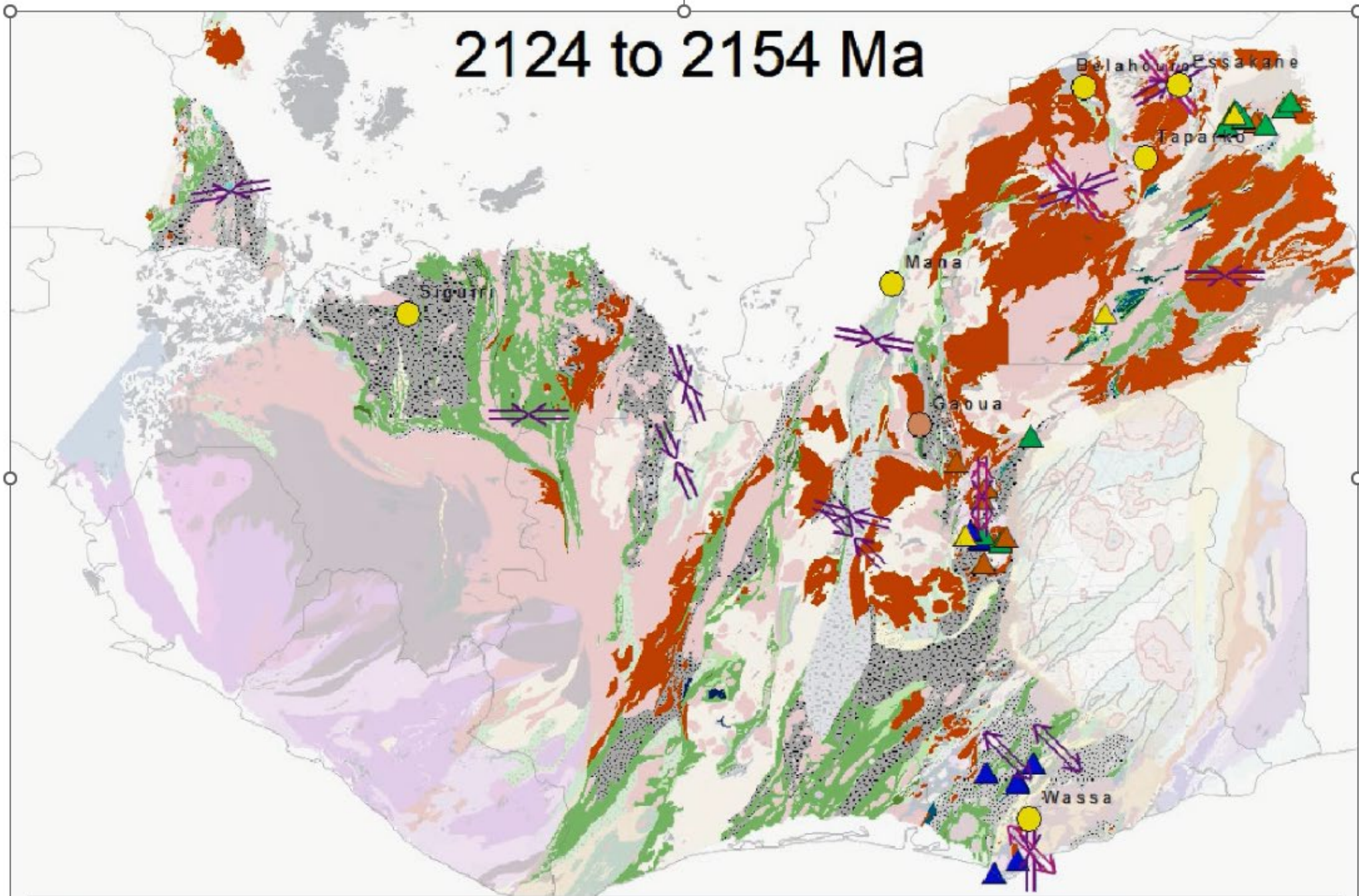
Intrusions

Deformation

Sed/Volc

200 Ma of tectonic and metallogenic evolution

2124 to 2154 Ma



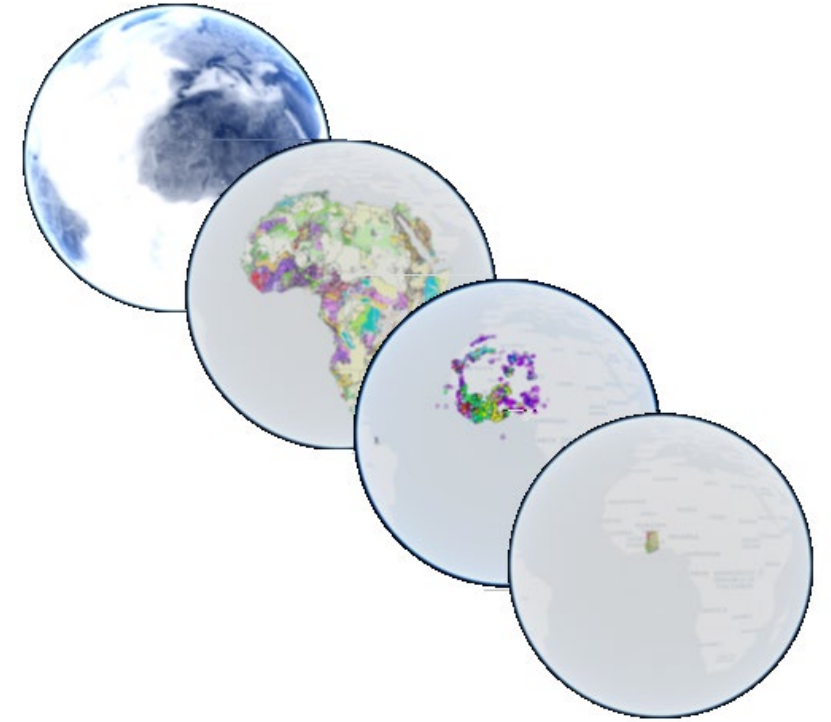
Data Delivery to Sponsors

4 Geographic Scopes:

- Country Level:
 - Burkina Faso, Mali, Liberia, Mauritania, Senegal, Ghana, Guinea, Cote d'Ivoire, Togo, Niger, Sierra Leone
- West Africa
- Africa
- Global

5 Thematic Scopes:

- Geography:
 - gazeteer, roads, rivers...
- Geology:
 - maps, structural point observations, geochronology, isotopic data, 3D models...
- Geophysics:
 - survey extents, line data, interpolated grids, inversions...
- Minerals:
 - mineral deposit databases...
- Tectonics:
 - plate boundaries, subduction zone models, paleomagnetic data...

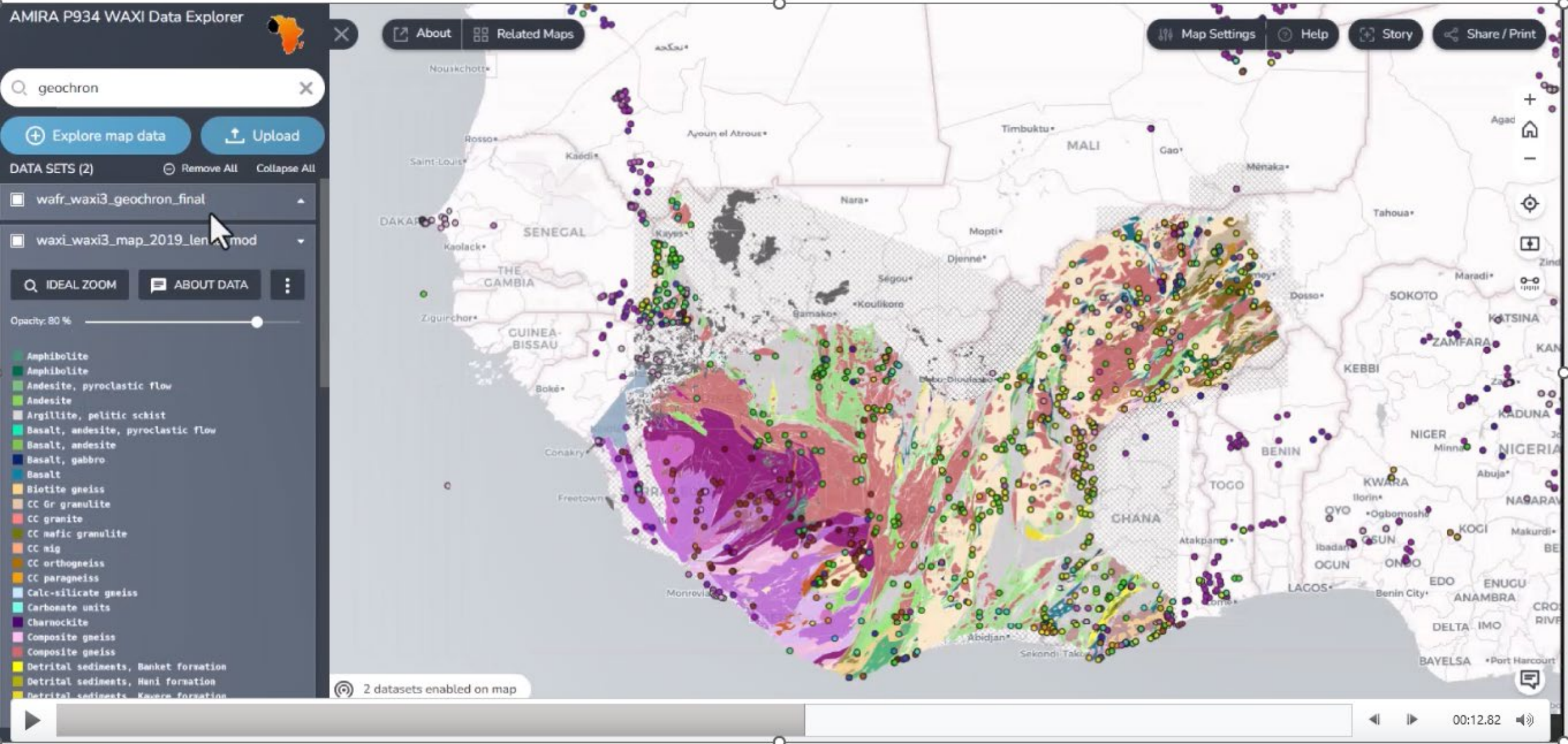


~900 GB GIS

**~350 vector and raster layers,
of which**

**170 are available for display
and download online**

900 GB WAXI GIS, on disk and online- 15 years of research



WAXI 4 Sponsors at Start-up

Companies

AngloGold Ashanti

Aura Energy

Barrick

Centamin

Endeavour

Gold Fields

Managem

Newmont

Perseus

Resolute

West African Governmental Agencies

Geological Survey - Sierra Leone

Centre de Recherche Géologique et Minière - Niger

Bureau des Mines et de la Géologie du Burkina Faso - Burkina

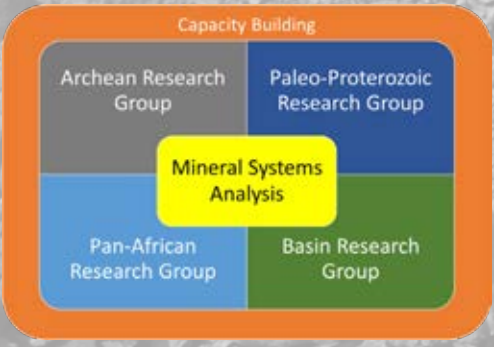
Direction Nationale de la Recherche Géologique - Guinée

Direction Générale des Mines et de la Géologie - Togo

Direction de Prospection et de la Promotion Minière - Sénégal

Service Géologique National du Sénégal

Ghana Geological Survey Organisation – Ghana



Modules that could be started with additional funding

New Commodities

- Lithium deposits
- Depositional setting and iron enrichment of Archean iron mineral systems
- Kimberlites, Diamonds and Xenoliths

New Systems

- Gold footprints dispersion in the regolith
- Pan-African margins of the WAC
- Basin sediments and stratigraphy
- Archean Reguibat Survey
- Structural interpretation of the Leo-Man Shield
- Tera region, Niger

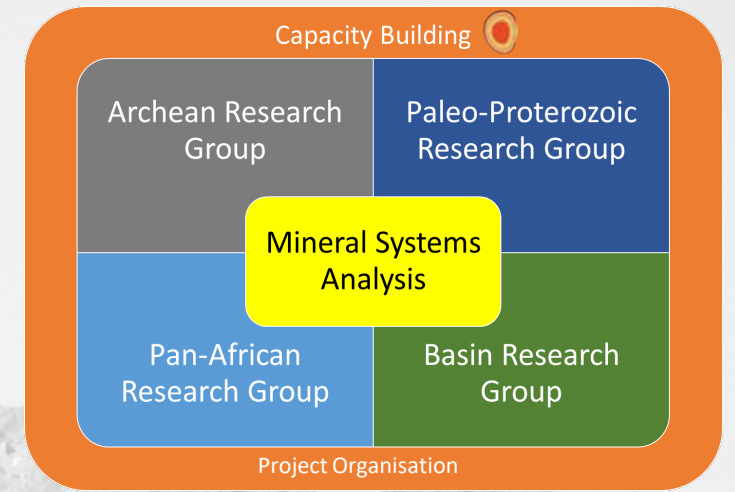
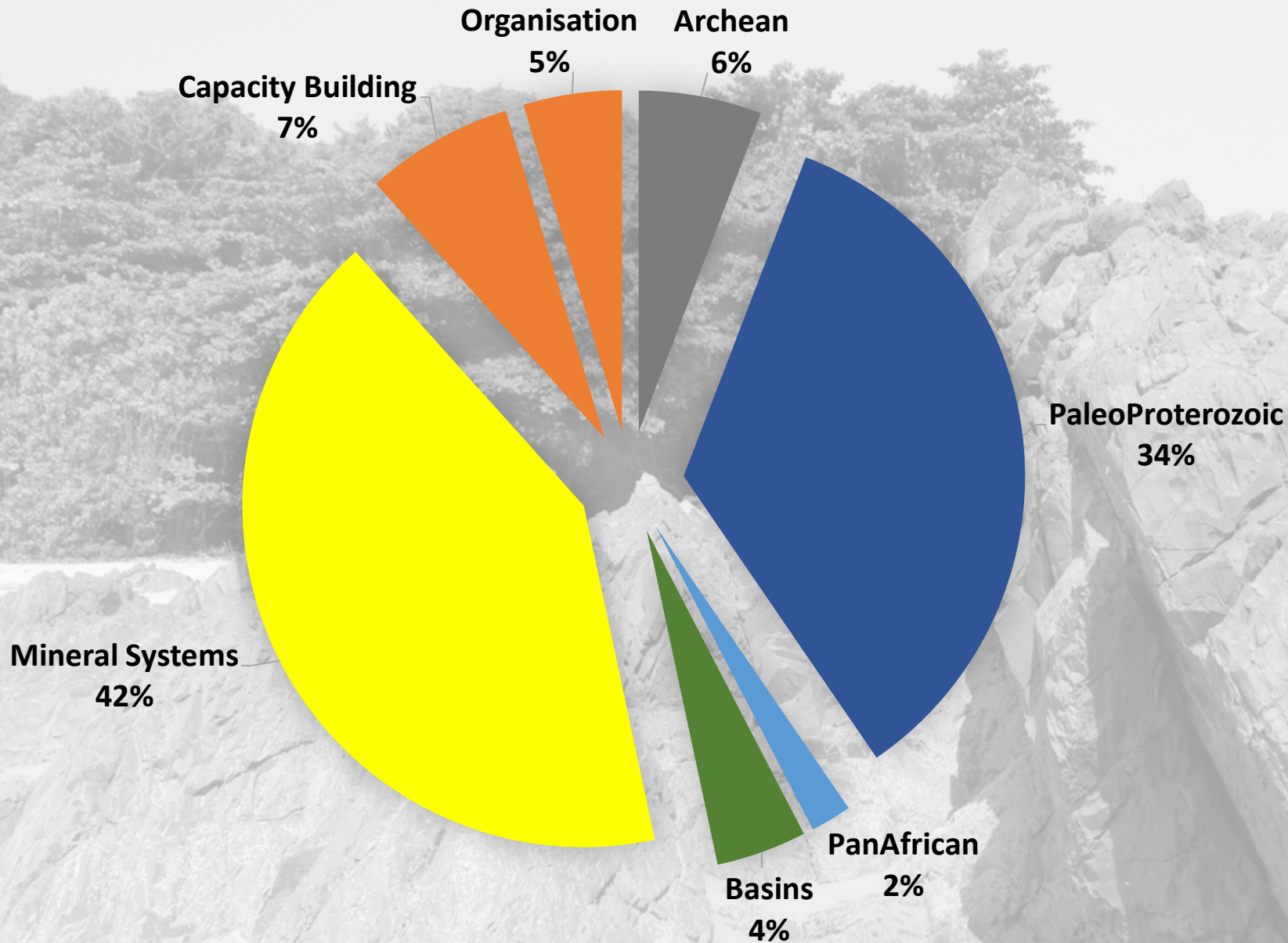
During WAXI 3, the distribution of strategic metals (Nb-Ta-Li-Sn) and uranium associated with magmatic systems has been characterised at the craton scale. Granite and pegmatite fields from Paleoproterozoic domains were studied for their rare metal fertility and geological context of emplacement.



Objectives of Lithium Deposits Module in WAXI 4:

- 1) Compile existing geochemical data on metasedimentary rocks associated with Li pegmatites visited during WAXI 3. Such data can serve as geochemical tools for exploration as lithium is known to occur in metasomatic haloes around mineralised pegmatites.
- 2) Better understand the genetic link between peraluminous granitic suites and associated lithium-rich pegmatites, by applying systematic geochronology and radiogenic isotope analyses on granite and pegmatite accessory minerals.
- 3) Study Li pegmatites in the Archean, in collaboration with the British Geological Survey (LiFT project).

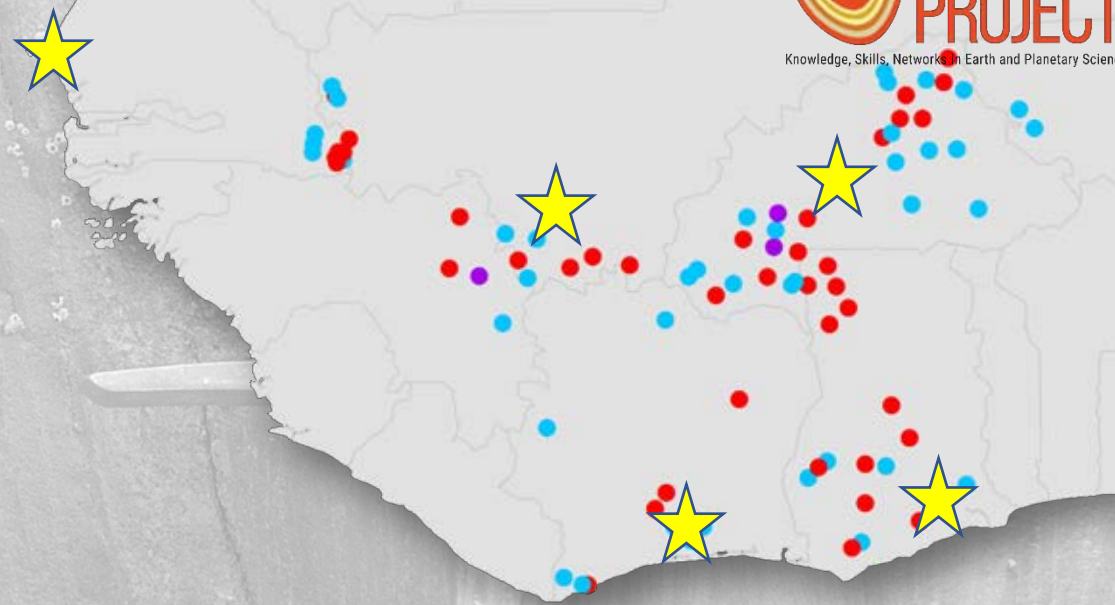
Project Costs



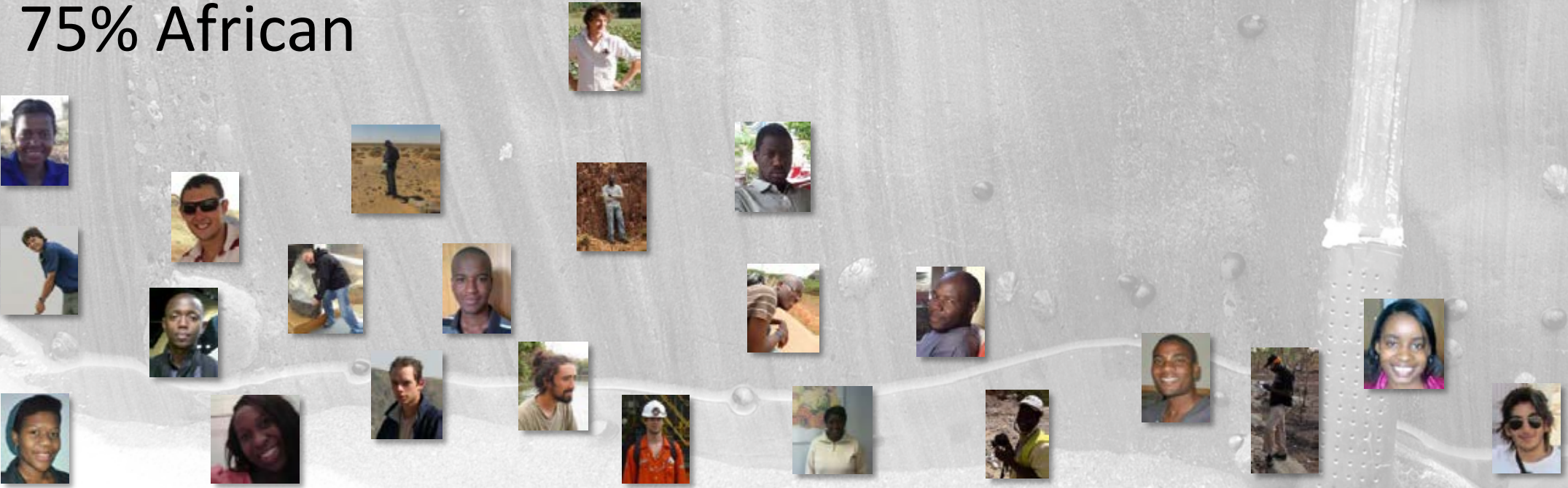
2. Support for professional and research training

A new pool of qualified geoscientists applied to mineral exploration in West Africa

156 MSc, PhD and Postdoc projects
75% African



-  Hons/MSc
-  PhD
-  Postdoc
-  WAXI-trained ECR

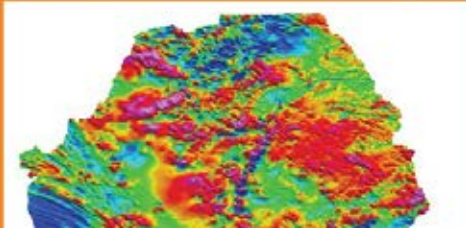




Annual Student Scholarships
Annual Research Grants



Structural Geophysics



Agate/WAXI Training

23rd - 27th Feb 2023
Freetown, Sierra Leone

Geophysical and structural approach to lithotectonic mapping of sedimentary basins

Agate/WAXI Training

2nd - 6th Oct 2023
Accra, Ghana

Structural geology, regional geophysics and portable instruments for field mapping



Agate/WAXI Training

3rd - 8th April 2023
Abidjan, Côte d'Ivoire

Lithostratigraphic and structural analysis of Precambrian terranes



Agate/WAXI Training

14 to 20 October 2023
Yamoussoukro, Cote d'Ivoire

Magmatism and Geodynamic context

Agate/WAXI Training

18th - 23rd April 2023
Abidjan, Côte d'Ivoire

Inversion of regional Grav-Mag data

Agate/WAXI Training

16-18 Oct 2023
Abidjan, Cote d'Ivoire

Introduction to the use of Python in mining exploration



Agate Training

2nd-6th Oct 2023
Marrakesh, Morocco

Potential New 2024 Courses

Management in Mineral Exploration *Franey*
Field Mapping using QGIS/QFIELD *Perret*
Structural and Applied Geology in the Mine *Thebaud*

Key Benefits for WAXI 4 Sponsors

- **Leadership** in direction of research strategies across the region
- **Access** to WAXI 1-3 data and reports. New and newly compiled datasets in GIS formats ready for integration into company's exploration targeting programs.
- First access to the latest **ideas** on the formation and reworking of the West African Craton and its margins in the context of mineralisation.
- Support for the next generation of company, academic and government personnel, thanks to the **Capacity Building** program.
- Preferential access to custom **professional courses** for their staff, using the latest techniques and ideas, and based on local datasets.

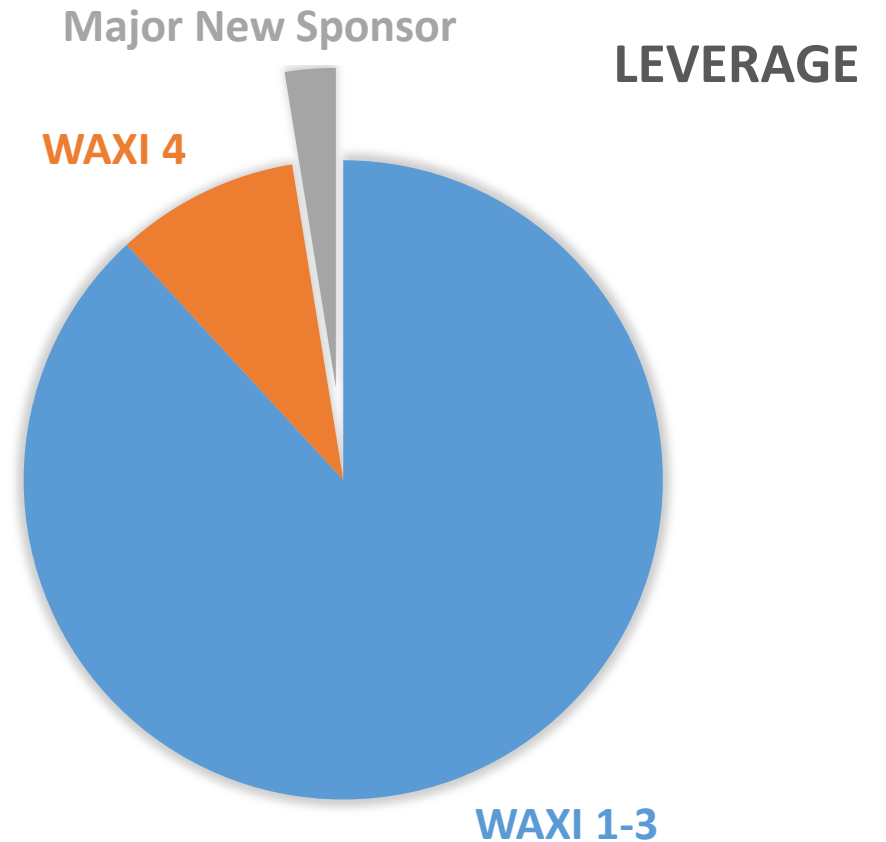


What ChatGPT Says...

- **Access to a collaborative platform:** Sponsoring companies gain access to a collaborative platform where they can engage with government bodies, research institutions, and other industry stakeholders in West Africa.
- **Networking opportunities:** WAXI provides networking opportunities for sponsor companies to connect with potential partners, investors, and local professionals in the exploration sector.
- **Reduced exploration costs:** By participating in WAXI, sponsor companies can benefit from cost-sharing initiatives, shared research, and data exchange, which can reduce their exploration costs.
- **Exposure to new opportunities:** The initiative exposes sponsor companies to new exploration opportunities in West Africa, allowing them to expand their portfolio and potentially discover new mineral deposits.
- **Attraction of investment:** Sponsoring WAXI demonstrates a commitment to exploration in West Africa, attracting potential investors and partners who recognize the value of the initiative.
- **Enhanced reputation:** Sponsoring WAXI showcases a company's commitment to sustainable exploration practices and responsible resource development, enhancing its reputation in the industry and among local communities.
- **Access to research and knowledge:** Sponsoring companies gain access to research findings, geological surveys, and valuable knowledge about West Africa's geology and mineral resources, providing them with a competitive edge in their exploration activities.
- **Capacity building:** WAXI offers training programs and workshops, enabling sponsor companies to enhance the skills and expertise of their staff in exploration geology and mining, leading to improved operational efficiency.
- **Influence and engagement:** Sponsor companies have the opportunity to contribute to the decision-making process of WAXI and influence the direction of exploration initiatives in West Africa, ensuring their interests are represented.
- **Market expansion:** Successful exploration outcomes through WAXI can open doors for sponsor companies to access new markets and commercial opportunities in West Africa's mining sector.

Leverage for new sponsors

- New sponsors to WAXI 4 immediate gain access to the results of \$9.5M past WAXI research plus and will get quarterly updates to the next 3 years of research totalling at least another \$2M
- New major sponsors are thus getting a total of \$11.5M worth of research and training for \$92K per annum or a leverage of over 40:1
- Worth noting that two-thirds of companies that have indicated that they will join WAXI 4 are returning sponsors, so they think it is worth joining even though they have all the results from WAXI 1-3





COLLABORATION PARTNERS

- 40 Industry Sponsors
- 12 In-kind Sponsors
- 23 R&D Partners

CAPACITY BUILDING
Postdoc, PhD, MSc and Hons
students, 70% are African



INTERNATIONAL
PUBLICATIONS

120

75

140

COUNTRIES

12



WAXI

2006 - 2018

INVESTMENT

- US\$8.5M from Industry
- US\$1M from Governments
- Substantial in-kind contributions

9.5M

DATA GATHERING

- 650GB exploration geoscience database
- Geodynamic Atlas
- 650,000 km² geophysically-constrained geological map

650

WAXI Annual Sponsors Meeting

12th & 13th October 2023 Abidjan, Côte d'Ivoire

- Presentation of updated GIS
- Presentations by all modules
- Future directions
- Choice of training modules for 2024



WAXI

West African Exploration Initiative

Sponsor Category	Eligibility	Annual / Total Sponsorship US\$ (excl. GST if applicable)
Existing Major sponsor	Companies with capitalisation of >US\$250M	74,500/223,500
Existing Minor sponsor	Only companies with capitalisation of ≤US\$250M	52,500/157,500
Existing Junior sponsor	Only companies with capitalisation of ≤US\$250M, who are not a subsidiary of a producer and with no operating mine anywhere	22,000/66,000
New Major sponsor	Companies with capitalisation of >US\$250M	92,000/276,000
New Minor sponsor	Only companies with capitalisation of ≤US\$250M	65,000/195,000
New Junior sponsor	Only companies with capitalisation of ≤US\$250M, who are not a subsidiary of a producer and with no operating mine anywhere	28,500/85,500
Sponsor-in-kind	Restricted to West African Geological Survey organisations	n/a

Plus AMIRA Membership





Next WAXI Annual Sponsors Meeting

- 12th & 13th October 2023 Abidjan, Côte d'Ivoire
- Presentation of updated GIS
- Presentations by all modules
- Future research directions