Telfer Region FALCON Airborne Survey, Western Australia

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SUMMARY

The Telfer region in the Paterson Province consists of Proterozoic metasediments of the Yeneena Group, of lower-upper Greenschist facies. Sediment lithologies vary from siltstones to quartzites and carbonates. These are intruded by intrusive suites ranging from felsic to mafic, plutonic to hyperbyssal.

Known world-class assets include the Telfer Gold operation, and the O'Callaghan's Tungsten resource (both 100% Newcrest owned).

The sedimentary and intrusive lithologies have considerable density contrast. These factors, combined with steeply dipping on-edge stratigraphy make the Telfer region ideal for gravity surveying.

Previous gravity coverage in the region has been a combination of small prospect scale surveys, and 1980s vintage 2 x 4 km regional helicopter surveys with barometric levelling control.

In order to get systematic gravity coverage of good resolution, a FALCON survey of 250m line spacing, 60m flight height, was flown in 2010.

The data show a number of blind felsic plutons, some intersected in drilling, some interpreted – especially associated with the O'Callaghan's tungsten resource, and the Trotman's Stockwork tungsten prospect. The data also outline much more clearly the NE over SW thrust faults in the region, and the late north-south transfer faults, the most well known of which is the Graben Fault through Telfer Dome.

Three dimensional gravity inversions performed over the O'Callaghan's and Trotman's Stockwork tungsten areas in Gocad/VPMG software have defined extra felsic intrusive targets for tungsten and gold mineralisation. Further diamond drilling will increase inversion constraints.

Key words: Tungsten, Gold, FALCON.

INTRODUCTION

The value of gravity data in the Telfer Region has long been recognised, due to the significant density contrast between the carbonate and other sedimentary units, as well as the intrusive suites (Table 1).

Some blind felsic intrusives in the area have long been known for skarn style mineralisation, with dominant base metals and minor gold. Offsets in the stratigraphy mean gravity can also map structure well in the area. This can be difficult with aeromagnetics alone, as the only sedimentary unit that has strong magnetic susceptibility is the Wilkie Quartzite (SEXTON, 1994).

The area has always had difficult access for ground gravity surveys due to aeolian sand and sand dune cover. This has been made even more difficult in recent years due to environmental constraints regarding the traverse of sand dunes with any form of machinery, as well as the need to minimise disturbance of heritage areas. Minimising disturbance is also compliant with Newcrest policies of working in areas with traditional owners.

The commercial availability of airborne FALCON gravity gradiometry in Australia for mineral exploration surveys during 2010 led to the design of a FALCON survey for the Telfer Mine corridor region.

The survey specifications are in table 2.

Stratigraphic Unit	Density g/cc (Weathered)	Density g/cc (Fresh)
Puntapunta Fm	2.7(?)	
Telfer Fm		2.59
Malu Fm	2.40	2.64
Isdell Fm		2.63

Table 1 – Stratigraphic Unit Densities (adapted from SEXTON, 1994)

METHOD AND RESULTS

The survey flown by Fugro Airborne Surveys, using a FALCON digital Airborne Gravity Gradiometer (AGG). The FALCON AGG system is well known (LEE, 2001).

Total magnetic intensity measurements were also taken using a magnetometer. The equipment was mounted in a CASA 212 fixed wing platform, registration VH-TEM.

Total line-km	7762
Terrain Clearance (m)	80
Clearance Method	drape
Traverse Line Direction (deg)	048 / 228
Traverse Line Spacing (m)	250
Tie Line Direction (deg)	138 / 318
Tie Line Spacing (m)	2500

Table 2 - Survey Specifications, FALCON Survey

Selected results can be seen in Figure 1.

The area to the south east of Telfer mine is interpreted to consist of a number of blind, low-density felsic plutons, some of which have been intersected by diamond drilling. These are co-incident with lower values of gD.

The O'Callaghan's pluton features magnetite and pyrrhotite bearing skarns, and was first drilled in the 1980s after an early aeromagnetic survey.

Despite having minimal gold, the O'Callaghan's skarns have been shown in recent years to in fact be a world class tungsten resource, with a total of 78Mt @ 0.33% WO3. There is also economic copper, zinc, and lead (Newcrest, 2010).

Another gD low is co-incident with the Trotman's Stockwork tungsten and copper prospect. This is currently being drilled.

The FALCON data tensor components also show a number of NE over SW thrust faults, and NS transfer faults (sub-parallel to the Graben Fault through Telfer Dome). These faults have been partly mapped and interpreted from aeromagnetics by geoscientists previously, but the FALCON data increases confidence in their existence, extent, and position.

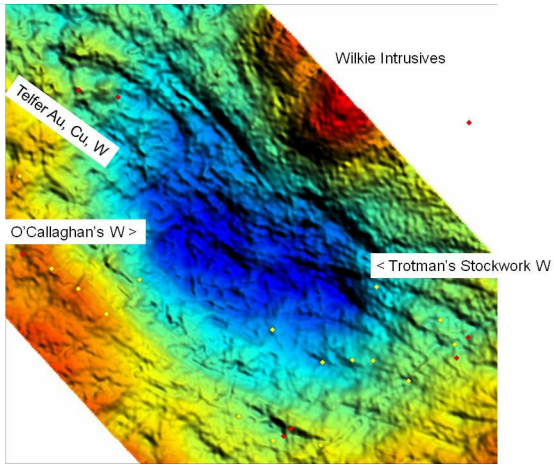

Figure 1. FALCON gD Subset Image with Mineralisation

A three dimensional, unconstrained inversion of the gD data has been performed in Gocad/VPMG software. I covers an area which includes the O'Callaghan's pluton, as well as the Trotman's Stockwork prospect further to the SE.

The inversion shows a number of low density bodies, interpreted to be blind felsic plutons and stocks within the denser carbonate sequence.

CONCLUSIONS

FALCON AGG data has been useful in mapping and detecting stratigraphy (including blind intrusives) and structure in the Yeneena Basin. Some of these intrusives are very prospective for tungsten mineralisation.

Further drilling should increase constraints on three dimensional inversion gravity inversion.

ACKNOWLEDGMENTS

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