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**HYDROTHERMAL IRON OXIDE COPPER-GOLD & RELATED
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Volume 3 - Advances in the Understanding of IOCG Deposits
GUIDE TO AUTHORS

PGC Publishing is continuing its sought after series of Global Perspective technical books with a new 300 to 400 page volume on new discoveries and advances in the understanding of the IOCG deposits of the world since volume 2 was published in 2002. It is to contain 22 to 25 all new papers by leading experts from academia and industry, including both general papers on the occurrence of this style of mineralisation and descriptive contributions on prime examples from around the globe.

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T M (Mike) Porter
Editor

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THE GEOLOGY OF THE EL SOLDADO MANTO TYPE Cu (Ag) DEPOSIT, CENTRAL CHILE

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Abstract - El Soldado is the largest (>200 Mt @ 1.4% Cu) of the known Cu manto-type deposits in central Chile. It is strata-bound within a submarine, bimodal calc-alkaline basalt - rhyodacite unit of the Lower Cretaceous Lo Prado Formation, which also contains marine carbonaceous shales and volcanoclastic sandstones. Although stratigraphically restricted, the clustered orebodies are mostly vein-like and discordant, controlled by a system of N-S to NNW faults formed within a transtensional zone (cymoid loop) of a sinistral, strike-slip brittle shear system. Individual orebodies are

Introduction

The El Soldado copper deposit (32° 38' Lat S; 71° 04' Long W; 500-1000 m above sea level) is located in the Coastal Cordillera of Central Chile, 120 km northwest of the capital city Santiago, and 30 km from the Pacific coast (Fig. 1). The total identified resource at El Soldado, comprising production plus reserves, is well over 200 million tonnes @ 1.35% Cu, including 70 million tonnes @ 1.8 % Cu mined out from rich zones (Contador and Glavic, 2000), thus making it equivalent, in terms of total metal content, to a medium size porphyry copper deposit, yet smaller than Mantos Blancos and Candelaria (eg. Maksaeve and Zentilli, this volume).

This paper offers an updated description of the geology, petrography, structure, ore and gangue mineralogy, hydrothermal alteration and paragenesis of the El Soldado deposit

Tectonic & Geological Setting

The Ordovician Macquarie Volcanic Arc lies within the Eastern Subprovince of the Lachlan Orogen, one of the constituents of the Tasmanides of eastern Australia. The Tasmanides occupy the eastern third of Australia, fringing Precambrian cratons to the west. They record the rifting of a supercontinent in the Neoproterozoic, as the proto-Pacific Ocean opened, followed by convergent margin activity that lasted from the late Middle Cambrian (~520 Ma) until the Middle Triassic (~230 Ma) and the commencement of the Mesozoic Gondwanide Orogeny (Cawood, 2004; Glen, 2005).

The Tasmanides formed one sector or segment of the proto-Pacific margin of Gondwana that stretched almost 20 000 km, from Papua New Guinea southwards to Tasmania and New Zealand (Tuhua Orogen), into Antarctica (Ross Orogen), and then northwards up the Antarctic Peninsular into the western margin of South America to what is now northern Colombia (Fig. 1) (Cawood, 2004, Glen, 2005). Cawood (2004) called this the Terra Australis Orogen. It overlapped the Precambrian cratonic masses of Gondwana on one side and was bounded by proto-Pacific Ocean on the other margin (Cawood, 2004).

Sub-heading One

The Lachlan Orogen extends from eastern Tasmania, through Victoria to New South Wales, where it occupies much of the state. The western boundary with the Delamerian Orogen is largely obscured by the Tertiary Murray Basin and the Great Australian Basin, but is exposed in Western Victoria. Although the east-dipping Moyston Fault has been accepted until recently as the surface expression of the boundary (VandenBerg *et al.*, 2000; Korsch *et al.*, 2002), results of recent Ar-Ar dating by Miller *et al.*, (2004) suggest that the Avoca Fault, ~100 km further east, may be the actual boundary (Glen, 2005).

The eastern boundary with the largely younger New England Orogen is obscured by the coal-rich Permian to Triassic Sydney and Gunnedah Basins, although deep seismic reflection profiling indicates that the crust of the Lachlan Orogen extends east under the foreland fold-thrust belt of the New England Orogen (REF)

Sub-heading Two

The Delamerian cycle is best represented in the Delamerian Orogen, which underwent development from a rifted and passive margin in the Neoproterozoic, to a convergent margin that involved accretion of boninitic forearc crust and one or more arcs in the late Middle Cambrian. The Delamerian Orogeny was followed in western Victoria by post-collisional volcanism and deposition of Late Cambrian turbidites of the Glenthompson and St

Arnaud Groups (Glen, 2005; Miller *et al.*, 2004; Crawford *et al.*, 2003; VandenBerg *et al.*, 2000). In the Lachlan Orogen, the Delamerian cycle is represented by Cambrian mafic, ultramafic and related rocks that are found in Victoria as several belts of greenstone that occur in the hangingwall of major thrusts, and underlie Ordovician turbidite packages (Gray, 2006; VandenBerg *et al.*, 2000).

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