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PORPHYRY COPPER, GOLD AND MOLYBDENUM DEPOSITS – NEW GEOCHEMICAL EXPLORATION METHODS TO AID DISCOVERY

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C.V.

El Dr. Cooke ingresó a trabajar a la Universidad de Tasmania (UTAS) después de completar sus estudios de doctorado en la Universidad de Monash en 1991. Su primer encargo en la Universidad de Tasmania fue el de investigador postdoctoral. En 1995 fue nombrado profesor adjunto en el área de geoquímica y, desde entonces, ha sido ascendido a profesor titular, profesor asociado y profesor principal. David ha asumido roles de liderazgo en centros de investigación financiados por ARC en la UTAS, incluido el Centro de Investigación Especial CODES (1998-2005) – siendo líder del programa 5; Centro de Excelencia CODES (2005-2013) - líder del programa 2; Director adjunto de CODES 2013-2017; Director de CODES desde el 2017 a la actualidad y del Centro de Investigación de Transformación Industrial TMVC (2015-2020).

David ha sido líder de nueve proyectos de investigación, basados en equipos, financiados por la industria desde 1998. Cada uno de estos proyectos de tres o cuatro años ha involucrado a un equipo compuesto por personal académico, becarios de investigación postdoctorales y estudiantes de posgrado (PhD, Masters, Honorarios), trabajando en estrecha colaboración con socios de la industria.

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Porphyry copper, gold and molybdenum deposits – new geochemical exploration methods to aid discovery

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In the past decade, significant research efforts have been devoted to mineral chemistry studies to assist porphyry exploration. These activities can be divided into two major fields of research: (1) porphyry indicator minerals (PIMS), which aims to identify the presence of, or potential for, porphyry-style mineralization based on the chemistry of magmatic minerals such as plagioclase, zircon and apatite, or resistate hydrothermal minerals such as magnetite; and (2) porphyry vectoring and fertility tools (PVFTS), which use the chemical compositions of hydrothermal minerals such as epidote, chlorite and alunite to predict the likely direction and distance to mineralized centres, and the potential metal endowment of a mineral district. This new generation of exploration tools has been enabled by advances in laser ablation-inductively coupled plasma mass spectrometry, short wave length infrared data acquisition and data processing, and the increased availability of microanalytical techniques such as cathodoluminescence. PVFTS and PIMS show considerable promise for porphyry exploration, and are starting to be applied to the diversity of environments that host porphyry and epithermal deposits around the circum-Pacific region. Industry has consistently supported development of these tools, in the case of PVFTS encouraged by several successful “blind tests” where deposit centres have successfully been predicted from distal propylitic settings. Industry adoption is steadily increasing but is restrained by a lack of the necessary analytical equipment and expertise in commercial laboratories

Since 2004, a series of AMIRA International research projects (P765, 765A, 1060, 1153, 1202) have been conducted at CODES (University of Tasmania) and collaborating organizations, funded by up to 21 industry sponsors, several of them over a period of more than 12 years. The research program has been designed to develop new geochemical and geological methods to detect, vector towards, and discriminate between porphyry and epithermal deposits in both green rock and lithocap environments, and has delivered new porphyry vectoring and fertility exploration tools. For deeply eroded systems in green rocks, research has focused on key alteration minerals in green rock environments (e.g., epidote and chlorite; Cooke et al., 2014; Wilkinson et al., 2015). This work has shown that the analysis of subtle, low-level hypogene geochemical signals

preserved in distal alteration minerals can potentially provide explorers with both fertility (how large?) and vectoring information (how far, and in what direction?), allowing the presence, location and significance of porphyry and/or epithermal copper, gold and molybdenum deposits to be assessed during the early stages of exploration with remarkably low-density sampling and very low cost relative to most other available search technologies. Industry adoption of PVFTS is increasing steadily but is restrained by a lack of the necessary analytical equipment and expertise in commercial laboratories.

References

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