

## A. B. Christie, R. L. Brathwaite (eds): *Geology and exploration of New Zealand mineral deposits*

**AusIMM Monograph 25, 2006, hardback, 353 pages (AUD\$80, nonmembers, non residents, plus shipping cost); also available separately on CD-ROM (AUD \$70); student members 50% discount: <http://www.shop.ausimm.com.au/bookdetails.php?BookID=296>**

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New Zealand is a small island nation in the South Pacific Ocean with highly varied geology. It is 270,000 km<sup>2</sup> in size, barely 70% of the land area of the state of California or the country of Japan with which it shares some of the geologic environments and, hence, type of mineral resources, namely orogenic and epithermal gold deposits, respectively. Despite its relatively small size, New Zealand is rich in natural resources. Gold rushes in the 1860s brought many people to New Zealand and led to a tremendous growth in the economic activity of the isolated country. In 2004, the country produced mineral resources worth a total of NZD\$1.14 billion (USD\$741 million), with coal (36%), gold (18%), and iron sands (3.4%) being the principal sources of revenue. A total of 29 Moz of Au was produced from the mid-1800s to 2005, mainly from orogenic and epithermal deposits, and assessments suggest that less than half of the endowment of the country has been recovered; yearly production is presently about a third of a million ounces, as it has been since the early 1990s. The boom from <10% of this level of gold production in the mid-1980s coincided with a major government restructuring, including new legislation concerning natural resources; the latter was in part driven by exploration, and has in turn helped to improve the exploration climate.

As John Dow, long-ex-patriot New Zealander and recently retired managing director of Newmont Australia, notes in the Foreword to this monograph of the Australasian Institute of Mining and Metallurgy, “These papers

include previously unpublished company exploration data, university research on mineral deposits and a useful summary of the country’s regional geological framework. This provides a context for the papers which describe New Zealand’s natural mineral endowment.” Also highlighted by Dow, “This Monograph provides helpful cross-references to many other sources of technical exploration data such as CD-ROMs and GIS information contained in government, university and company websites.” To date, explorers have often been handicapped by the fragmented nature of the mineral resources database, particularly during the very active period since 1989 when a huge amount of technical information was produced.

Editors Christie and Braithwaite followed the philosophy of the previous 1989 Monograph 13, “Mineral Deposits of New Zealand”, an update of the original 1974 Monograph 4 on the economic geology of New Zealand, in that they sought to summarize the mineral exploration and mining activities since 1989 and not repeat basic information that had already been documented. The following 337 pages contain 47 papers by 70 authors, a mere 7 pages per article on average; as such, the explorer interested in the basic details of geology will want the two earlier monographs, as well as many of the sources of data and information referred to in the papers that comprise the volume.

These short papers were reviewed by a panel of 65 experts from New Zealand and worldwide, and hence, the technical content presented is largely of a uniformly high quality. The contents touch on such varied topics as volcanogenic massive sulfide deposits, both on-shore as well as off-shore potential (the latter is still active in many cases), platinum prospects in layered igneous complexes, placer ilmenite deposits, and alluvial gold mining. Other

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resources include griesen W and Sn, orogenic and granite-related Au, magmatic Ni–Cu sulfide, and ophiolite-related Cu, chromite, and chrysotile. There are porphyry Cu as well as Mo deposits, Pb–Zn skarns, epithermal Au–Ag veins, and the volcanogenic massive sulfide deposits include both Pb–Zn and Cu±Au. These resources reflect the wide variety of tectonic environments on this sliver of microcontinent, early Paleozoic to early Cretaceous in age, formed on or near the margin of Gondwana. Late Cretaceous to Cenozoic sedimentary basins and volcanic arcs formed after the separation of the sliver from Gondwana.

The recent to active arc-back arc setting of much of the North Island and its associated resources is reflected in 22 papers, nearly half the volume, related to epithermal systems, including some that are still hot. Fifteen of the papers deal specifically with individual gold deposits. Other papers discuss topics beyond the epithermal deposits themselves, including GIS modeling and related studies of the gold prospectivity—epithermal and otherwise, structural and tectonic controls on epithermal mineralization, magnetic and gravity results in exploration (although not the magnetic and gravity surveys recently flown over the Taupo Volcanic Zone that hosts extinct as well as active systems), and halloysite and zeolite resources. Eleven other papers discuss the orogenic gold deposits of the South

Island and their derivative placers that account for much of the pre-1990s gold production and a significant portion of the present production.

The hardcopy of the book has only black-and-white figures; the book is duplicated by the CD-ROM with many figures in their original color. As a result, some figures meant to be viewed in color are difficult to understand in their black-and-white versions in the book. The AusIMM would have been better off charging \$20 more for the book and including the CD-ROM in the back of all copies rather than selling them separately. In addition, a few of the figures did not translate well to the digital production. For my own preference (and perhaps others with reading glasses), the font of the main text is too small, fine for a glance at some data, but uncomfortable for an evening read.

I will pull this book off the shelf first to look for timely information on New Zealand mineral resources and references; for any detailed consideration of figures, particularly geophysics, I am glad that I also have the CD-ROM. This volume is essential to the library of anyone exploring New Zealand's mineral resources or considering to do so and should be perused by those exploring similar terranes elsewhere, given the wealth of knowledge on these New Zealand resources and their geologic settings in this and previous monographs.