

BOOK REVIEW

PRINCIPLES OF METAMORPHIC PETROLOGY by Ronald H. Vernon and Geoffrey L. Clarke. Cambridge University Press, 2008, 446p., Price:\$120.

The book 'Principles of Metamorphic Petrology' is an absolutely wonderful work and a delight to read. I found the book very refreshing content-wise and clarity in terms of the writing style. Vernon and Clarke's book opens with a succinct preface that gives an overview of what's out there on the subject. The core text of this book is covered in seven chapters.

Chapter one is conventionally devoted to introduce the reader about the definition, classification and scope of metamorphic processes. It gives a balanced account of metamorphic rocks and processes. With the advent of advanced analytical tools, experimental techniques aided by software programs, we are now able to quantify the metamorphic processes more accurately and more thoroughly. For those seeking the very soul of metamorphic petrology, the best the book has to offer is to be found in the first four chapters. One of my favourite chapters in the book deals with the interplay between metamorphism, microstructures, deformation, and pressure-temperature-deformation-time (P-T-d-t) studies. Earth evolution is largely the result of dissipation of Earth's heat through time. The study of pressure-temperature-time variation in rock record is apparently the key to envisage how lithosphere responds in terms of energy and material. Tracking the P-T-d-t history of individual rocks in tectonic belts and comparing such histories among different belts helps us understand the tectonic processes that have shaped Earth's lithosphere. Besides, advances in analytical capabilities over the period of time have allowed geochronological studies to be carried out at a scale similar to petrological observation and within the realm of mineral processes. With a variety of techniques now available for high resolution studies, the authors effectively relate metamorphic petrology and geochronology to comprehend tectonometamorphic events. The emerging concept of P-T pseudosections for phase equilibria lessons using bulk-rock composition through versatile THERMOCALC program has been given wide coverage in this book.

Chapter 4 covers the interface between metamorphism and metamorphic melting reactions. Also discussed is the extent of partial melting and magma generation that significantly influence the granulite – granite link during

high-grade metamorphism. Exciting researches on the deep seated granulites have captured the spirit of petrologists across the globe. Vernon and Clarke have a talent for translating their own enthusiasm for the subject to the written text as they focus on composition and excellent field description of migmatites for understanding continental magmatism and rheology of the high –grade rocks.

Chapter 5 is committed to grain boundary fluids and material transport in the realm of metasomatism: fluids are vital in speeding up the chemical reactions and facilitating melting too. Having experienced remobilization, the metamorphosed ore bodies and their altered host rocks show textural and mineralogical modifications that carry economic implications. Thus, looking for metamorphic overprint can be an effective exercise to understand the primary ore-bearing rocks.

Metamorphosed rocks commonly suffer deformation. In chapter 6, authors discuss about metamorphism, microstructures and deformational studies over a range of P-T conditions and on all scales. However, Chapter 6 appears little out of place in respect of continuity of the previous sections. Several field photographs and photomicrographs of deformed/folded/layered rocks inserted throughout the text are spectacular.

In the last chapter, the authors focus on the broad criteria for recognizing 'parent rocks' or 'protolith' affiliation of recrystallized metamorphic rocks. They attempt to classify the metamorphic rocks according to the chemical variation found in the metamorphic rocks. This chapter offers essential reading for students of petrology. Importance of the study of precursor rocks is illustrated by some examples that simultaneously demonstrate potential economic mineral exploration.

Useful glossary, a voluminous bibliography (from Abbott to Zwart) running to almost 70 pages and an index conclude the volume. This book will be of interest to both the metamorphic petrologists and geochronologists.

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