Devils Siphon, Dunstan Mountains

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Abstract

The Devils Creek-Siphon area located in the north end of the Dunstan Mountains, south of the Bendigo goldfield, Central Otago. The basement geology comprises textural zone TZ4, upper greenschist facies, psammitic and pelitic schists which are interlayered with folded metachert and metabasite horizons that act as good marker units to constrain late- and post-metamorphic deformation. The area is cut by the Green Valley Fault (GVF) which is an inferred regional-scale, shallowly NE-dipping, normal fault (Turnbull, I.M. 2000, MacKenzie and Craw, 2005). The fault and adjacent schist are highly prospective for gold mineralisation as it is subparallel to, and likely to be coeval with the Late Cretaceous, Thompson Gorge Fault (TGF) which truncates TZ4 schist that hosts the Rise and Shear Zones inferred resource of 2.4 million oz Au, located 6.2 km, to the north (Cox et al., 2006, Santana Minerals, 2024) A detailed geological mapping program has been undertaken to assess the location of the GVF and asses the areas prospectivity for hydrothermal gold mineralization.

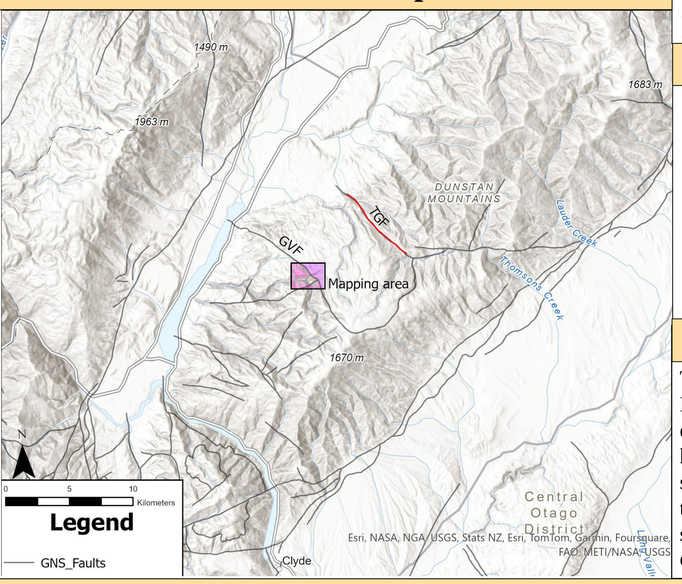
Research Objectives

- Field mapping, to delineate the GVF, and identify potentially mineralized structures to gain insight into post-metamorphic deformation.
- Collection of samples of dominant lithologies and any hydrothermal structures, for examined under petrographic microscope.
- Examination of ankerite alteration and structures to be compared to known mineralized structures.

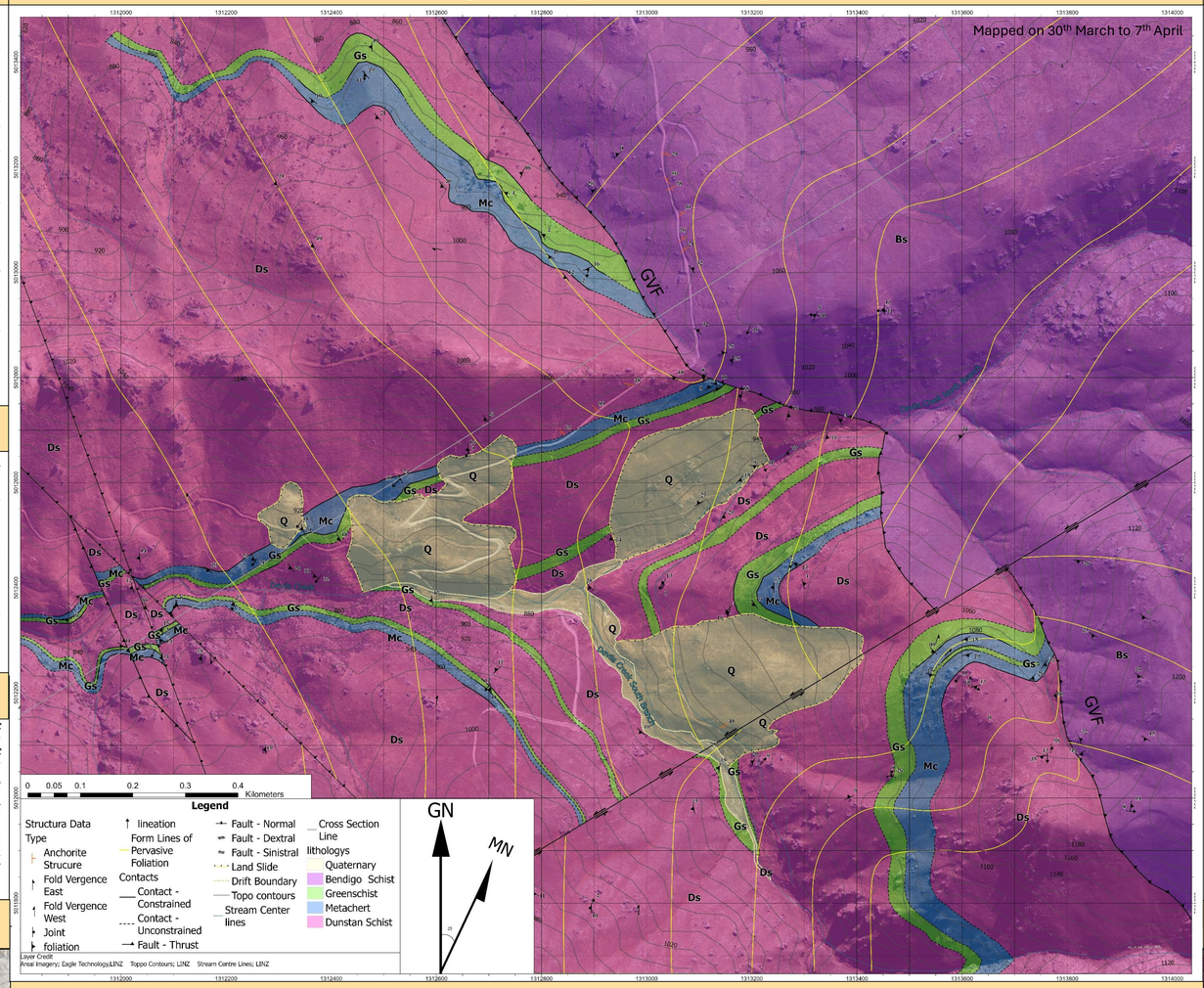
Method

Field mapping was completed over a span of 7 days, from the 31st of March to the 6th of April, with a focus on the GVF and the constraining of greenschist and metachert horizons south of the GVF. Investigations were conducted for evidence of hydrothermal fluid movement and any subsequent mineralization. Samples of interest were examined using pXRF, and rock samples were preserved. Plans are in place for examination of host lithologies and hydrothermal structures under a petrographic microscope.

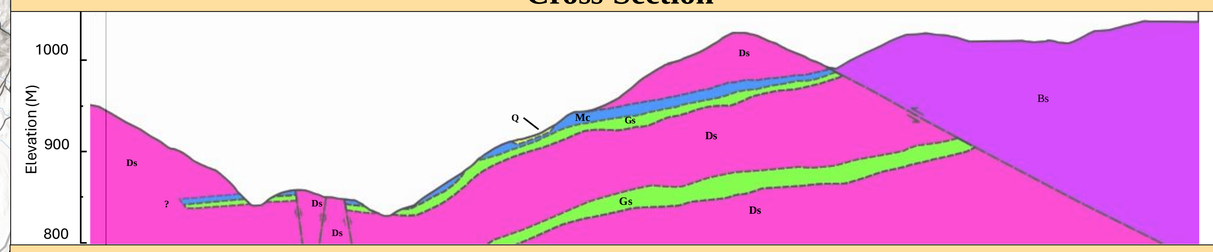
Location Map



Geological Map of Devils Siphon



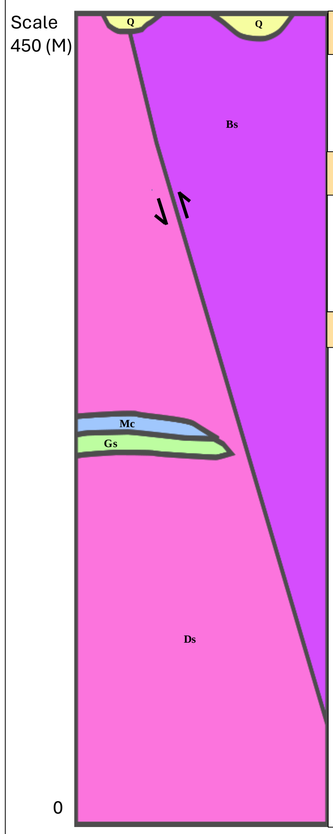
Cross Section



Discussion

The mapping program has successfully identified the regionally significant Green Valley Fault and delineated two distinct schist units: the Bendigo Schist and the Dunstan Schist. These schist are likely derived from differing metamorphic environments and depths. This is evidenced by their distinct metamorphic fabrics and the history of deformation revealed by their folding senses. The Dunstan Schist's horizons of metachert and greenschists suggest a variation in the protolith between the two schist blocks. Investigations into the anchoretic structures have identified zones of hydrothermal quartz structures with arsenic (As) values up to 180 ppm. Additionally, the discovery of the 'Alien Breccia' rock float, and the subsequent outcrop, resulted in arsenic values of up to 2679 ppm. These arsenic values are significantly elevated when compared to the accepted background level of less than 15 ppm. (Blake et al., 2019). These results provide evidence of hydrothermal fluid movement and thus increases of the potential for gold minimization.

Lithographic Descriptions



Quaternary Sediments (Q)

Landslides and slumps of massive shist boulders. Fluvial river deposits of locally derived material

Bendigo Schist. (Bs)

Psammitic and pelitic moderately segregated, thinly lamented schist. Dominant F2 folding with minor F3.

Dunstan Schist (Ds)

Psammitic and pelitic moderate to poorly segregated laminated schist. Dominant F3 folding minor F2. with horizons of …..

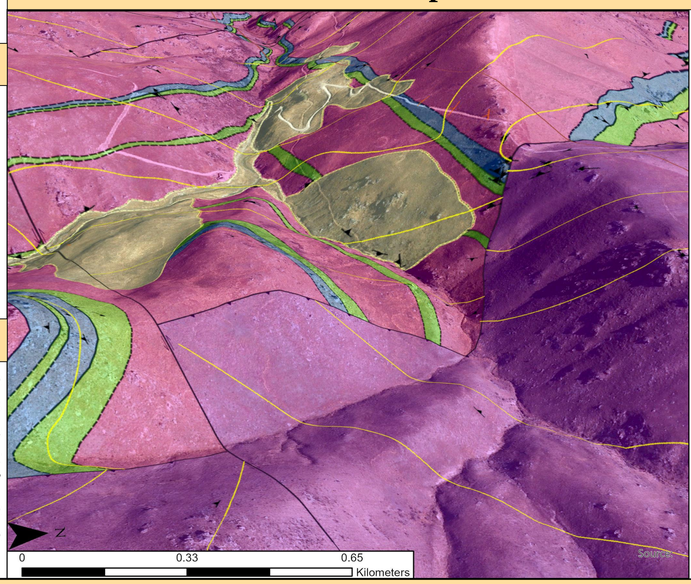
Metachert (Mc)

Well segregated, laminated, siliceous metachert. Strongly lineated and dominate Schistosity. Intermixed with smaller greenschist and schist horizons. Located atop greenschist.

Greenschist (Gs)

Unsegregated highly deformed metavolcanic greenschist. Varying millimetre scale magnetite porphyroblasts.

3D View Map



Acknowledgments

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References

Craw, D. Upton, P. MacKenzie, D. 2009. Hydrothermal alteration styles in ancient and modern orogenic gold deposits, New Zealand. NZJGG 52: 11-26.
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Blake, F., Grant, K., MacKenzie, D., Scott, J., & Craw, D. (2019). Surficial arsenic redistribution above gold-mineralised zones in East Otago, New Zealand. *New Zealand Journal of Geology and Geophysics*, *62*(4), 573–587.