

## BOOK REVIEW

**Book Review: *A Pictorial Guide to Metamorphic Rocks in the Field*.** By Kurt Hollocher (2014) CRC Press, Boca Raton, Florida, 326 pages, ISBN: 9781138026308, print \$42.46, eBook \$34.97.

I will begin by stating that I like this book. The book is really all about recognizing and interpreting textures of metamorphic rocks and it succeeds with abundant high-quality outcrop photographs, photomicrographs, and illustrations. I am sure this book will be a helpful supplement for many students of geology, regardless of whether they practice in the field or behind the eyepiece of the petrographic microscope. The textures illustrated in the book include those that form from the deformation and recrystallization that accompanies metamorphism and relict features from sedimentary or magmatic protoliths. The variation of natural metamorphic textures is enormous, so no book will be able to illustrate them all, but this book shows the most common as well as a few more exotic textural examples. The book has 25 chapters that are organized into three parts: (1) Metamorphic rock types—13 chapters; (2) Metamorphic features—8 chapters; and (3) Relict pre-metamorphic features—3 chapters. There is also a reference list and a glossary of terms at the end of the book.

Chapter 1 is set apart from the three parts of the book and is a concise summary of themes important to understanding metamorphism and textures that develop during metamorphism and deformation. The short summaries include metamorphic facies, preservation of peak assemblages, metamorphic field gradients, foliation and lineation, chemical flux, and recrystallization.

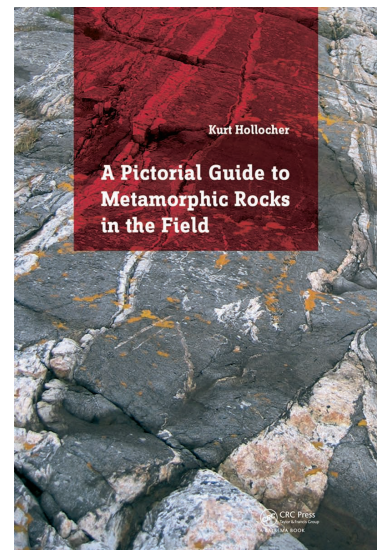
**Part 1: Metamorphic rock types.** Short and useful remarks about the protoliths of each of these rock types lead off these chapters. Chapters 2–14 cover and illustrate the following rock types: pelites, quartzite, marble, calc-silicate rocks, mixed sedimentary rocks, conglomerates and breccia, gneisses, basaltic rock (low and intermediate pressure), blueschist, eclogite, ultramafic rocks, contact metamorphic rocks, and rocks in fault zones.

**Part 2: Metamorphic features.** Chapter 15 illustrates and depicts basic foliation, cleavage and primarily mineral lineations. Chapter 16 shows folds in a variety of rock types over a range of scales. The last illustration of the chapter shows a nice pair of sheath folds. Chapter 17 is concerned with porphyroblasts and augen. A simple illustration shows the schematic deformation of porphyroblasts and relict phenocrysts (augen). A variety of mineral porphyroblasts are shown along with a variety of slightly to highly (mylonitic) deformed felsic gneisses that had

porphyritic granitoid protoliths. Chapter 18 illustrates boudins and boudinage development in outcrop photographs. Some of these photographs are spectacular. Chapter 19 shows examples of veins and hydrothermal alteration. These photos include a geothermal field, a range of veins filled with low to higher temperature minerals, as well as veins with alteration haloes. Chapter 20 is focused on metasomatism.

One figure (20.2) gives six examples of metasomatism at thin section scale. The outcrop-scale photographs show metasomatic rims associated with several types of veins and a mafic xenolith in a granodiorite, and due to contact metamorphism. Chapter 21 is concerned with partial melting and migmatites. Textures associated with partial melting and migmatites could consume an entire book, so specialists might find the treatment here a little superficial; nevertheless, the ten outcrop photos and photomicrograph plate will give students a good overview. Chapter 22 shows retrograde metamorphism, and the emphasis is on textures that reflect post-peak hydration or decompression for rocks that have not experienced significant penetrative deformation along the retrograde path. As a result, the photomicrographs and outcrop photographs are either partial to nearly complete pseudomorphs of original porphyroblasts or reaction rims producing minerals with large molar volumes (e.g., cordierite or plagioclase) that are commonly associated with decompression following peak metamorphism.

**Part 3: Relict pre-metamorphic features.** This could be my favorite part of the book. The correct recognition of protolith textures that survive metamorphic recrystallization can (1) be key to interpreting the regional significance of metamorphic rock sequences and (2) alleviate the need to concoct complicated deformation and/or reaction scenarios to explain puzzling



textural observations. Chapter 23 explores examples of primary sedimentary textures, mostly from quartzite and turbidites, that survive metamorphism. The photomicrographs show examples of detrital feldspar and zircon from quartzite. The outcrop photographs show examples of soft-sediment deformation, crossbedding, and graded bedding. Chapter 24 deals with the unusual topic of fossils in metamorphic rocks. Many of these outcrop photographs illustrate fossils from the well-known localities near Littleton, New Hampshire (U.S.A.), but there are also examples of trace fossils from Norway and crinoids from Sweden. Chapter 25 covers relict igneous features at outcrop scale. The igneous features include deformed pillow structures, fragments attributed to pyroclastic activity in felsic volcanics, dikes that cut various host rock types, graded layering in a metamorphosed cumulate gabbro, relict phenocrysts, preserved chilled margins, metamorphosed intrusive breccia, and metamorphosed granitoids with xenoliths.

This book is intended to be a reference rather than a textbook. The book would be particularly useful as a reference in practical/lab sessions. In e-book format it could also be easily taken

into the field, and I believe students would find it very useful.

The final outcrop photograph (Fig. 25.22) uses the author's Ph.D. advisor (and mine), Peter Robinson, for scale. Peter taught many students at the University of Massachusetts about metamorphic textures and their interpretation on both the thin-section and outcrop scales. The author has benefitted from and taken this experience and instruction to heart. The book's dedication is to "all the world's field mappers, without whom instrument crank turners, like me [the author], would have nothing useful to do." This is perhaps somewhat falsely modest considering the collection of field and petrographic imagery amassed over years and used by the author for this publication. I would also encourage anyone buying the book not to skip reading the "About the author" page.

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