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REVIEWS

Geology and Exploration of New Zealand Mineral Deposits. A. B. CHRISTIE AND R. L. BRATHWAITE, Editors. Australasian Institute of Mining and Metallurgy Monograph 25. Pp 350. 2006. ISBN 978 1 920806 52 1. Price A$80.

This book is one of a series, published since 1962 by the AusIMM, that focuses on aspects of mining and economic geology of the Oceania region. Monograph 25 is the third of a series devoted to New Zealand, following Monographs 4 and 13. Another monograph, published by the Institute of Geological and Nuclear Sciences, dealt with the tectonics and metallogeny of New Zealand and provides a comprehensive list of all deposits and occurrences known as of 1993 (Brathwaite and Pirajno, 1993).

Monograph 25 is edited by two well-known geoscientists who have devoted most of their professional life to the economic geology of New Zealand, a country not especially renowned for its mining industry but with the considerable advantage of having a range of tectonic settings conducive to several kinds of ore systems within a comparatively small geographic area. This rare advantage provides the international geoscientific community with insights into the relationship between ore-making systems and tectonic environments.

Monograph 25 comprises a total of 47 papers, with 21 papers that describe epithermal systems, nine on orogenic gold-tungsten-antimony lodes, eight on alluvial gold and placer iron sands deposits, and three that deal with offshore minerals such as ferromanganese nodules and fascinating accounts of submarine ore systems in the Kermadec arc. One paper treats the unusual, alkaline-related Sams Creek gold deposit, whereas others provide an awareness of the exploration for and uses of industrial minerals (halloysite and zeolites deposits). Although discussed in Monograph 13 (Kear, 1989), missing from this volume are the Ni-Cu magmatic sulfide mineralization of the Riwaka Complex and the intrusion-related Mo and W-Sn systems of the South Island. This is somewhat disappointing because short papers and/or updates on these important ore systems would have been welcome.

Although each paper is only 8 to 10 pages long, the editors have ensured adequate coverage of the relevant topics together with a comprehensive list of references that cover practically all that is known about the particular subject. The figures are good, clear, and all consistently drafted in the same style, although in places differences in gray shadings are not easy to discern.

Following an introduction and an overview of New Zealand's geologic framework and associated mineral deposits by the editors, the monograph is divided into eight sections, essentially based on geography, but also taking into consideration mineral deposit types. The sections are as follows: (1) Northland, (2) Hauraki gold field, (3) Taupo Volcanic Zone, (4) North Island coastal iron sands, (5) Marlborough and Nelson regions, (6) West coast region, (7) Otago and Southland regions, and (8) Offshore minerals. Each section provides a variety of short papers that encompass a series of ore systems.

In the introduction, the editors discuss the comparatively new legislation that regulates the mining and exploration industry. New Zealand has spectacular scenery and its environmentally conscious inhabitants strive to preserve the natural beauty of the country. New Zealanders have managed to restructure legislation to allow mining and exploration, providing that certain strict guidelines are maintained. This has been particularly successful with alluvial and iron sands mining in the South Island, thereby providing an example of how the mining industry and a pristine environment can coexist.

The overview chapter for the monograph begins with a summary of New Zealand's geology and associated mineral occurrences. The second paper in this chapter summarizes GIS modelling of gold deposits. Overviews of the VMS deposits and PGE prospects follow. Placer ilmenite along the west coast and the alluvial gold operations of central Otago and near Greymouth, all on the South Island, are then summarized.

The chapter on Northland contains one paper on halloysite clays, and a second on Hg- and Au-Ag–bearing epithermal sinter deposits north of Auckland. Next is the chapter on the Hauraki gold field, truly one of the best natural laboratories in the world for the study of epithermal ore systems. This section, understandably, has the largest number of papers (17). A regional overview, with excellent figures detailing all known deposits and occurrences, is followed by papers on structural and tectonic controls, geophysical signatures, caldera controls, exploration, geology, and mining history of several of the epithermal systems, including the well-known Karangahake and Waihi-Martha Hill deposits. Very useful here are insights into the geophysical signatures and historical backgrounds.

I have to lament, however, two things. One is that a geologic summary and/or a table of volcanic stratigraphy of the Hauraki gold field could have been presented in the introductory paper, thereby avoiding unnecessary repetition of the regional geology in each paper. The space saved could have been utilized for more text. The second is that gold grades and production data are presented as a mix of ounces and/or metric units, often in the same table. For an international audience, particularly the surging Asian economies, it would have been best to use only metric units.

The next chapter is focused on the enthralling Taupo Volcanic Zone, where present-day near-surface and surface expression of epithermal systems can be observed first hand. One paper details the well-established models of the Taupo geothermal and the White Island magmatic-hydrothermal systems. The coastal iron sand deposits of the North Island follow with two papers. The chapter on Marlborough and Nelson includes two papers: one describing the Marlborough Schist belt and the other discussing the unusual gold- and sulfide-bearing peralkaline intrusions at Sams Creek in northwestern Nelson. For the west coast region, two papers review exploration and geology of the historical Reefton gold field.

These are followed by three papers on alluvial gold mining, including that associated with the historical Kaniere dredge. Another paper presents a summary of the Au-bearing veins of the Southern Alps. Descriptions of orogenic Au ± W ores systems, such as Glenorchy, Shotover-Macetown, and the world-class Macraes deposit, are presented in the chapter on Otago and Southland. Three papers on offshore minerals include material on the intraoceanic Kermadec arc submarine vent systems, on which cutting-edge research has been conducted, and the ferromanganese nodules on the Campbell plateau.

This new monograph on the geology of and exploration for mineral deposits in New Zealand complements the previously published monographs which, taken all together, effectively provide a comprehensive treatise. The layout, figures, and presentations are all of high quality, and the price is very affordable. This monograph is highly recommended to academics, researchers, geoscientists, and engineers in the mining and exploration industry.

REFERENCES

Brathwaite, R. L., Pirajno, F. 1993, Metallogenic map of New Zealand: Institute of Geological and Nuclear Sciences, Monograph 3, 215 p.

Kear, D., 1989, Mineral deposits of New Zealand: The Australasian Institute of Mining and Metallurgy, Monograph 13, 225 p.

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