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Practical Examples of the Role Structures Play in Porphyry and Epithermal Deposit Exploration

Stephanie Sykora¹, Alex Farrar², Rob Sievwright³, Saúl Galvez⁴

1. Exploration Geologist, Independent Consultant and OreQuest Consultants, BC, Canada, 2. Centre for Ore Deposit and Earth Sciences (CODES), University of Tasmania, Hobart, TAS, Australia, 3. First Quantum Minerals Ltd., London, United Kingdom, 4. First Quantum Minerals Ltd., Lima, Peru

In exploration for porphyry copper (\pm gold \pm molybdenum) and epithermal gold \pm silver deposits, structure plays an essential role on many scales. Here we highlight examples of structural patterns that show the variability within porphyry and epithermal systems and how this information is captured and used in different stages of exploration for targeting. In particular, examples highlight surface mapping and core logging that focused on vein and fault orientations and kinematics from a series of early to advanced porphyry copper \pm gold and epithermal gold \pm silver projects in South America, North America, and Papua New Guinea.

On a regional scale, the identification of fundamental translithospheric faults and opportune stress configurations prior to and at the time of magma (and porphyry) emplacement are critical first-order factors to locating favourable areas of interest for porphyry exploration. On the deposit scale, the interplay of both regional and local stresses manifest as structures. In several cases, an overarching regional stress pattern is clear; however, nested within are local areas of different strikes and dips, which highlight a proximal stress control, likely from shallowly emplaced intrusions and magmatic-hydrothermal fluid pressures.

In each case, understanding structure on the regional or ore-deposit scale, such as the underlying controlling faults or the differences in vein orientations and dips, is useful for vectoring. This can lead to either location of different porphyry dike phases and/or determining the location of structurally controlled ore.