

BOOK REVIEW

MODELLING OF MAGMATIC AND ALLIED PROCESSES. Edited by Santhosh Kumar and Ram Narain Singh, Springer, 2014, 240p.

The book under review comprising of ten papers succinctly provides an overview of the numerous geophysical and geochemical models of magmatic processes both in terms of mathematical treatment as well as direct evidences from field, mineralogical and petrographic studies. Additional information obtained from petrographic, LA-ICP-MS, SEM and EPMA studies (zoned minerals and fluid inclusions) and the use of the geochemical data tool kit (GCDkit) are also included in this compilation which help in understanding the magmatic processes and also constrain some models.

Santhosh Kumar in his lead article '*Magmatic processes: review of some concepts and models*' (pp. 1-22), provides a review of models of magmatic differentiation through crystal fractionation and magma mixing from field and petrographic (textural) evidence. Singh and Manglik in two articles, deal with '*Models for quantifying mantle melting processes* (pp.23-46) and '*Parametrized mantle convection analysis in crustal processes* (pp.75-88). Vijay Kumar and Rathna (pp.47-74) in '*Geochemical modeling of melting and cumulate processes: a theoretical approach*' provide a generalized over view of mantle melting and magma chamber processes with Indian examples from Kondapalli and the Nellore schist belt. Sing and Ganguly (pp.89-108) in '*Modelling of paleogeotherms in the continental lithosphere: a brief review and application to problems in the Indian subcontinent*' provide an account of the different models of paleogeotherms for steady-state and transient conditions with examples from the Dharwar craton. Borska and Petrik (pp.109-150) in '*Accessory phases in the genesis of igneous rocks*' deals with the characteristics and typomorphic features of accessory mineral phases such as zircon, apatite, iron-Ti oxides, titanite, epidote, allanite, monazite, xenotime and tourmaline from granitic rocks and their use in classifying the granites in to A-, I- and S-types with examples from Western Carpathians. Slaby and others (pp.151-166) in '*Self-similar pattern of crystal growth from heterogeneous magmas; 3D application of LA-ICP-MS data*' deal with a novel method of 3D depiction of digital concentration – distribution models (DC-DMs) of trace elements in complex zoned crystals combined with fractal statistics and evaluation of the

equilibrium-non-equilibrium processes during crystal growth in geochemically heterogeneous environments during magmatic evolution. Pant (pp.167-180) in '*Micro-analytical characterization and application in magmatic rocks*' briefly reviews the application of SEM and EMPA in obtaining data on geothermobarometry (using Ti in quartz and zircon), timescale of magmatic processes (dating of monazite and others) and melt inclusions to understand magmatic processes. Sharma and Srivastava (pp.181-208) in '*Hydrothermal fluids of magmatic origin*' provide an over view of the variety of fluids that emanate from the magmatic system and their mineralization potential with examples of porphyry-type Cu and Mo (Malanjkhand) and W (Balda-Tosham) deposits from India. Ishihara and Imai (pp.209-224) in '*Oxidized granite magmas and porphyry copper mineralization*' provide an account of the oxidation state of Precambrian granitoids (low oxygen fugacity) and lacking the magnetite-series (magnetite=hematite) compared to those of Cenozoic age which show high oxygen fugacity with the magnetite series minerals (magnetite=hematite) along with hornblende and biotite having higher Mg/Fe ratio and which host porphyry Cu deposits. Janousek and Moyer (pp.225-238) in '*Mass balance modeling of magmatic processes in GCD kit*' provide a brief introduction about the utility of an open-source software package Geochemical Data Toolkit (GCDkit: <http://www.gcdkit.org>) updated in 2013 written in R language for handling, calculating and plotting the geochemical data of igneous rock suite.

As the Editors point out, the domain of magmatic modelling and allied processes is a vast one with considerable scope to cover other aspects not included here. Nevertheless this book would be an excellent guide and source for teachers, post-graduate students and research scholars in igneous petrology and also for geophysicists dealing with P-T domains related to magma generation in the mantle and crustal domains.

Flat No. 103 A, IGV Apts.,
Rajarajeshwarinagar,
Bengaluru – 560 098
E: krisviji@gmail.com

P. KRISHNAMURTHY