

Project 8: Geological Architecture and Evolution

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Timing:

Phase 1:

1 January 2019 - 31 December 2021

Cash Funding:

\$3,432,000

Project Participants:

Research Participants:

- The University of Adelaide
- The University of South Australia
- Curtin University
- The University of Newcastle
- The Australian National University
- CSIRO

Geological Survey Participants:

- Geological Survey of New South Wales
- Geological Survey of South Australia
- Geological Survey of Western Australia
- Geoscience Australia
- Geological Survey of Queensland
- Geological Survey of Victoria
- Mineral Resources Tasmania
- Northern Territory Geological Survey

Project Summary:

The mission of National Drilling Initiative (NDI) is to drill multiple holes in several case study areas to map the regional geology and architecture and define the potential for new mineral systems in 3D.

Project 8 aims to provide new geoscience data and knowledge in the NDI case study areas via integration of geophysics and petrophysics, regolith and hydrogeology, alteration signatures, basin analysis, and igneous and metamorphic analysis. These new data will aid in the construction of 3D geological models and 4D reconstructions of the geological evolution of the case study areas and aid in the identification of known and potential mineral systems within. New technologies and methodologies will be developed and leveraged to change mineral exploration practices in under-cover regions. Project 8 will provide advice to assist program design for future drilling in covered terranes, including within the NDI case study areas.

Phase 1 Objectives:

The objectives of Project 8 can be divided into five themes, which also provide structure to the Project 8 research strategy:

- A. Petrophysics to Geophysics:** Develop workflows to incorporate geological and petrophysical data into geophysical models in order to better understand the distribution and geometry of geological units and more accurately map key boundaries in the cover and basement (e.g. the basement/cover interface), geared to better understand mineral systems.
- B. Regolith and Hydrogeology:** Develop the means of efficiently mapping buried geology by understanding its expression through cover sequences. Define and understand the relationships between cover, basement (including depth to crystalline basement) and their regolith to reconstruct landscape evolution through time through new knowledge of mineralogy, geochemistry, petrophysics, hydrology and geochronology.
- C. Basin Analysis:** Develop a chronostratigraphic and basin architecture framework for basins in the NDI case study areas and include data relevant to the location of (and exploration for) mineral deposits within or beneath the basins. Geometry of key boundaries, structures and fluid pathways will be defined by drilling and better constrained geophysical models.
- D. Igneous and Metamorphic:** Investigate and map the basement geology in the NDI case study areas using structural analysis, petrology, geochemistry, isotopes and geochronology from drilling samples linked to drillhole imaging and geophysical interpretation.

- E. Signatures of Alteration: Identify and map the mineralogical and geochemical signatures of alteration related to mineralisation and developing techniques to rapidly and efficiently recognise those signatures in geological, petrophysical and geophysical datasets.