## Structural Analysis of Polyphase Deformation in the South Peruvian Andes and Its Basement: Implications for Cu-Au Mineral Deposit Localization

**Maryi Rodriguez-Cuevas**[1], Daniel Wiemer[1], Steffen G. Hagemann[2], Nicholas Hayward[3], Ioan Sanislav[1]
[1]Economic Geology Research Centre, James Cook University, Townsville, Australia, [2]Centre for Exploration Targeting, University of Western Australia, Crawley, Australia, [3]Predict Ore Pty Ltd, East Perth, Australia

Trans-lithospheric faults (TLF) acting as primary magma and fluid conduits play a fundamental role in the spatial distribution of mineral deposits. However, why large Cu-Au deposits display a punctuated spatial distribution along their respective principal arc-parallel TLF remains debated: both self-organization and/or high-permeability intersections with inherited basement structures are considered.

The southern Peruvian Andes host world-class Phanerozoic Cu-Au deposits spatially associated with sub-parallel magmatic belts that formed during different accretionary episodes along the western South American margin. Major deposits belonging to individual belts show spatial alignment with deposits of adjacent belts along transverse-lineaments that cross the Andes normal, or oblique to the main direction. If the transverse-lineaments represent long-lived TLFs that controlled the spatial distribution of deposits this would imply that they: (i)were either laterally propagated into newly accreted terrane, or originate from a coherent basement tectonic entity of at least Paleozoic age that underlies the entire region, (ii)have been reactivated repeatedly during main accretionary episodes (iii)have been vertically propagated into younger cover, and (iv)experienced no or only limited lateral displacements or rotations during subsequent reactivation events.

To test these hypotheses, we present field-based structural analyses from selected areas in South Peru to shed new light on the nature, kinematics and relative timing of polyphase deformation affecting Andean basement and overlying lithologies. Correlation of deformational intensities (brittle and/or ductile), metamorphic grade and type and geometry of structural features (e.g., foliations, folds, faults, fractures) helps to improve understanding of the tectonic history and lithospheric architecture. Importantly, we show that basement structures played an important role in controlling successive deformation and repeated magma and magmatic-hydrothermal fluid flow. Furthermore, observed distinct generations of mafic dike swarms, within or nearby TLFs, attest to structural longevity and connectivity of TLFs. Overall, our results allow for advanced predictiveness in Cu-Au mineral system exploration in South Peru.