New toolkit aids discovery of mineral deposits crucial to 'green economy' transition

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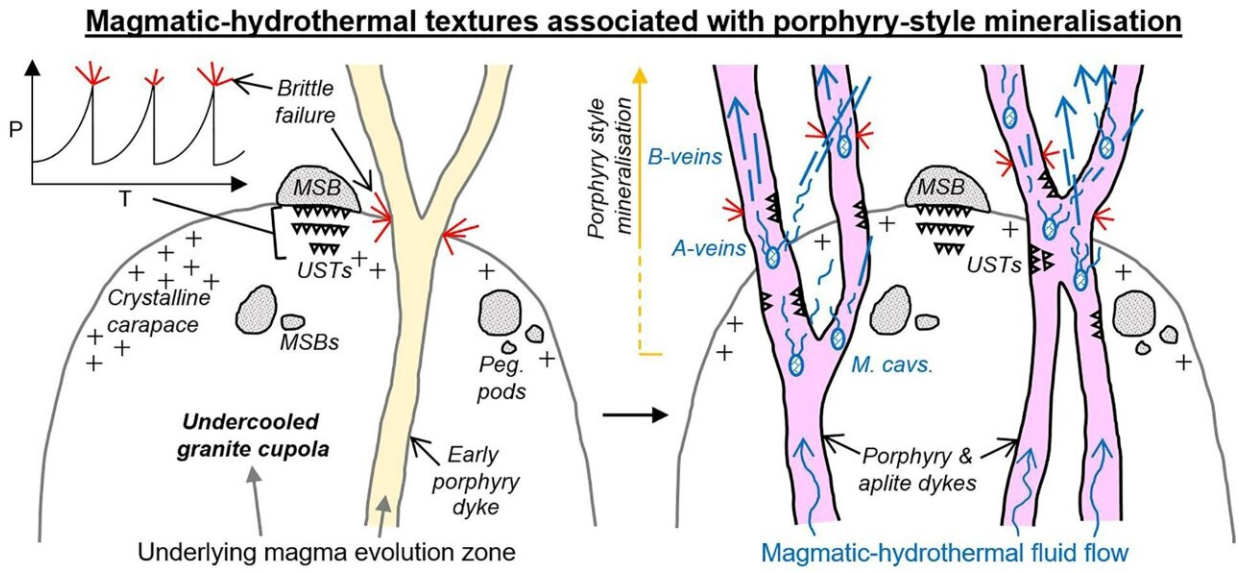

Graphical abstract. Credit: *Ore Geology Reviews* (2022). DOI: 10.1016/j.oregeorev.2022.104783

Scientists have developed a new toolkit for the discovery of mineral deposits crucial to our transition to a "green economy."

A study led by Lawrence Carter from the University of Exeter's Camborne School of Mines has given fascinating new insights into how to discover porphyry-type copper deposits.

Porphyry-type deposits provide most of the world's copper and molybdenum, as well as large amounts of gold and other metals, which are of increasing demand for green technologies such as electric vehicles , wind turbines and solar panels, and for power transmission. They are the principle target of many mining companies that employ a wide range of invasive and expensive exploration techniques to find them.

Porphyry-type deposits originally form several kilometers below the Earth's surface above large magma chambers. Not only are they rare, but most large near-surface examples have already been found. To meet future demand for copper, new methods are needed to discover deeper and possibly smaller deposits, using techniques that meet increasingly strict environmental regulations.

The researchers show that certain textures preserved in rock may be indicative of the types of physical processes that form these deposits, and may give an early indication of their location.

Previous understanding of such textures was disjointed because they are often small, poorly exposed or are simply not recognized when encountered.

The new study was carried out in the Yerington district of Nevada, where tilting of the upper crust has provided a globally unique cross-section through four porphyry-type deposits and their host rocks. Because of this, previous studies in the district have underpinned much of the current understanding of how porphyry-type deposits form.

Lawrence Carter, a final year Ph.D. student and research associate at Camborne School of Mines, based at the University of Exeter's Penryn Campus, said, "We provide a textural framework for exploration geologists to assess the likely 3D architecture of porphyry-type deposits before employing more invasive and expensive techniques."

Professor Ben Williamson, co-author of the study and Associate Professor in Applied Mineralogy at Camborne School of Mines, added, "This innovative applied study, led by one of the UK's leading young geo-scientists, will provide much-needed field criteria for the discovery of economically important and green-technology-crucial porphyry-type deposits."

More information: Lawrence C. Carter et al, Textural indicators of mineralisation potential in porphyry magmatic systems – A framework from the archetypal Yerington district, Nevada, *Ore Geology Reviews* (2022). DOI: 10.1016/j.oregeorev.2022.104783

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