

New and improved geophysical and remote sensed data in the Northern Territory: 2025

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Introduction

In 2025, the Northern Territory Geological Survey (NTGS) completed two ground gravity surveys, the NTGS Pine Creek Ground Gravity Survey and the NTGS West Arnhem Ground Gravity Survey. Design of the NTGS South Georgina Basin Ground Gravity Survey was also completed, with acquisition to commence in mid-2026 and to be completed by the end of the year. This completes the upgrade of ground gravity data across the NT mainland to 4 km spacing or better using modern acquisition systems.

NTGS has also been preparing for a significant airborne magnetic and radiometric acquisition program to commence in 2026. Both the NTGS Pine Creek Airborne Magnetic and Radiometric Survey and the NTGS Cape Scott Airborne Magnetic and Radiometric Survey will be completed in 2026, upgrading magnetic and radiometric data across the Pine Creek Central and Litchfield domains. Planning for these surveys has been underpinned by a review and uplift of the NTGS collection of regional-scale airborne magnetic and radiometric datasets. Approximately two-thirds of the Northern Territory's data has been completed to date, with these datasets currently being released.

NTGS is also building on the accessibility of geophysical data through new Northern Territory (NT)-wide magnetic, radiometric and gravity grids, reprocessing and compiling industry geophysical data in the Pine Creek region and delivering geophysical upgraded imagery for gravity, magnetic and radiometric data.

NTGS regional-scale gravity acquisition

The NTGS Pine Creek and West Arnhem ground gravity surveys were both completed in 2025 with final products released by early 2026. Combined, the surveys cover an area of over 100 000 km² and extend north from Katherine to the coast, and from past Ramingining in the east to Channel Point in the west (**Figure 1**). Over 16 000 new stations were collected, with the NTGS West Arnhem Ground Gravity Survey primarily 4 km spacing and the NTGS Pine Creek Ground Gravity Survey primarily 2 km spacing. Ten industry partners participated across the two surveys, supporting acquisition of higher resolution data at 1 km and 500 m spacing within their areas of interest. All this data is now available for download via GEMIS.

The NTGS South Georgina Basin Ground Gravity Survey will cover an area of approximately 58 500 km² and will complete modern ground gravity coverage at 4 km spacing or better across the Northern Territory mainland (**Figure 1**). The survey will extend from the Stuart Highway, approximately 100 km south of Tennant Creek, eastwards to the Queensland border. Approximately 3630

new gravity readings will be completed during the survey at 4 km spacing, with the option for industry to participate to acquire higher resolution data at 2 km, 1 km or 500 m spacing over their areas of interest.

NTGS regional-scale airborne magnetic and radiometric acquisition

Two regional-scale magnetic and radiometric surveys will be completed in 2026. The NTGS Pine Creek Airborne Magnetic and Radiometric (AMR) Survey is located approximately 50 km south of Darwin and will extend from Litchfield National Park in the west to Kakadu National Park in the east, and near Katherine in the south (**Figure 1**). The NTGS Cape Scott Airborne Magnetic and Radiometric Survey will extend from Litchfield National Park in the east across to the coastline in the west, starting approximately 50 km south of Darwin and reaching as far south as the Fitzmaurice River (**Figure 1**). The two surveys will cover almost 50 000 km² of the prospective Litchfield and Central domains within the Pine Creek region. Both surveys will be flown east–west at 200 m line spacing and 60 m flight height. Industry will be able to participate in these surveys to infill areas of interest to 100 m line spacing.

Airborne magnetic and radiometric dataset uplift

The program to uplift the NTGS collection of regional-scale airborne magnetic and radiometric surveys has continued. Almost 40 surveys consisting of over 100 individual survey parts have been completed to date. The program addresses poor navigation data, located data issues, missing metadata and erroneous gridded products (Dhu 2024). These datasets are being released on an ongoing basis and incorporated into new products, along with informing future reacquisition needs.

Compilation of industry-submitted geophysical data in the Pine Creek region

A review of the industry-submitted geophysical dataset over the Pine Creek region has been completed. Following this review, a compilation of industry-submitted magnetic and radiometric, and induced polarisation data was completed. Over 360 000 line km of magnetic and radiometric data was reprocessed, covering an area of 37 000 km². The reprocessing included creating ASEG GDFII format located data, shapefiles of flightlines and survey boundaries, new grids, imaging and filtering.

A compilation of IP data acquired between 1992 and 2018 in the region was completed, and contains 16 gradient, 15 dipole–dipole and 5 pole–dipole surveys, consisting of over 130 individual lines. Data has been spatially referenced and attributed, with individual grids and pseudosections created or georeferenced to allow viewing in a GIS environment.

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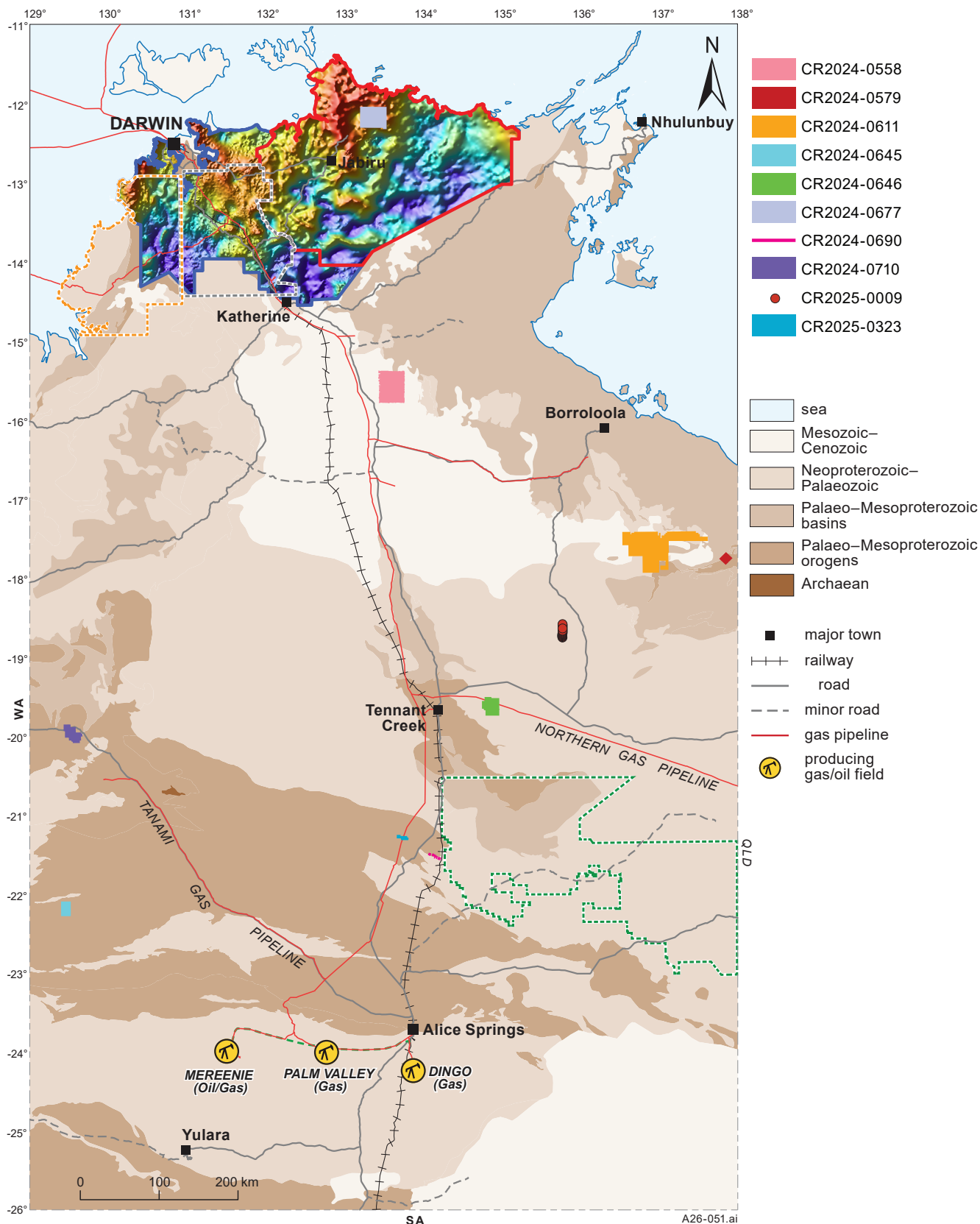


Figure 1. 1:25 M scale geological regions map of the Northern Territory showing locations of: (1) the NTGS Pine Creek Ground Gravity Survey (blue outline), NTGS West Arnhem Ground Gravity Survey (red outline) overlain on a grid of the new gravity data; (2) planned NTGS South Georgina Basin Ground Gravity Survey (green dashed outline), planned NTGS Pine Creek Airborne Magnetic and Radiometric Survey (grey dashed outline), planned NTGS Cape Scott Airborne Magnetic and Radiometric Survey (orange dashed outline); and (3) Round 17 NTGS Geophysics and Drilling Collaboration geophysical surveys, indicated as coloured polygons by project. Details of these surveys are available from GEMIS: Collections. NTGS-defined geological regions are shown in brown shades.

The compilation also includes flightlines showing the location of airborne electromagnetic data acquired through Geoscience Australia's Woolner Granite and Rum Jungle TEMPEST™ surveys and an updated gravity grid for the region that includes the new NTGS Pine Creek and West Arnhem ground gravity surveys.

NT-wide magnetic, radiometric and gravity grids

New NT-wide magnetic, radiometric and gravity grids have been released. The new magnetic and radiometric grids are levelled to the Australia Wide Airborne Geophysical Survey (AWAGS) flown by Geoscience Australia in 2008 and include the uplifted magnetic and radiometric datasets. The grid also includes over 30 industry-submitted datasets that have line spacings ranging from 50 m to 200 m. The grids have been created at a 20 m cell size, to capture as much information as possible. Downsampled grids (40 m cell size) have also been created and imaged in GeoTIFF format to improve the accessibility of the data. First vertical derivative and reduced-to-pole grids are also provided.

The new NT-wide gravity grid includes over 16 000 new stations, primarily from the NTGS Pine Creek and West Arnhem ground gravity surveys. Older, barometrically levelled readings, which have poor elevation control, have been removed in areas where modern data acquired using differential GPS is available. The grid has been produced at 100 m cell size, allowing preservation of greater detail in areas where stations are spaced 500 m or closer. Residual grids, created by removing a first-order polynomial to aid imaging across the Northern Territory, and first vertical derivative products are also provided, accompanied by GeoTIFF imagery.

All new grids and images are available to download via GEMIS.

Northern Territory Geophysics and Drilling Collaborations program: Round 17 geophysical projects

Round 17 of the NT Government's Geophysics and Drilling Collaborations (GDC) program co-funded 10 geophysical projects (**Figure 1**). One magnetotelluric survey (Pienmunne 2025), gradient and pole-dipole induced polarisation surveys (Pfaff 2024, Murray 2024), and a quantum gravity survey (Bennett 2025) were completed through the Innovative Targeting category of the program. Within the Regional Scale Geophysics category 1730 new ground gravity readings across two projects (Crombez 2024, Bennett 2025), over 1100 line km of airborne gravity gradiometry data (Saunders 2024), over 1425 line km of airborne electromagnetic data (Abbott 2024) and 50 000 line km of airborne magnetic and radiometric data across three surveys (Shaw 2024, Edwards 2024, Greene

2024) were completed. All these datasets are now available to download via GEMIS.

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