



Swedish Metals & Minerals

impact innovation

TECTONiSM*

- State-of-the-Art
- Project P2025-208719
- Coordinator Luleå University of Technology (LTU)
- Presenter Joel BH Andersson, LTU

* **Tectonic controls on critical raw material prospectivity in mafic intrusions - towards a mineral systems model for Ni–Cu–(± Co ± PGE) in northern Sweden**

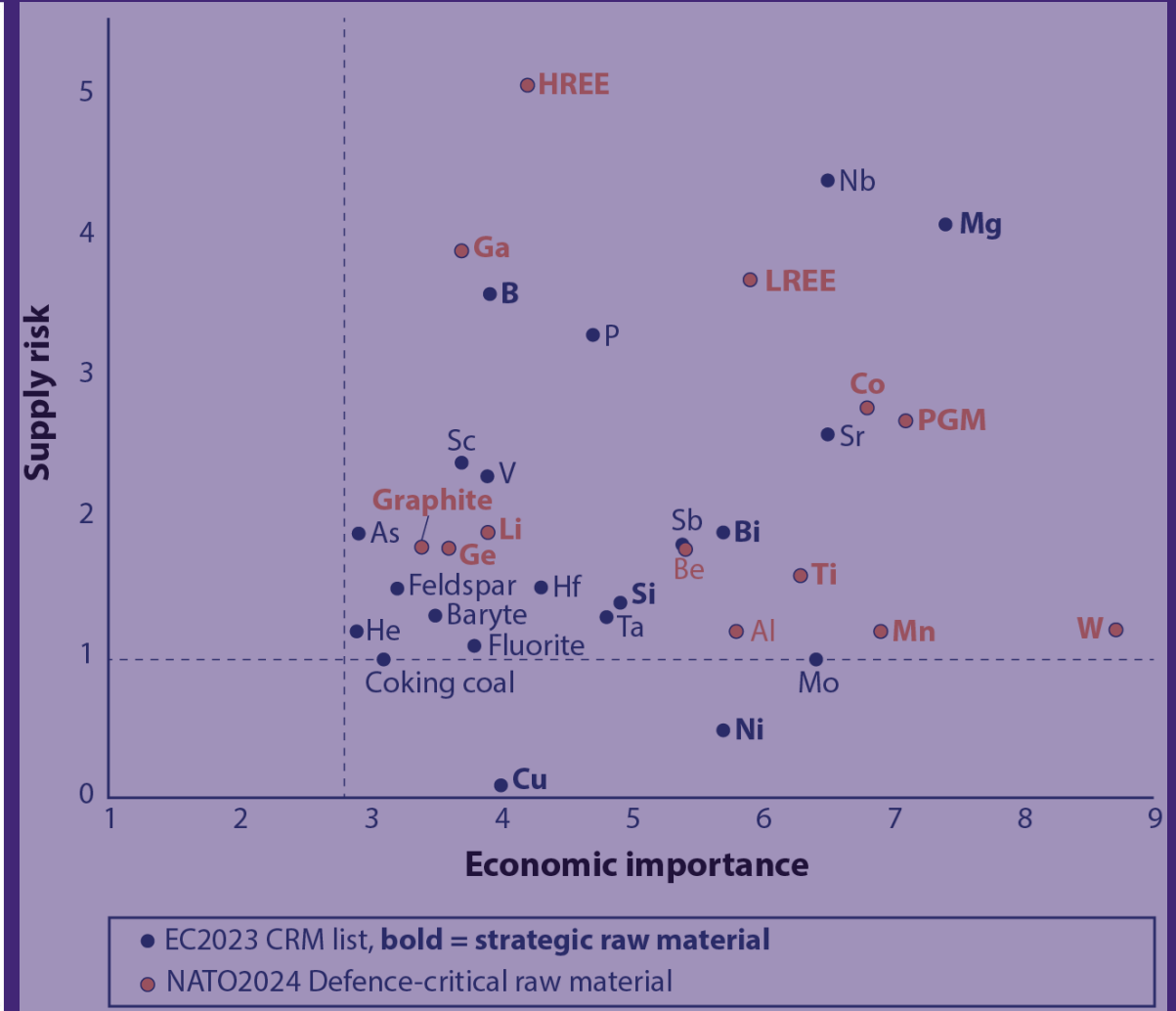
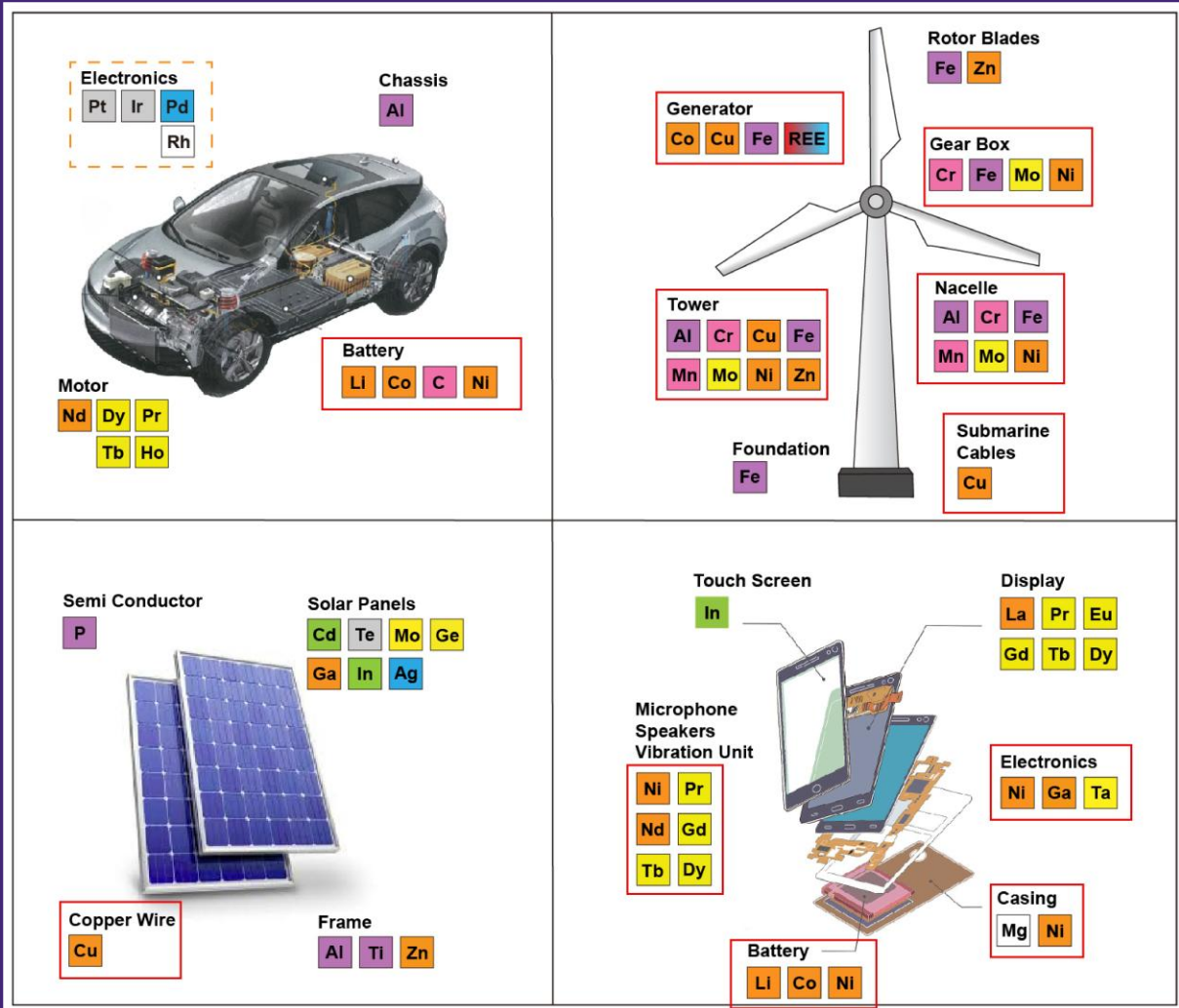
LULEÅ
TEKNISKA
UNIVERSITET

BOLIDEN

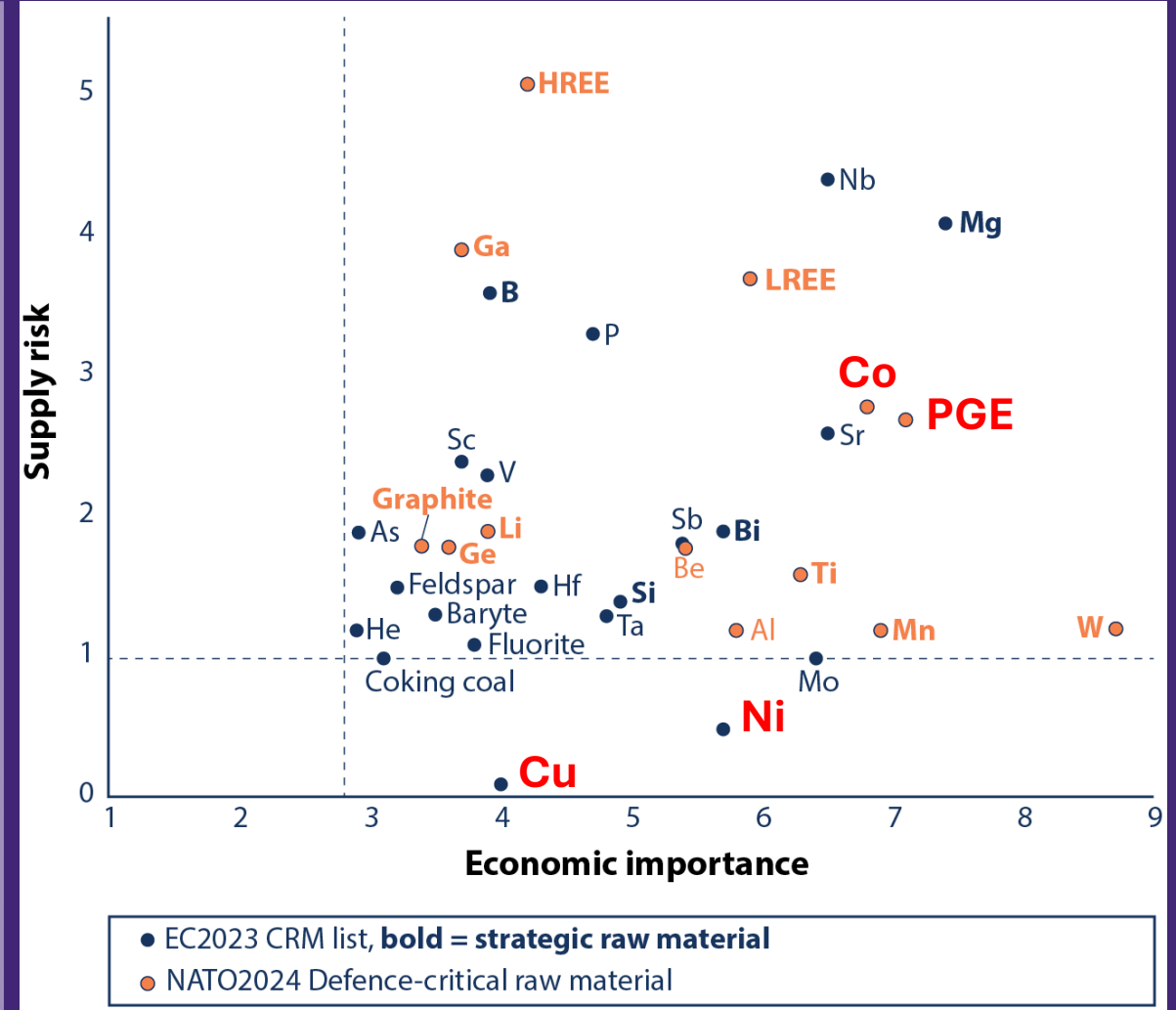
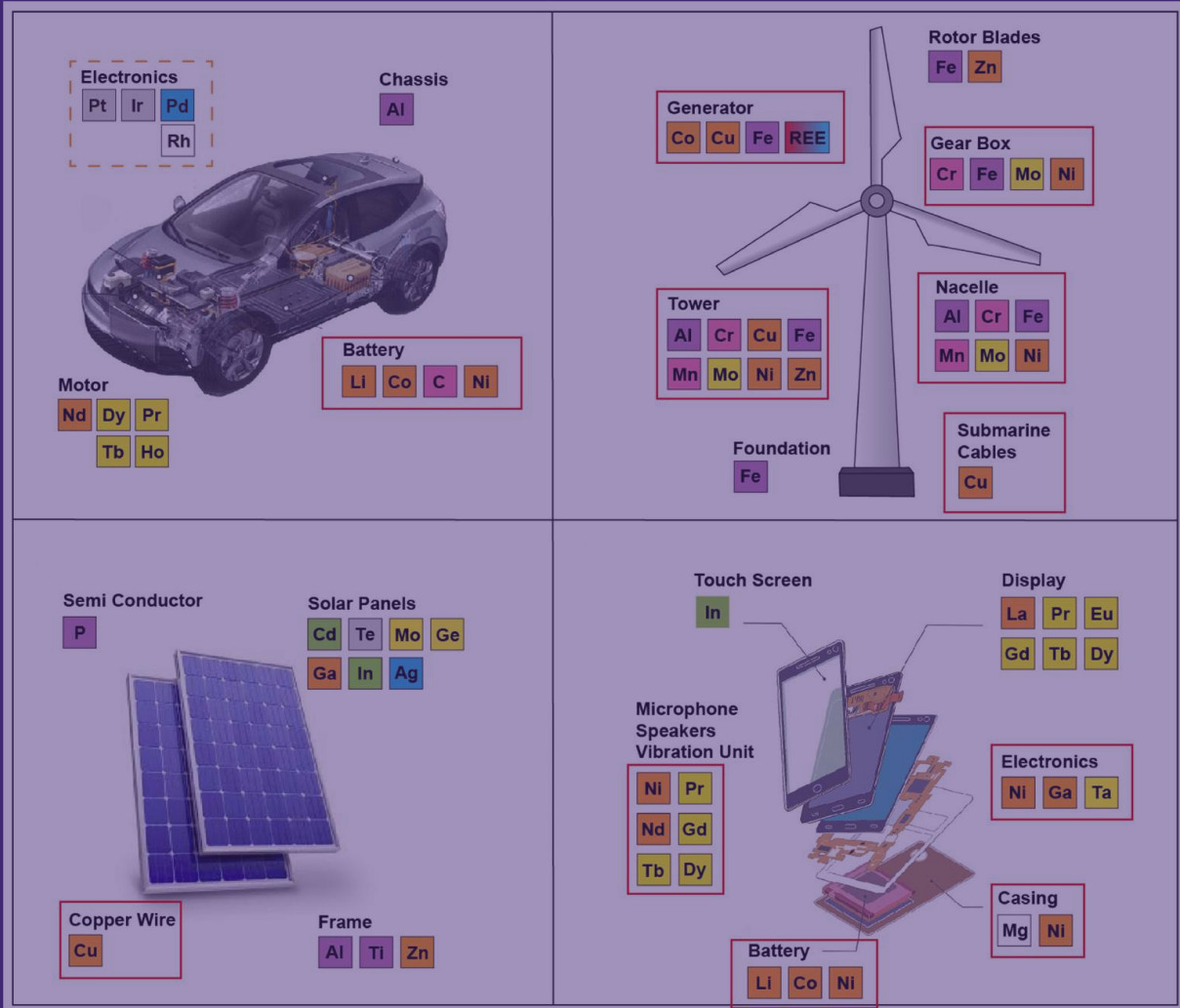


OREXPLORE

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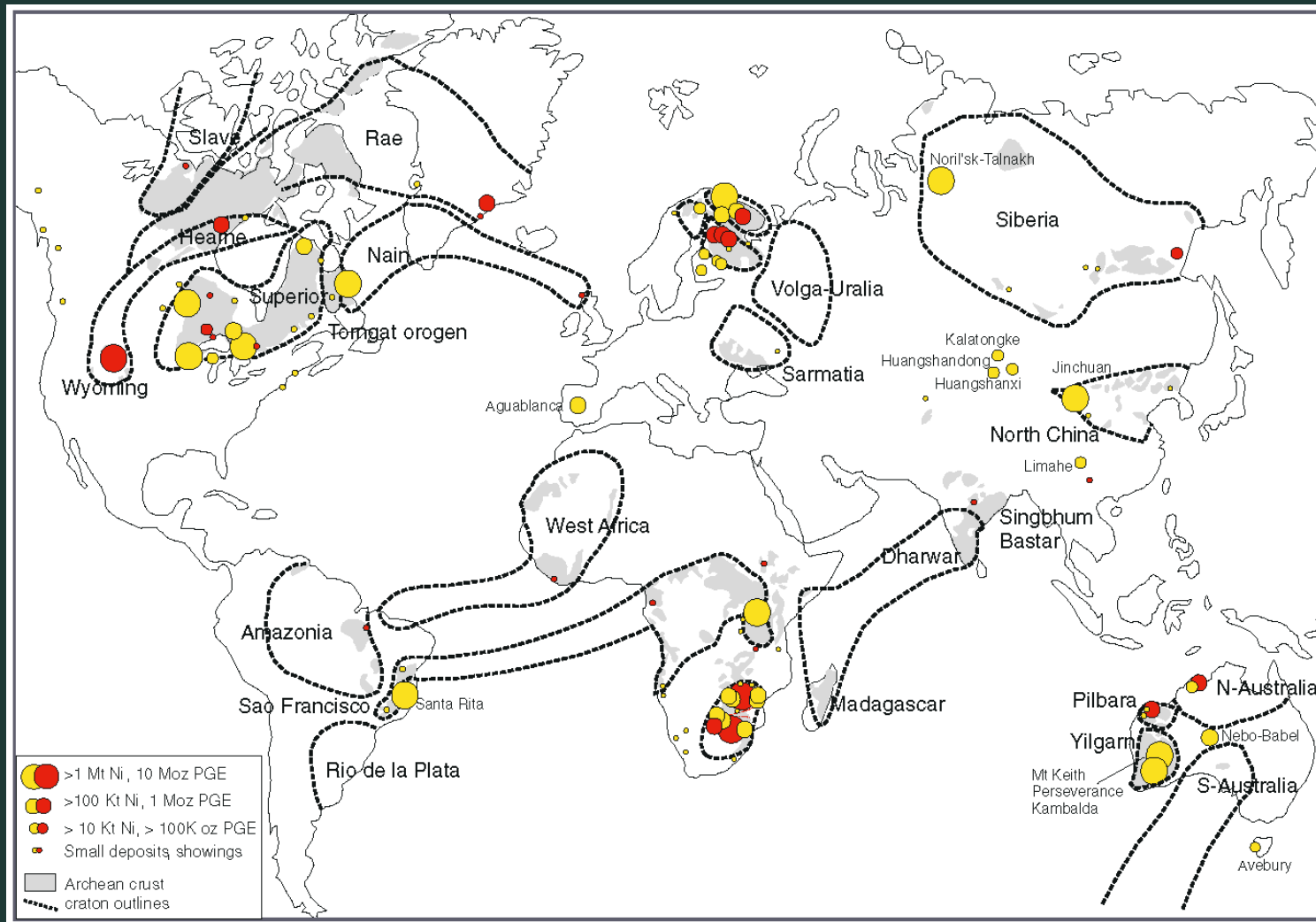


Rising demand and criticality of Ni-Cu-Co-PGE

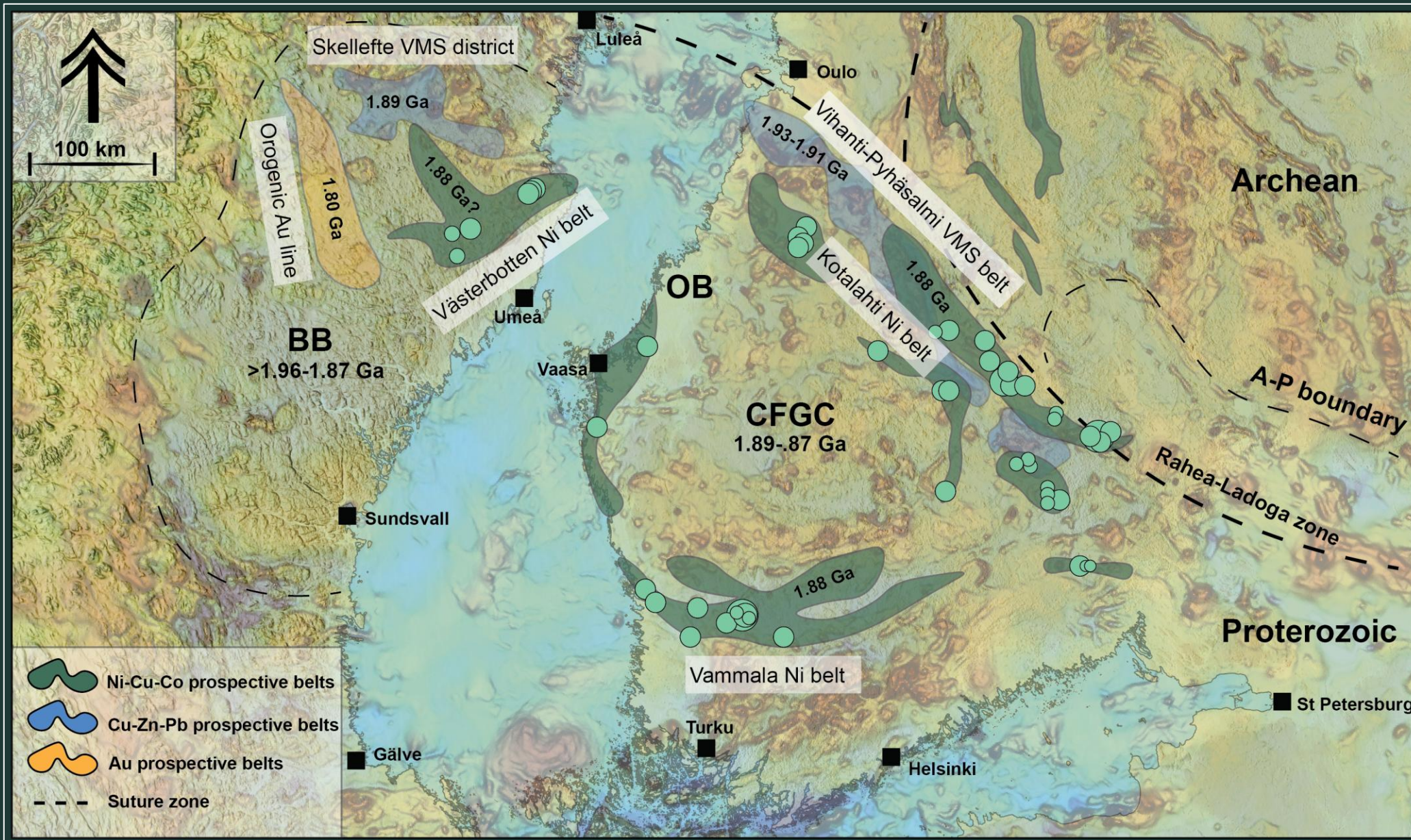


Rising demand and criticality of Ni–Cu–Co–PGE

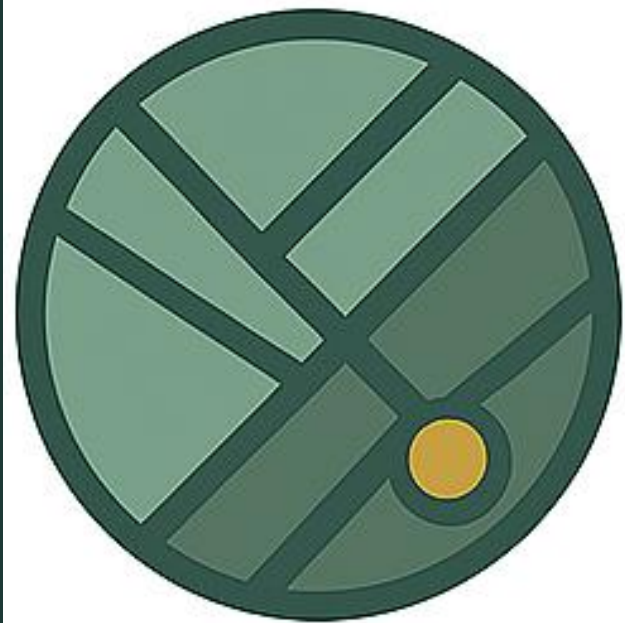
Geology controls both Ni–Cu–(± Co ± PGE) resources and global centres of expertise



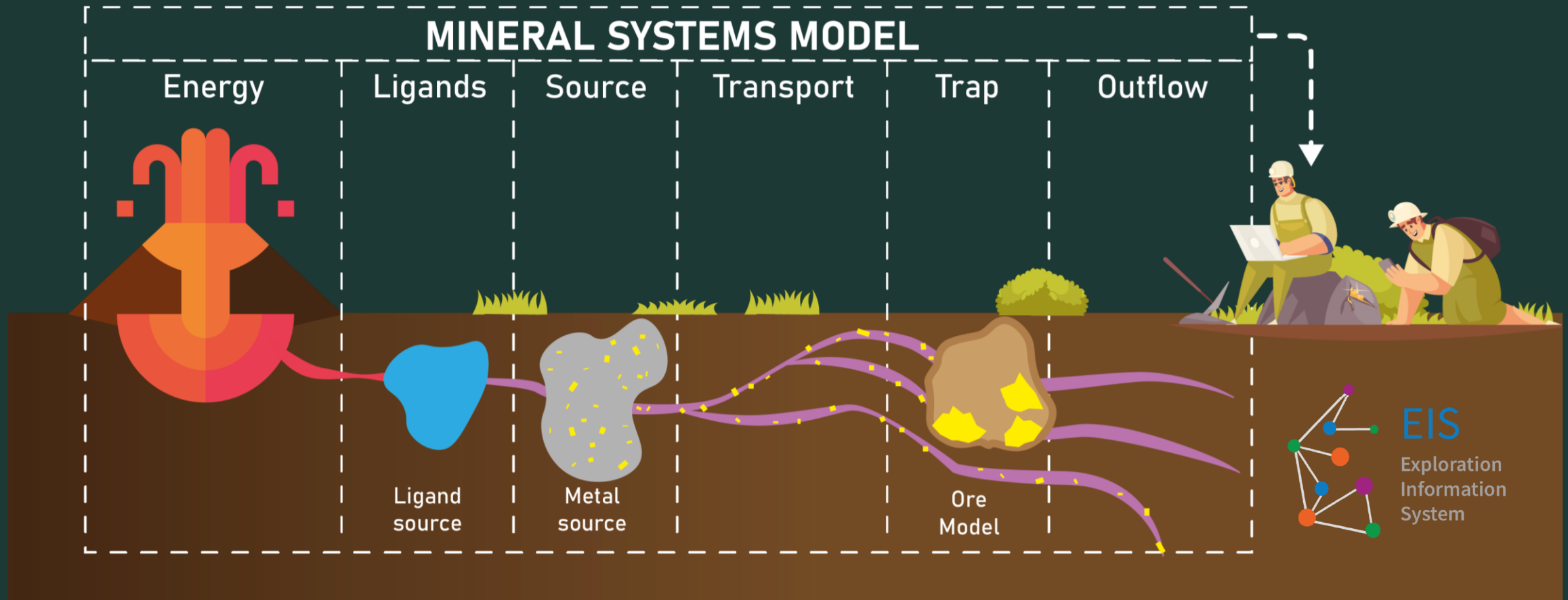
From Maier & Groves (2011)



Tectonic controls on critical raw material prospectivity in mafic intrusions - towards a mineral systems model for **Ni–Cu–(±Co±PGE)** in northern Sweden



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Data integration is the single most important outcome of the State-of-the-Art report

LARGE SCALE

Regional context

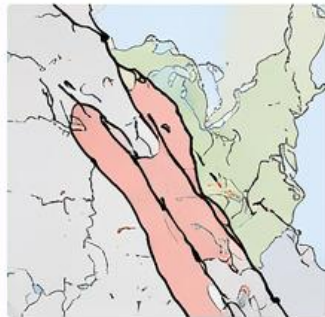
SMALL SCALE

Detailed understanding

Scale of analysis

100e – 1000s km

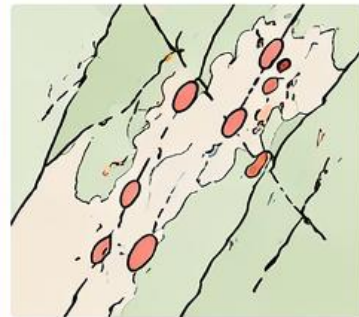
1. LITHOSPHERIC SCALE (100s – 1000s km)



- Tectonic setting
- Crustal architecture
- Major structures
- Magmatic provinces

10s – 100s km

2. PROVINCE / DISTRICT SCALE (10s – 100s km)



- Structural corridors
- Magma pathways
- Fertile intrusion clusters
- Regional fluid flow

1s – 10s km

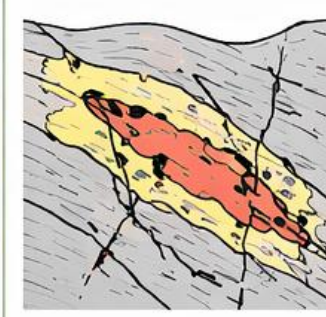
3. INTRUSION / CAMP SCALE (1s – 10s km)



- Intrusion architecture
- Conduit systems
- Structural traps
- Sulfide saturation

10s – 1000s m

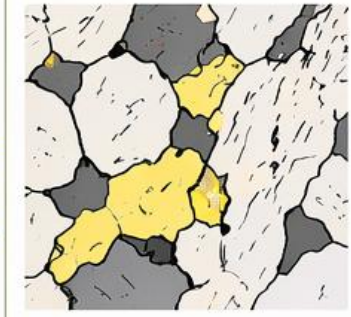
4. DEPOSIT SCALE (10s – 1000s m)



- Orebody geometry
- Deformation & remobilization
- Fluid flow & focusing
- Grade distribution

μm – mm

5. MINERAL / MICRO SCALE (μm – mm)

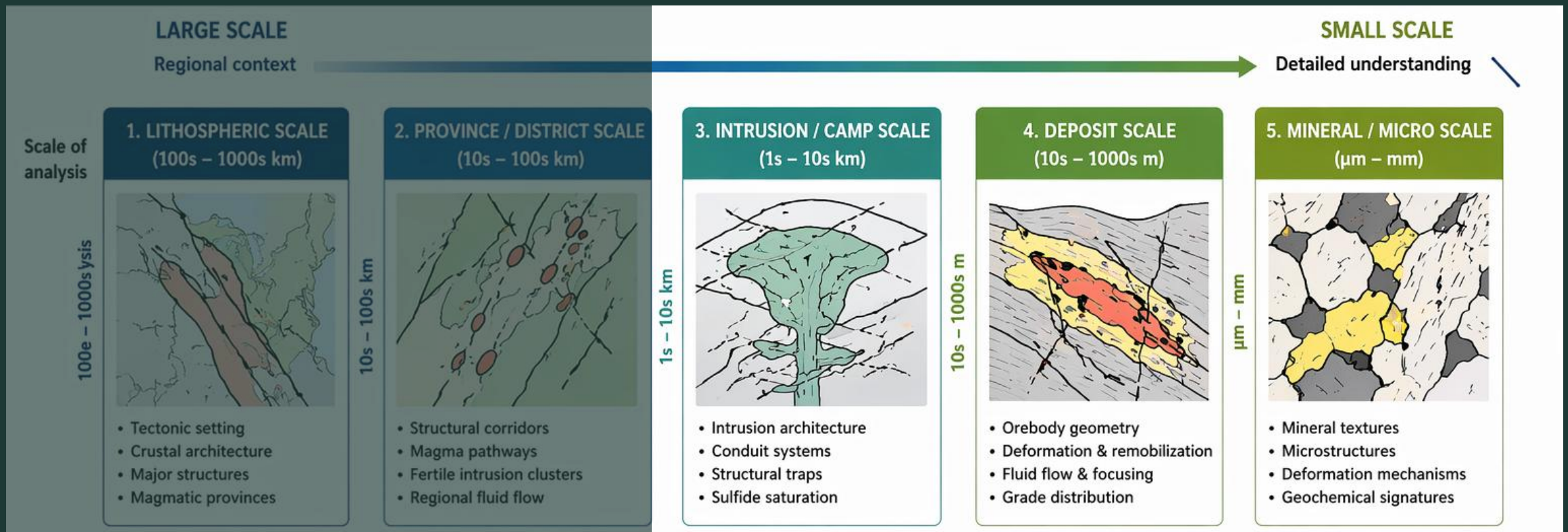


- Mineral textures
- Microstructures
- Deformation mechanisms
- Geochemical signatures

Data integration is the single most important outcome of the State-of-the-Art report

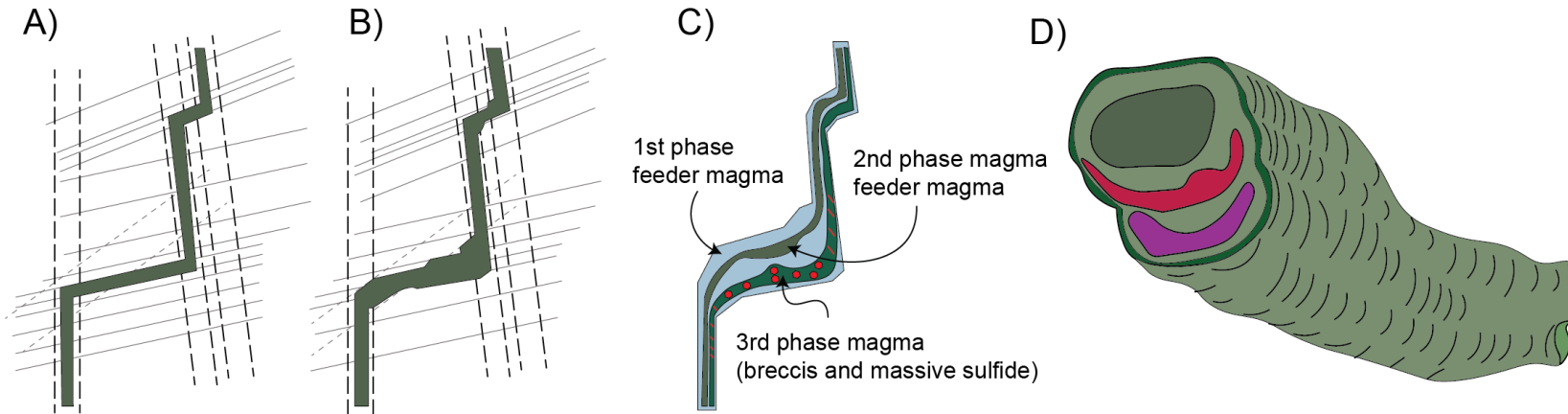
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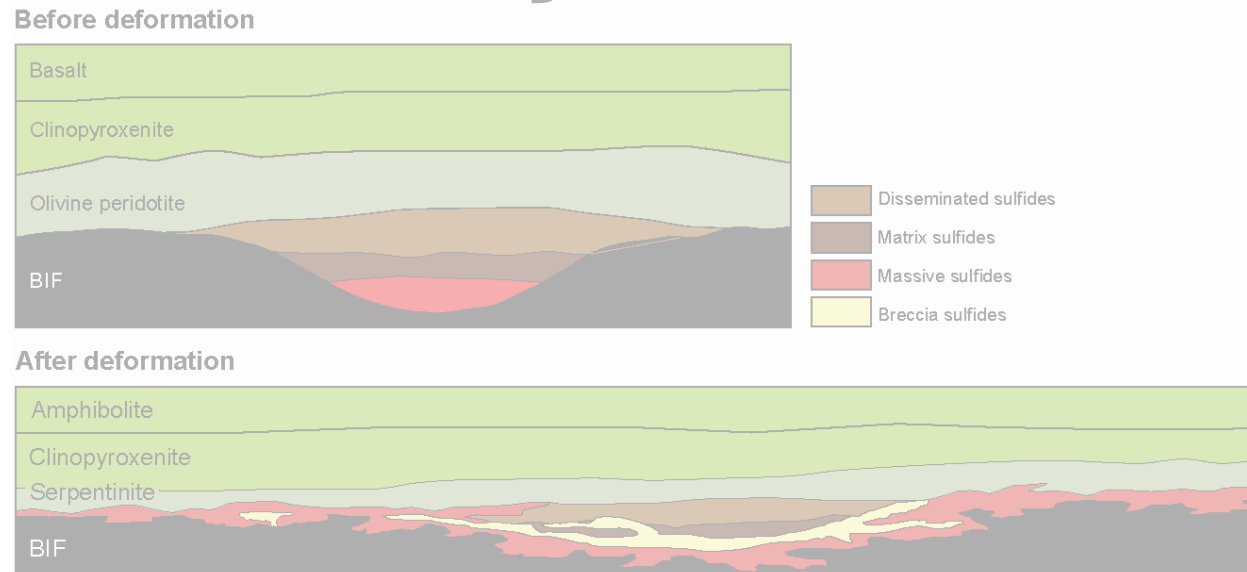
Data integration is the single most important outcome of the State-of-the-Art report

Primary structural control



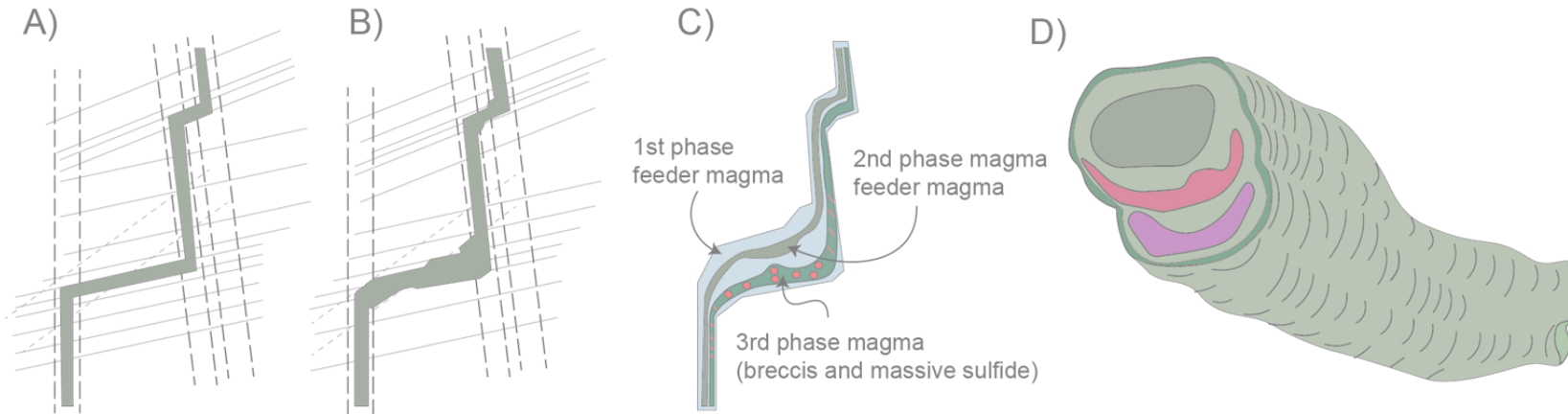
Modified after Barnes et al. (2016)

Secondary structural control



From Duuring (2025) after Brenner et al. (1990)

Primary structural control



Modified after Barnes et al. (2016)

Secondary structural control

Before deformation



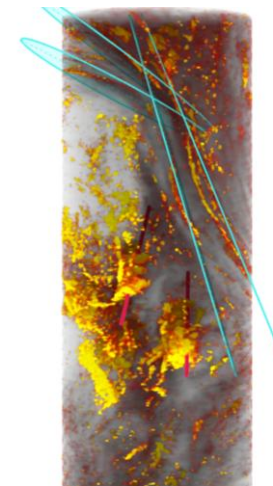
After deformation



From Duuring (2025) after Brenner et al. (1990)



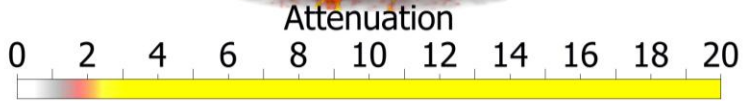
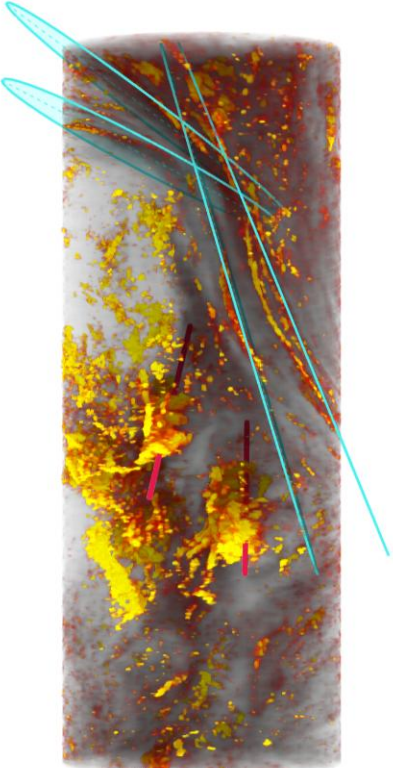
The GeoCore X10[®]



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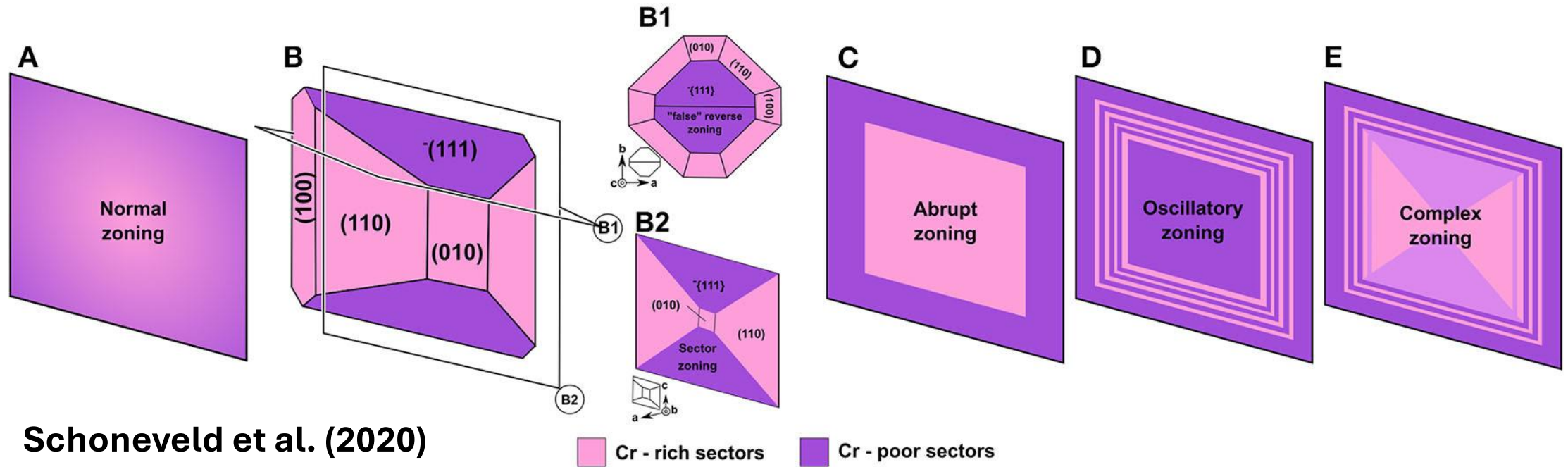
X-ray computed tomography (XCT) + X-ray fluorescence (XRF)

The GeoCore X10[®]

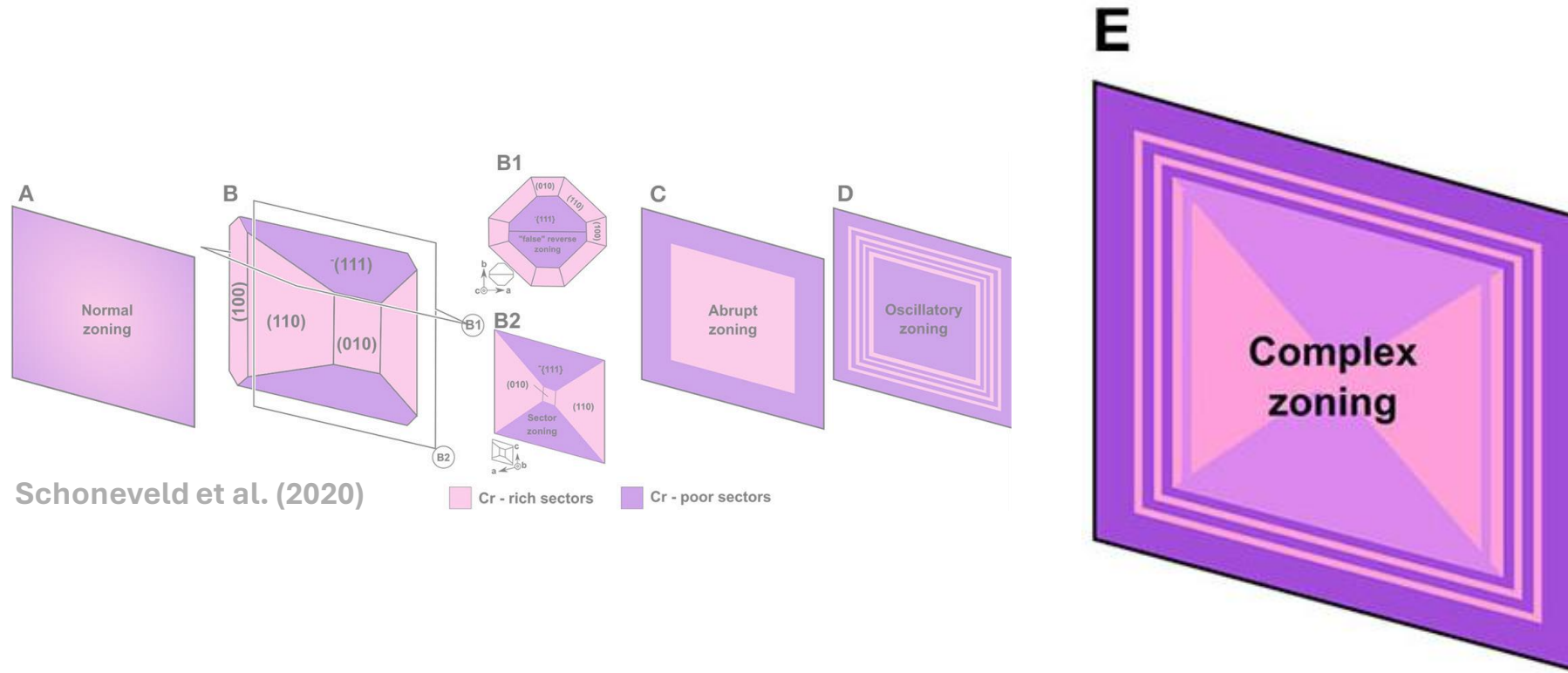


X-ray computed tomography (XCT) + X-ray fluorescence (XRF)

Cr-zonation in pyroxene



Cr-zonation in pyroxene



Textural vector to mineralization!



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