The Application of Ground and Airborne Magnetic Methods to Exploration and Geological Mapping in the Yilgarn Goldfields of Western Australia

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Abstract

The performance of both ground level and airborne magnetometer systems have been greatly improved as a result of advances in digital electronics, accurate automatic positioning devices and the introduction of high resolution, fast sampling caesium magnetometer sensors. Multiple sensor, low heading error airborne surveys are now being performed at relatively low ground clearance levels. The development of the TM-3, automatic positioning ground magnetometer system has made it practical to adequately sample all spatial frequencies present in the ground level magnetic field thereby acquiring the full spectrum of magnetic information.

Approximately a one square kilometre area near Coolgardie in WA has been chosen as a case-study area for investigating the relative effectiveness of conventional and new, ground level and airborne, magnetic surveying techniques. The site is geologically typical of the auriferous environments within the Yilgarn block.

This is the first time that such a comparative study has been made using all of the most common magnetic survey sampling standards available to the exploration industry. Data collected from conventional, government sponsored regional airborne survey and ground level proton precession magnetometer surveys has been image processed using state-of-the-art techniques. Data from a high quality, low level, multiple sensor, airborne, caesium magnetometer survey and a "broad spectrum" (sampled at a density of 200,000 measurements per square km) ground level caesium survey have similarly been processed. Geological control has been obtained from an extensive drilling and costeaning program.

This data set has provided a definitive comparison in cost spent, speed of survey and information obtained from each survey.