Distribution of gold within the Dargues Reef alteration system

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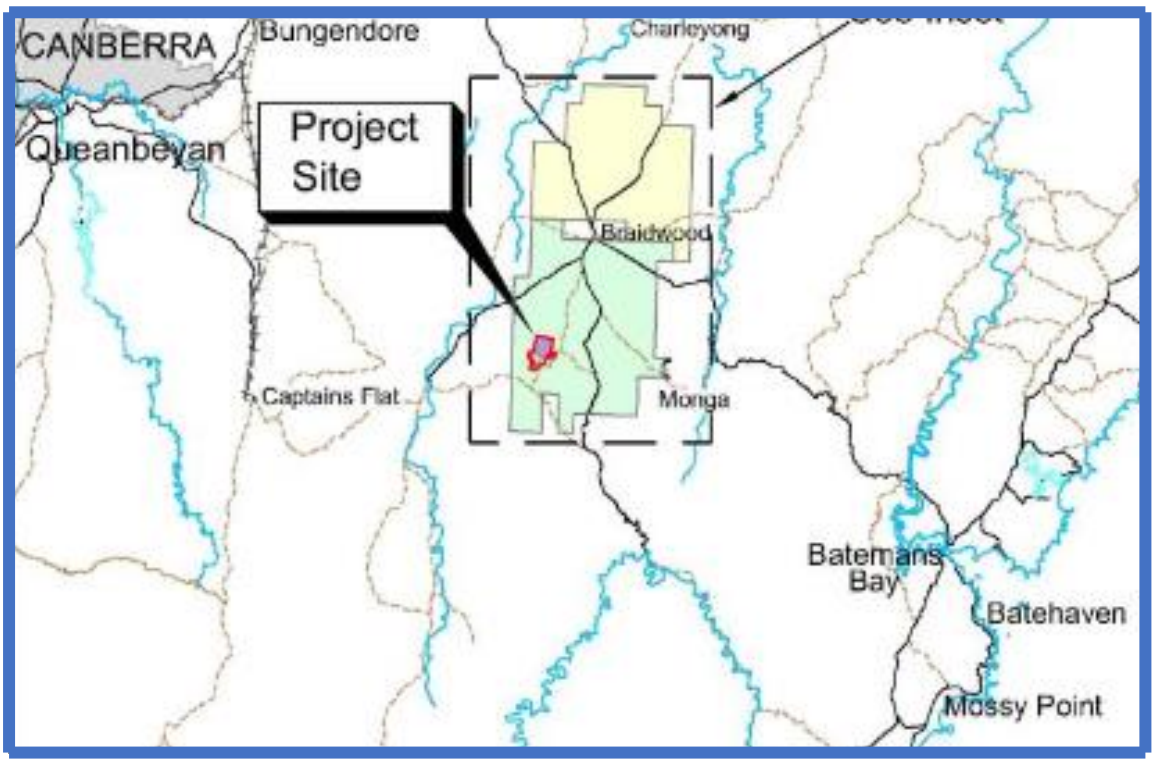
INTRODUCTION

The Dargues Reef gold deposit is hosted within the Early Devonian, Braidwood Granodiorite, 60 km southeast of Canberra, 13 km south of the town of Braidwood and 2 km north of the village of Majors Creek. The Resource and Reserves are 1.615Mt @ 6.3g/t Au (327,300 oz. of gold). The deposit is undeveloped however decline access is currently being constructed. The geology and dating of the deposit is well-described in Forster and Downes, 2014.



Location

More……

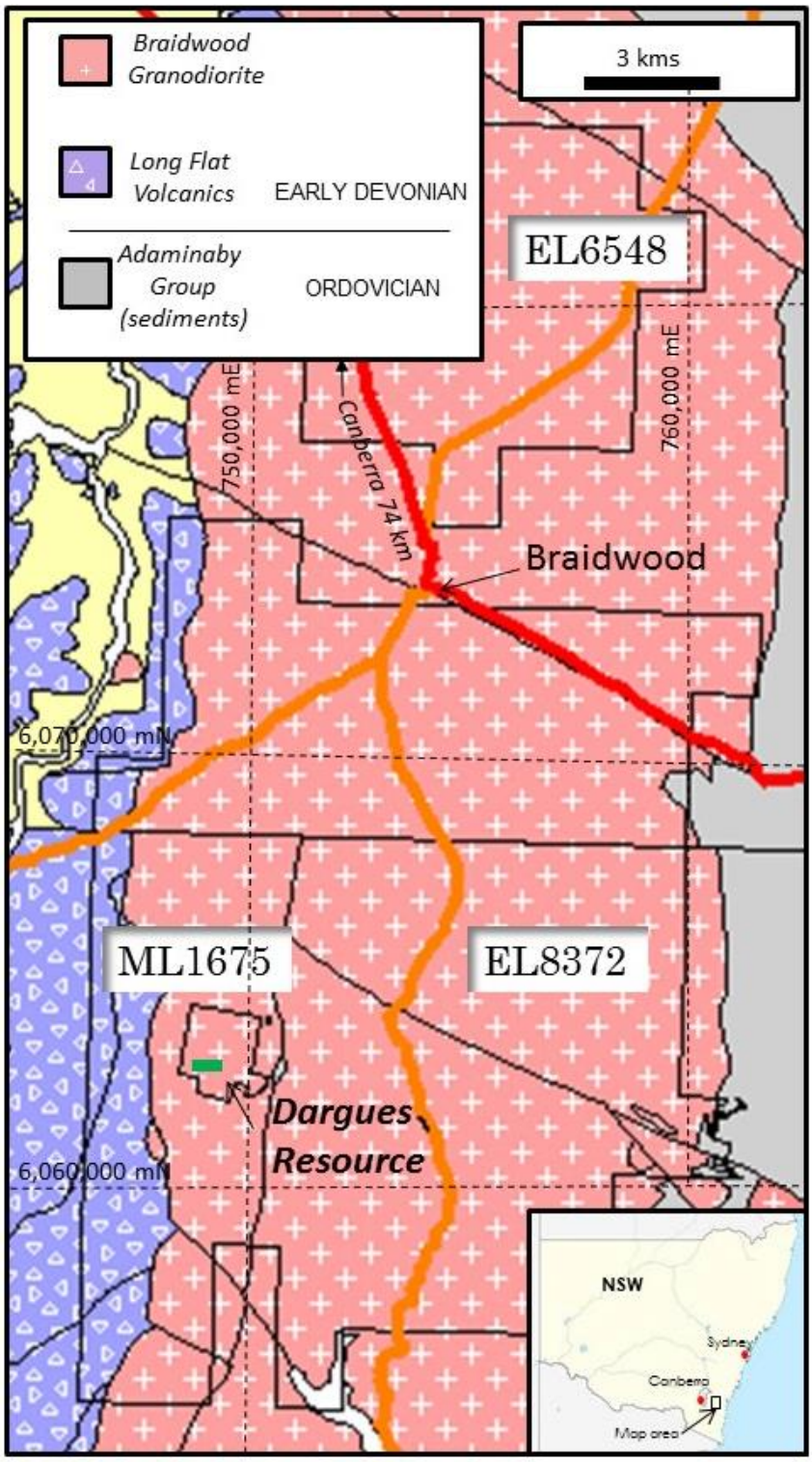


Figure 1. Location of the Dargues reef deposit. MGA94 co-ordinates.

The nature of gold mineralisation within the Dargues deposit is unusual. The geometry and distribution of the gold-bearing lodes is similar to that expected in a structurally- hosted gold deposit, however the gold is found within disseminated “clots” of pyrite at the centre of structurally-controlled alteration zones. The density of pyrite mineralisation, within a wider alteration zone, broadly determines the shape and geometry of the gold mineralisation. Even at the centre of the

lodes, the granitic texture of the host rock is retained and it is not possible to identify a particular structure that hosts the gold.

Regional sampling has shown that gold is found throughout the Braidwood Granodiorite associated with pyrite mineralisation in joints and fractures. Anomalous concentrations of pyrite are required for gold to reach ore grade.

Because disseminated pyrite is the main determinant of gold mineralisation, the Dargues-style mineralisation is readily located through the use of Induced Polarisation (I.P.) geophysics, the disseminated sulphides being located as distinct chargeability anomalies. Figure 2 illustrates the chargeability anomaly associated with the Dargues mineralisation.

An I.P. chargeability response is therefore a good starting point in exploring for additional mineralisation in the Braidwood Granodiorite. However the Granodiorite is too large to cover with Gradient Array I.P. and the search requires more focus.

It is known from logging and from Hy-logger scanning of some of the Dargues core, that the Dargues mineralisation is contained within an alteration zone. At the heart of the lodes, albite is the dominant feldspar and muscovite and illite the dominant micas. Carbonates are also found within the ore zone, as well as the pyrite that hosts the gold mineralisation. Beyond the “lode” alteration is an envelope of strongly developed chlorite/phengite. In the thickest part of the orebody the total alteration package is 65 m wide.

The use of airborne spectral data was considered as a means of locating alteration zones within the Granodiorite. As a result, ASTER data was acquired in an attempt to map alteration within the Granodiorite. The results of this work show that the resolution of the ASTER data is not sufficient to locate the relatively narrow alteration package that characterises the Dargues-style gold mineralisation, however it was observed that the Dargues mineralisation occurs at or close to the boundary between different mineral packages deduced from analysis of the ASTER data (Vukovic, 2014) . These packages are defined as “sericitic” (characterised by the minerals illite/muscovite/smectite + chlorite/carbonate) and “pyrophyllitic” (characterised by pyrophyllite/alunite + chlorite). Scanning of fresh samples of outcrop to ground-truth this mapping is on-going but the map has been used to guide the location of the most recent I.P. surveys.

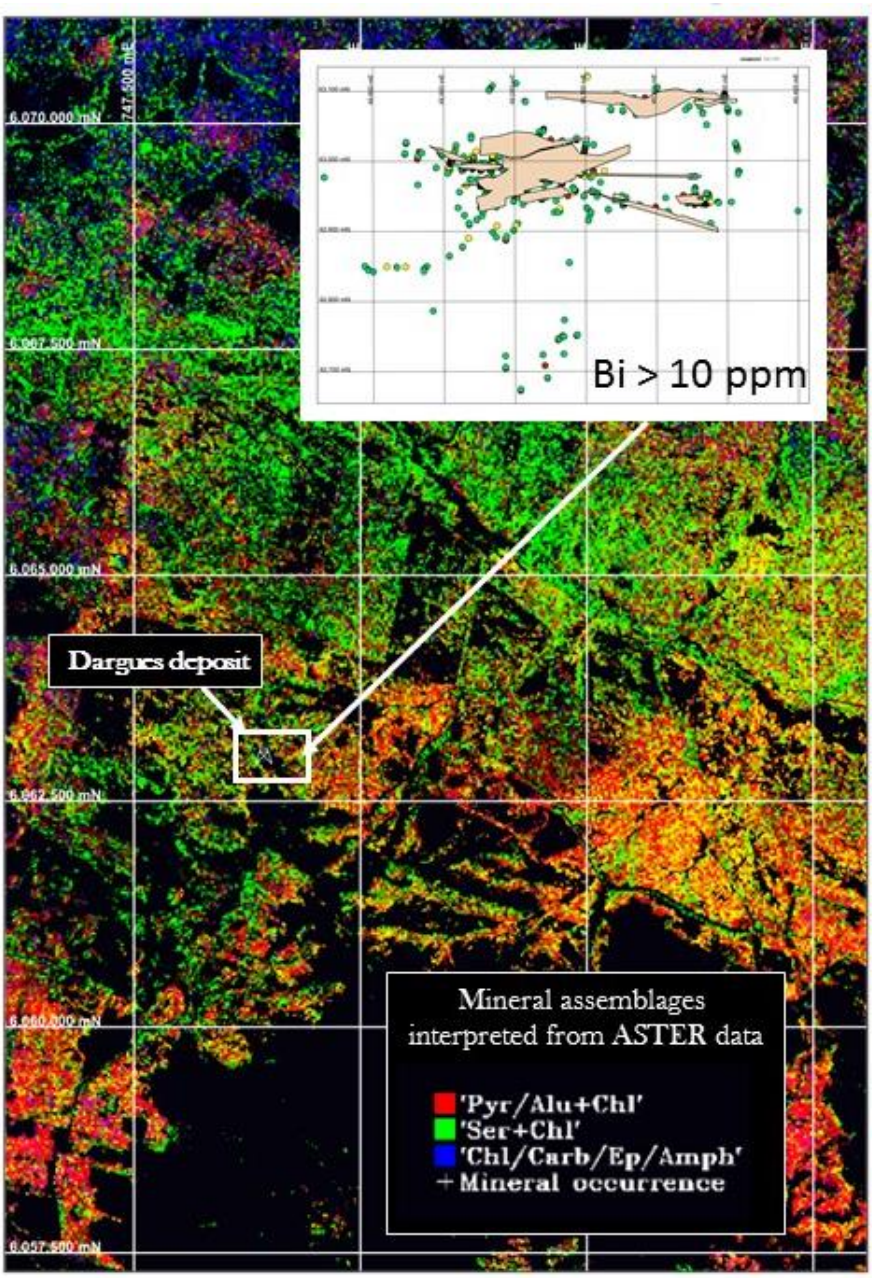


Figure 2. Interpreted ASTER mineral map with the location of the Dargues deposit. Inset shows the distribution of Bismuth (Bi) around the Dargues Resource. All Bi > 10 ppm shown. Hatched orange shapes are the Resource wireframes in plan view. Grid is MGA94 and grid spacing is 2500m in the main frame and 100m in the inset.

Once an I.P. anomaly is located, it can be tested with shallow drilling. The resolution of the I.P. data is good enough to locate disseminated pyrite but not to locate the most gold-rich pyrite zones. For this reason the metal zoning within the Dargues deposit itself has been examined in order to determine whether there are any metallic “vectors” to higher grade zones. It was also thought that if this technique worked, there may be metallic “vectors” to extensions of the deposit itself.

Due to budget constraints it was necessary to use the metals that had already been assayed for the Dargues drilling dataset (consisting of core and chip samples). The trend of silver, arsenic, copper and bismuth were all examined.

Whilst no definitive “vectors” or metal trends could be established, it was determined that bismuth provides a reasonably “tight” halo around the Dargues deposit, increasing, on average, into the heart of the mineralisation. Arsenic also provides a halo but this is much larger and does not always appear to be related to the alteration associated with gold mineralisation. Copper is more closely related to gold but also creates a halo that is too large to be useful. Silver is less widely distributed than gold and therefore not a “pathfinder” to gold.

Bismuth, filtered for values above 10 ppm, provides a halo broad enough to be seen outside the main mineralisation but is “tight” enough to define a halo that could be detected by wide-spaced, shallow drilling.

Gold distributions filtered above 0.1, 0.5 and 1 g/t all show a more scattered halo than bismuth and the gold halo is not as centred on the main deposit. This scattered nature of the gold halo is probably the result of the gold found in fractures throughout the Braidwood Granodiorite.

Work is on-going into the best indicators for Dargues-style mineralisation but the conclusions to date are as follows:

1. The ASTER data appears to define an alteration assemblage that favours the Dargues-style alteration.
2. Within the areas defined for further exploration, Gradient Array Induced Polarisation is a very useful technique for identifying the disseminated pyritic systems that host gold.
3. Once an I.P anomaly is defined, shallow drilling and analysis for bismuth and interpretation of bismuth distribution may be a useful method for finding the centre of a Dargues-style system.

Using this technique, a number of targets have already been identified for further testing.