

AIRBORNE MAGNETIC AND RADIOMETRIC (AMR) SURVEYS



Fixed-wing aircraft at Dubbo airfield used for the 2017 Coonabarabran AMR survey

Overview

An airborne magnetic and radiometric (AMR) survey measures variations in Earth's magnetic field and the naturally occurring radiation coming from the ground. Surveys are conducted by government agencies and companies using a light aircraft (fixed-wing or helicopter) operated by a specialist contractor.

Current focus

AMR surveys are planned as part of the activities of the Mineral Exploration Cooperative Research Centre (MinEx CRC) – a national collaboration to further our understanding of the geology and mineral deposits in areas where rocks aren't exposed at Earth's surface.

In NSW, work associated with the MinEx CRC focusses on the North Cobar, South Cobar, Mundi Mundi, Forbes and Dubbo areas. As part of MinEx CRC activities in 2021, the Department of Regional NSW's Geological Survey of NSW (GSNSW) will fill gaps in existing AMR coverage in the greater Cobar and Nyngan area.

About surveying

In NSW, the GSNSW collaborates with Geoscience Australia (GA – a Commonwealth Government agency) to fly AMR surveys using a specialist contractor. The data is then processed, modelled and interpreted by geoscientists.

The data from AMR surveys can be used to map various geological features such as:

- faults
- soil types
- iron-rich rocks
- old river channels
- heavy mineral sands
- granite and dykes
- sedimentary rocks like sandstone
- volcanic rocks like lava flows.

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Survey process

AMR surveys use passive sensors, are non-invasive and do not disturb the ground. Equipment is secured inside the fuselage and fixed to the outside of the aircraft. The most visible part of the equipment is a near-horizontal pole extending from the rear of, or beneath, the aircraft.



Heli-mag system with attached 'bird'
Source: Thomson Aviation

MAGNETIC MEASUREMENTS

A magnetometer measures variations in Earth's magnetic field. Magnetometers measure the direction of the magnetic field, like a compass does, but also how strong the field is. It is usually fixed to an aircraft using a device called a 'bird'.

A ground-based magnetometer located near the airfield is needed to record the daily variations in the magnetic field caused by the sun. These ground readings are used to adjust the airborne magnetometer data after the survey, to ensure the effects of the sun are removed from the data.

RADIOMETRIC MEASUREMENTS

The sensor used in a radiometric survey is called a gamma-ray spectrometer. It is fixed inside the fuselage of the aircraft. The sensor records the amount of naturally occurring gamma radiation coming from the ground. Only the naturally occurring radiation coming from the top 20–50 cm of rock and soil is measured.

FLIGHT LOGISTICS

A professional and experienced AMR company will be contracted to conduct the upcoming surveys. This company will adhere to strict aviation protocols (regulated by the Civil Aviation Safety Authority) and will make every effort to ensure there is minimal impact on the environment and community.

The AMR aircraft will fly daily (weather permitting) during daylight hours, typically at 60 m above the ground. It will fly along on parallel lines at a regular spacing. For example, the survey may be flown along approximately east-west-oriented lines at 200 m line spacing. Selected areas may be flown with lines closer together.

The aircraft will fly outside the survey boundaries only when it is:

- flying to or from an airfield outside the survey area
- turning around at the end of a survey line.

During surveying, aircraft noise will be like that of a low-flying crop duster. The aircraft will fly higher over towns and buildings, and try to avoid stock concentrations.



A fixed-wing aircraft with a magnetometer fixed to the rear of the aircraft
Source: CGG

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Survey results

The survey results are used by a wide range of people, including:

- **agronomists:** to examine the nature and type of soil in three dimensions and the implications for soil fertility.
- **geoscientists and explorers:** to interpret the nature of soil and sediments. They can also interpret rocks deep underground and identify geological features such as faults and tectonic boundaries.
- **landholders:** to identify areas with soil suitable for cropping or grazing and to find faults and fractures that may have groundwater in them.
- **local governments:** for land use planning, resource estimation and geohazard management.

The data will be available to view as images and for download on the NSW Government's web-based mapping system, MinView, approximately six months after surveying - after all the processing and quality checks are complete.

More information

Landholders and local communities will be notified in advance of the AMR surveys taking place, and a hotline is available for enquiries. Information including flight plans will be updated regularly during AMR surveys on the MinEx CRC website.

To learn more about MinEx CRC and how the results will be used:

Call: 1800 960 522

Email: minex.crc@planning.nsw.gov.au

Visit: resourcesandgeoscience.nsw.gov.au/minexcrc

WHAT DOES THIS MEAN FOR ME?

The noise of the aircraft will be like a low-flying crop duster. The height and speed of the fixed-wing aircraft or helicopter will limit any exposure to you or your livestock.

View a video of how loud the aircraft is by visiting the website.



A helicopter with magnetometers fixed to the side
Source: NRG™