

Critical Mineral Exploration Based on Digital Twin & Collaboration with Australia

Oct. 30th, 2023

Gyesoon Park

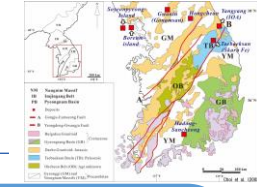
Head of Mineral Exploration and Mining
Research Center

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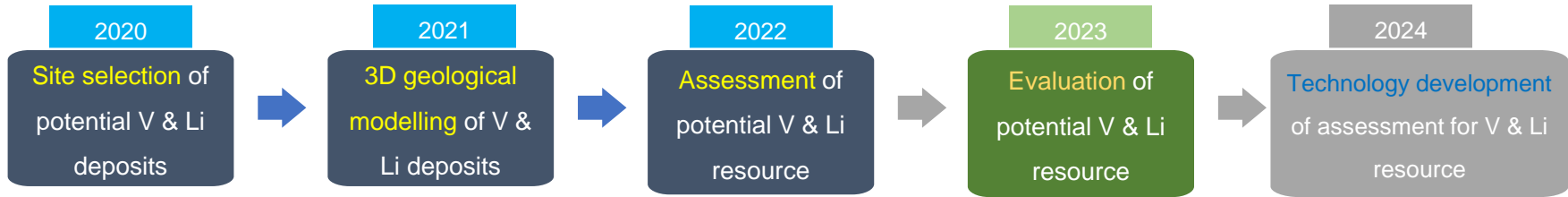
- | **1** | **Critical Mineral Exploration Based on Digital Twin**
- | **2** | **Cooperation with Australia in the Field of Mineral Resources**

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Critical Mineral Exploration Based on Digital Twin



Evaluation of mineral resources(V, Li) based on Digital-twin



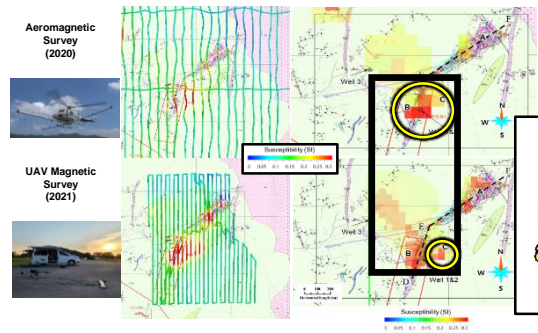
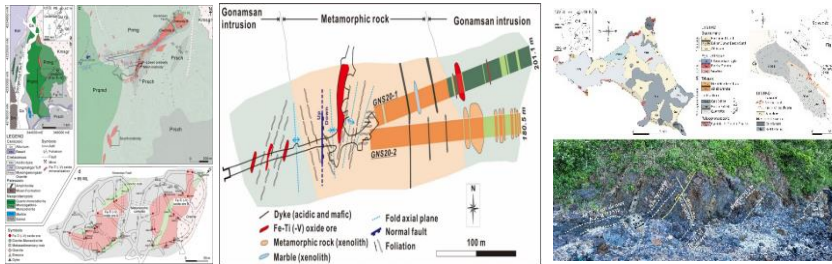
Vanadium project

- Selection of potential VTM deposits by analyzing **geophysical and geological data in multi-scale**
- Geological survey in the Gwanin VTM deposit
- Analysis of aeromagnetic data in the Gwanin VTM deposit
- Drilling planning and drilling investigation (600m)

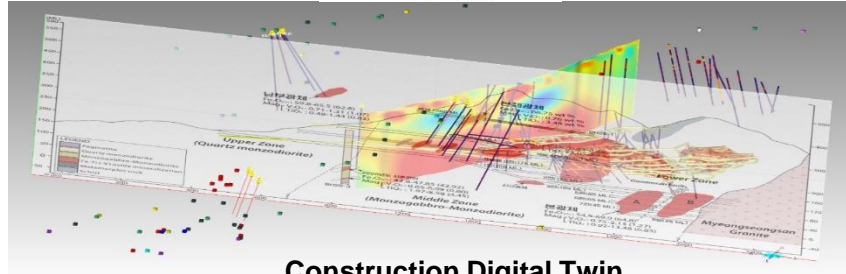
Site selection of potential VTM deposits

- Geologic mapping of diorite complex
- Database digitization of survey and drilling results using **3D geological modelling platform**
- Precise analysis of drone magnetic data in the Gwanin VTM deposit
- Production of hyperspectral, rock physics library of rocks

3D mineral assessment of VTM deposits based on Digital-twin



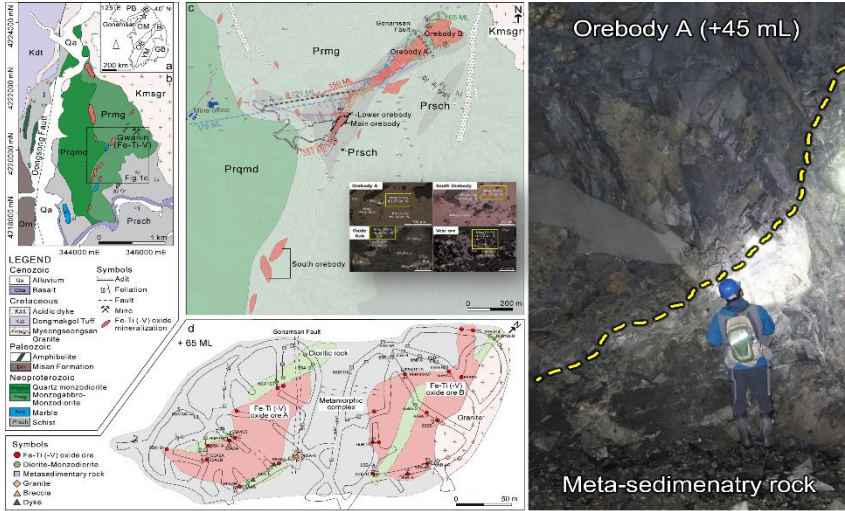
Independent magnetic anomaly has been detected in a detached area from the main ore body.



Construction Digital Twin

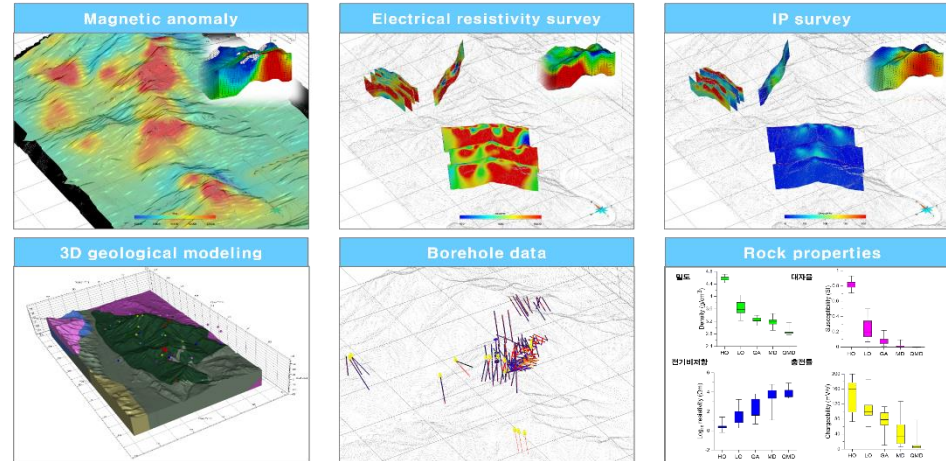
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Geological survey



Geological exploration

Geology / Geophysical DB



Rock physical property analysis

Phase 1: Sampling target rocks from drilled core



Phase 2: Making cylindrical specimens for measurement



Phase 3: Acquiring laboratory geophysical data

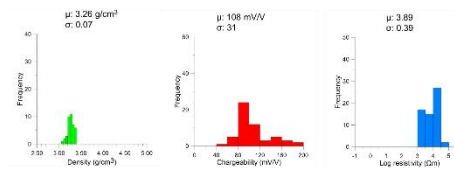


Dry and saturation system (density/porosity)

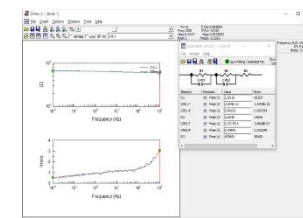
Susceptibility

Electrical properties (resistivity/IP)

Phase 4: Analyzing laboratory geophysical data



Data plotting



Equivalent circuit analysis (IP)

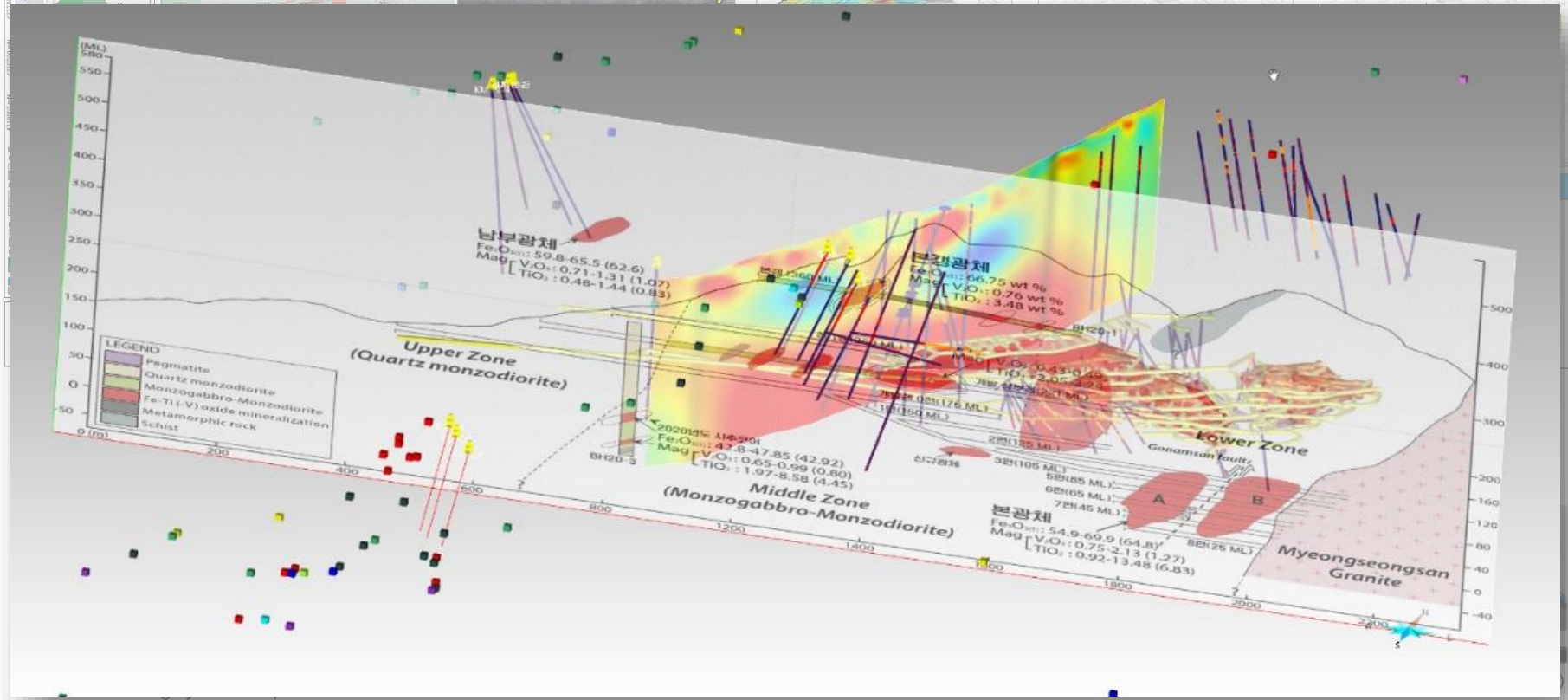
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● Geological survey

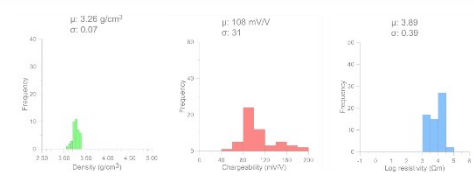


● Geological exploration

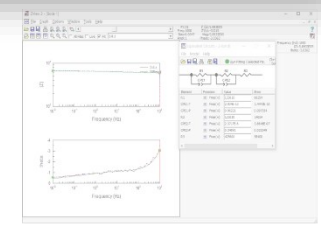
❖ Geology / Geophysical DB



Phase 4: Analyzing laboratory geophysical data

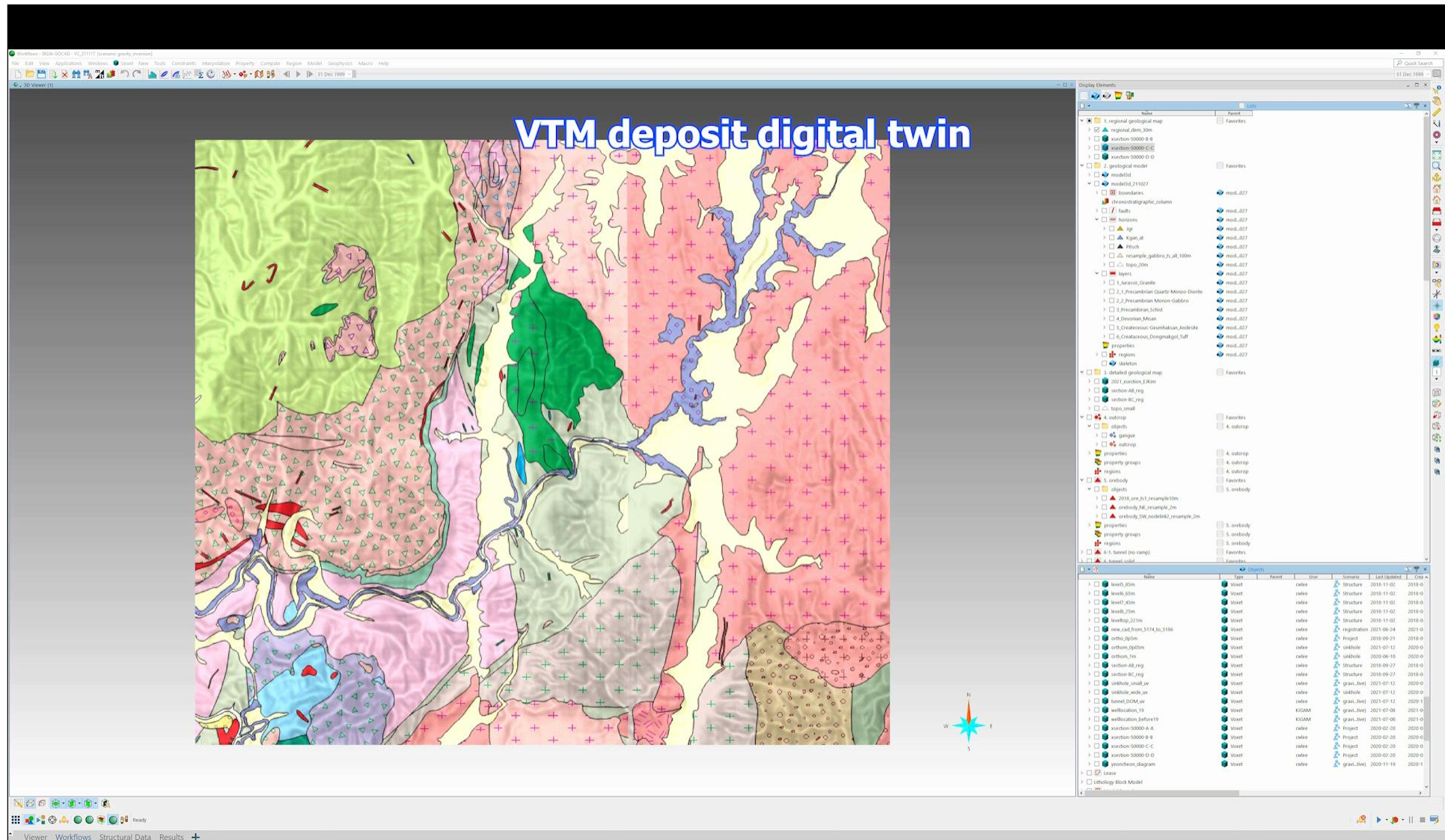


Data plotting



Equivalent circuit analysis (IP)

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Ore genesis model

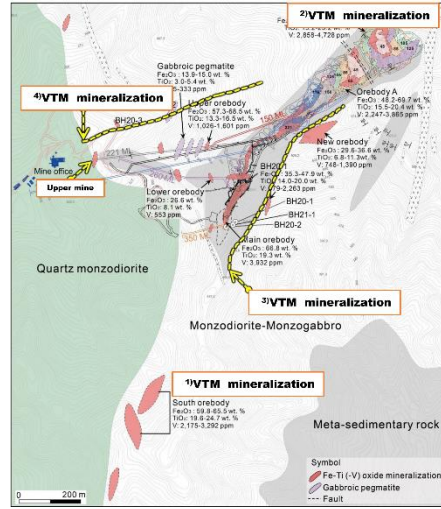
Geological Survey Results

VTM Mineralization

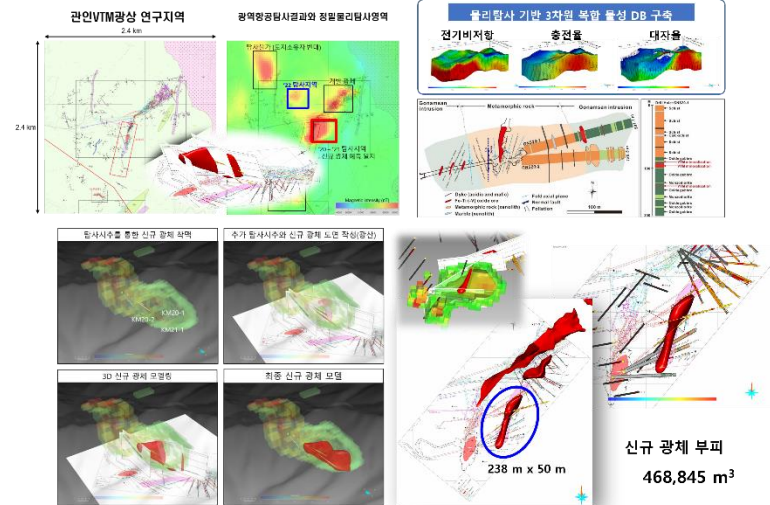
- 1) Boundary of QMD-MD-MG
- 2) Interior of Metamorphic sedimentary rocks
- 3) Metamorphic sedimentary rocks (MSR) – along the verges of MD-MG to the interior of MD-MG
- 4) Northeast-Southwest of the upper mine

Geophysical Survey Results

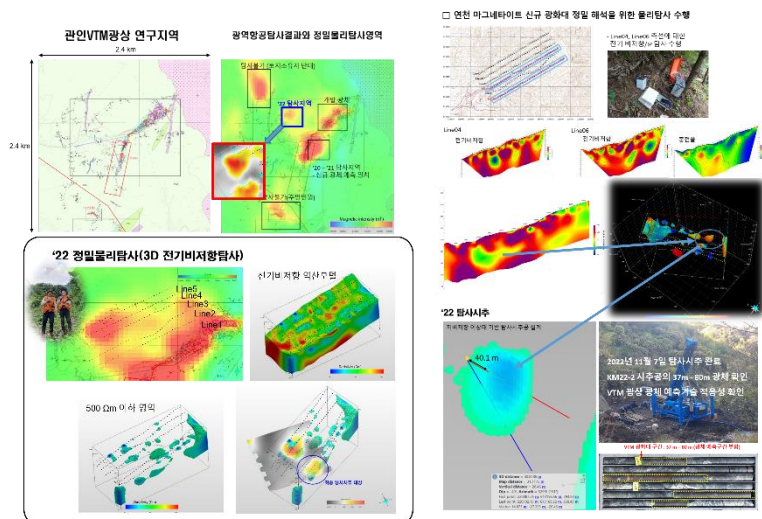
- 3) Alongside the boundary of MSR - MD-MG, independent magnetic anomaly has been confirmed inside MD-MG through using UAV magnetic survey.
- 4) Electrical Resistivity / Induction Polarization anomalies have been identified in the north of the upper mine that extends to the Northeast-Southwestward.



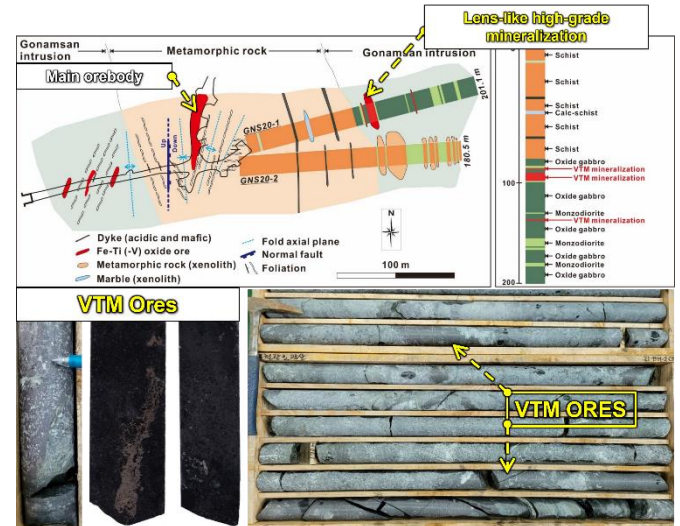
Ore modeling



Drilling simulation



Drilling & Targeting

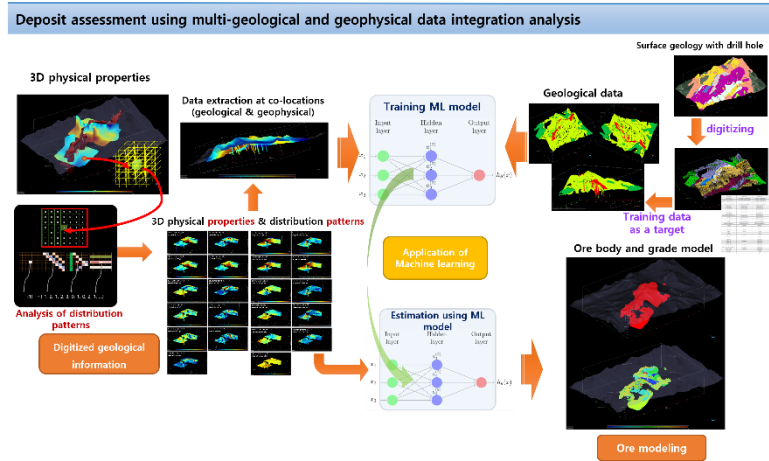




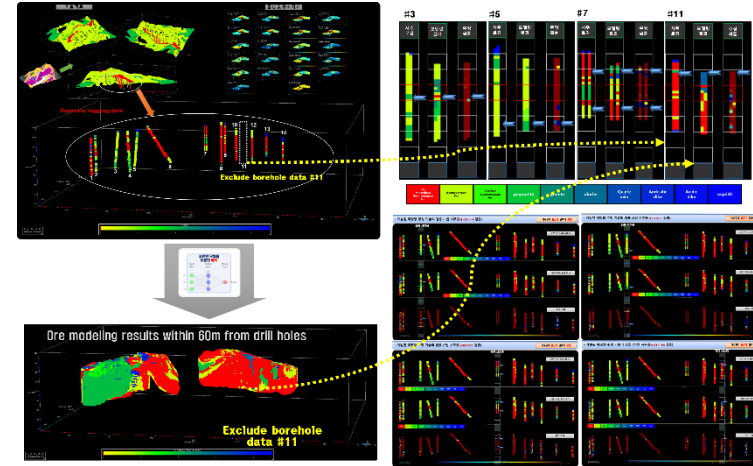
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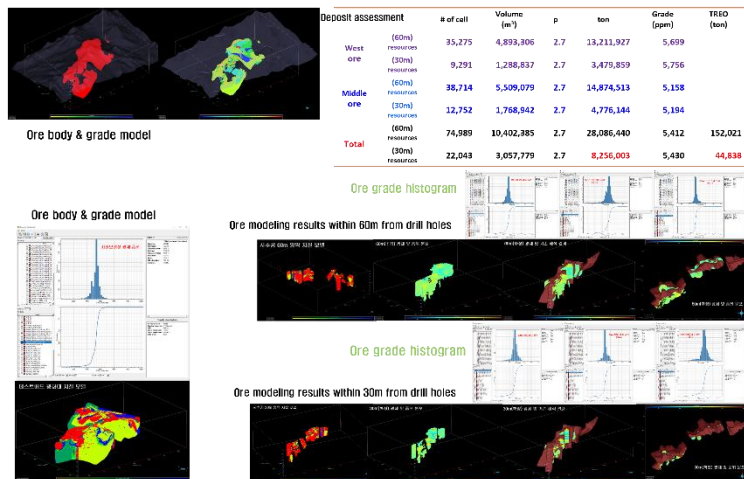
AI based 3D ore modeling



AI based 3D drilling simulation



AI based mineral evaluation

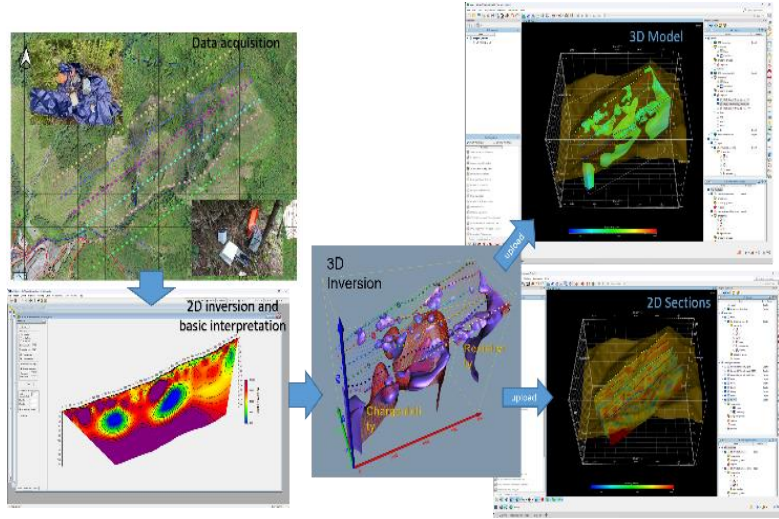


In-situ exploration system



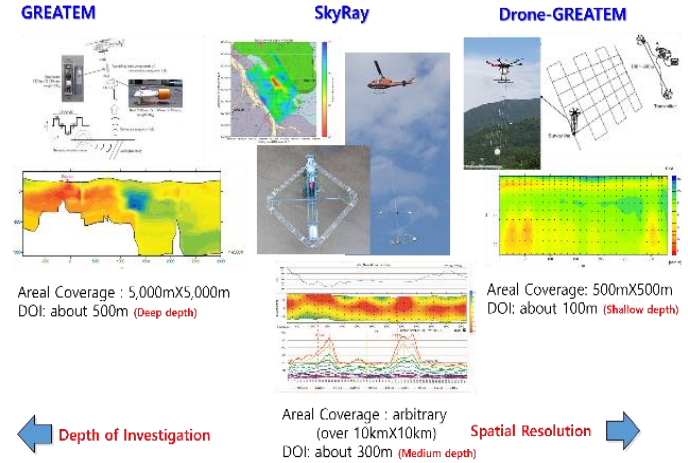
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3D electrical resistivity



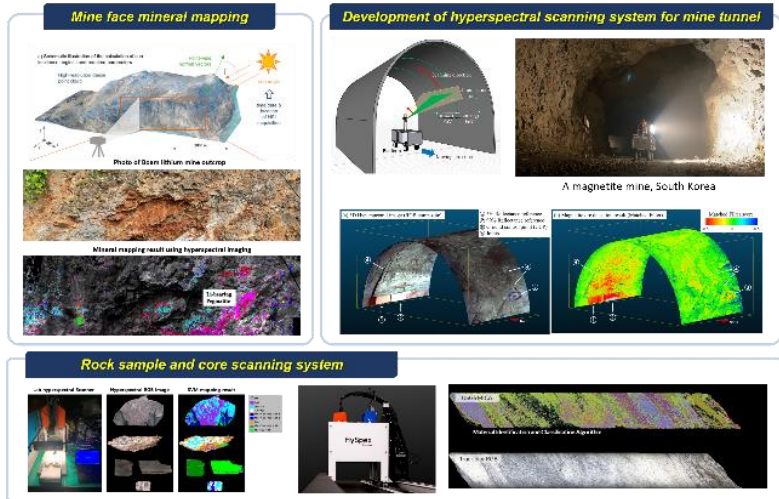
Electromagnetic exploration

3 Fold Multi-Scale AEM system + Airborne Magnetics & Radiometrics

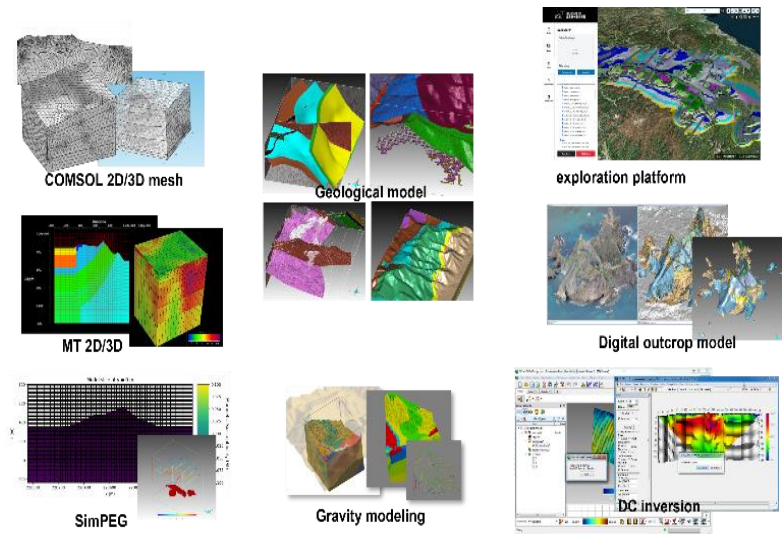


Hyperspectral exploration

❖ Application of hyperspectral technology

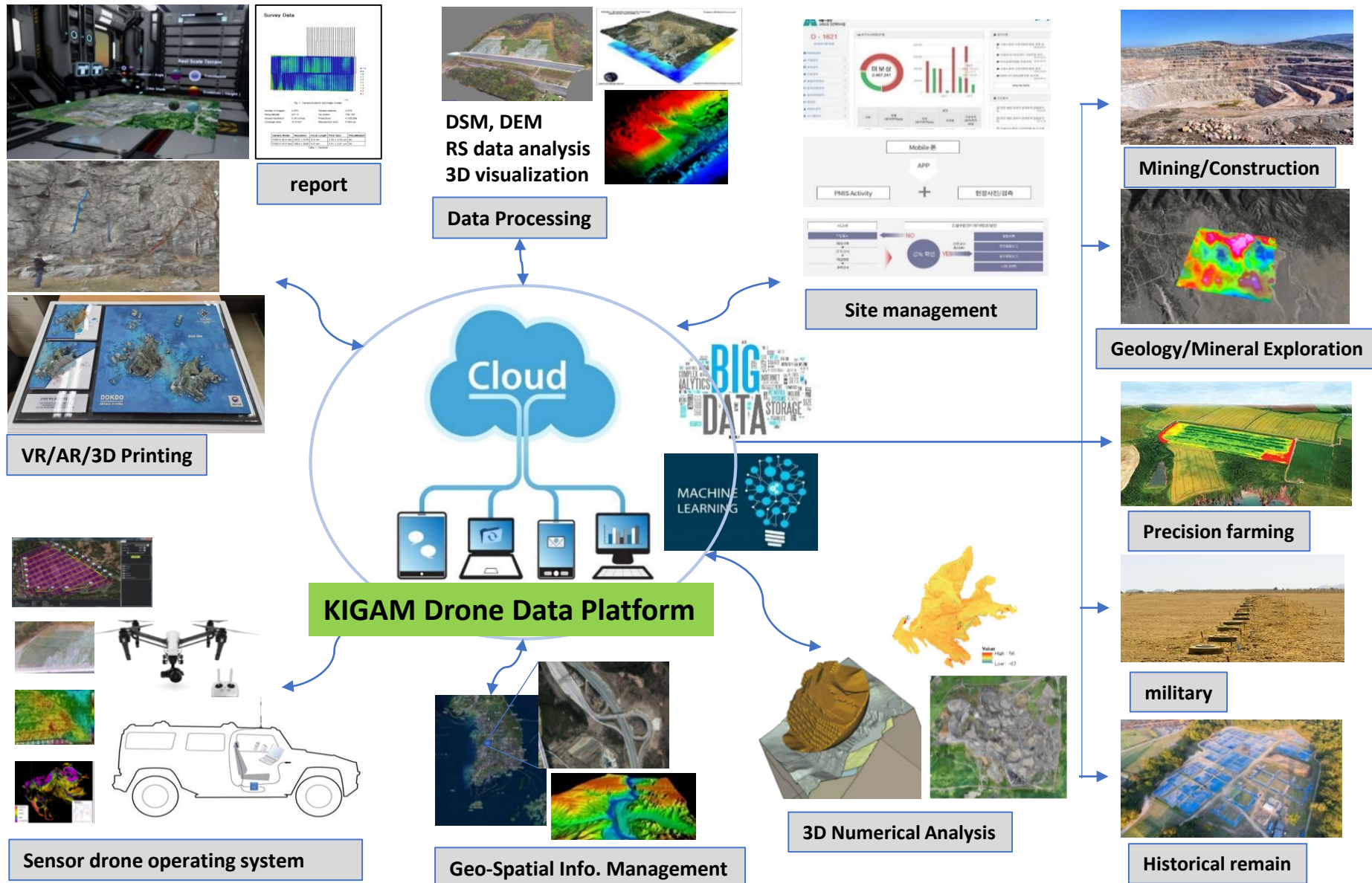


3D geological model based simulation



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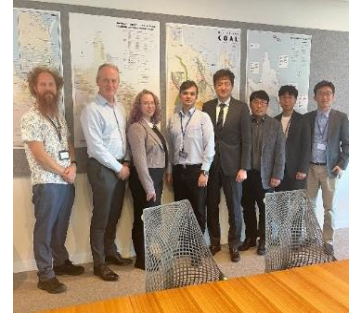
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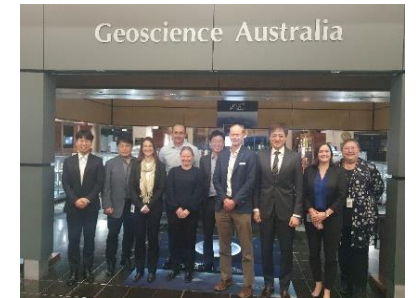
- Minerals Research Institute of Western Australia
- Curtin University
- WA-Korea Business Forum



- Geological Survey of Queensland



- Geoscience Australia



● Collaborative Project Arrangement Cooperation on Critical Minerals between KIGAM and Geoscience Australia

Agreed collaborative research projects

- Characterizing critical minerals in ores
- Geophysical characterization of critical mineral potential in mine waste
- Enhanced regional-scale mineral potential mapping using machine learning techniques