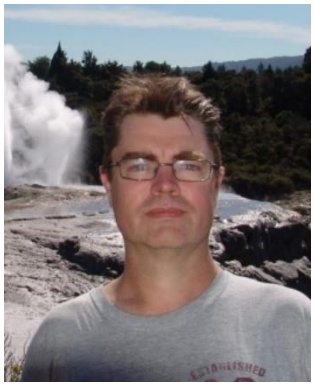
16th SGA BIENNIAL MEETING
KEYNOTE SPEAKER



Mark Simpson

Wairakei Research Center, GNS Science, New Zealand

Epithermal deposits of the Hauraki Goldfield, Aotearoa New Zealand

Mark P. Simpson, Anthony B. Christie

Low (-intermediate) sulfidation epithermal Au-Ag vein deposits of the Hauraki Goldfield, have produced over 12.5 Moz of Au and 55 Moz of Ag since 1862. They are hosted in andesite-(dacite) and rhyolite, with 97% of Au recovered from veins in andesite. The quartz veins formed during the Miocene-Pliocene are up to 4.5 km in length, 25 m in width, and 700 m in depth. Alteration halos that encircle veins are 6–50 km^2 in areal extent, and the largest encompass several vein centers. The rocks are altered to quartz, adularia, illite, chlorite, pyrite, ± calcite. Adularia surrounds veins (100–500 m laterally) and is coextensive will illite that grades successively into illite-smectite and outlying smectite. Ammonium minerals, when present occur proximal to some veins (<100–300 m). Based on the geothermal analogy, adularia indicates zones of inferred high permeability and the upflow of boiling hydrothermal fluids. Illite, illite-smectite and smectite outline the broad thermal structure of the former hydrothermal system, with illite formed in the hotter portion. Epithermal veins are predominantly composed of quartz, ± minor adularia, ± clays (illite, corrensite, kaolinite) ± ± calcite/carbonates and ± pyrite. They display a diversity of textures including, banded (colloform and crustiform), massive, breccia, comb, and lattice-bladed; some with multiple generations of each. Electrum and acanthite are the main ore minerals with some deposits having Te- and Se-bearing minerals. Where present, chalcopyrite, sphalerite and galena occur in increasing amounts with depth. Gold is typically microscopic, but some deposits can have very high-grade electrum bands that have formed via the suppression of quartz deposition. The origin of bonanza-grade electrum at Thames and Coromandel remains enigmatic. The epithermal deposits can be broadly subdivided into northern, southern, and eastern groups based on their host rocks, age, Au/Ag ratios, and differences in vein minerals and textures.

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Mark Simpson is a geothermal and minerals geologist with GNS Science, Wairakei, Taupō.

His work includes research on epithermal deposits and geothermal systems and consulting in geothermal exploration. Prior to joining GNS Science in 2012, Mark spent 14 years at the University of Auckland as a research associate investigating epithermal deposits of the Hauraki Goldfield. During this same period (UoA), he was a consultant geologist to the global minerals and geothermal industry, running his own company. For the past 26 years, he has been investigating the geology, alteration, ore mineralogy and chemistry (alteration and fluid inclusions) of epithermal deposits and prospects. This has focused on better understand of their origins as well as identifying mineral and chemical indicators that point towards mineralisation.