

most idiosyncratic contribution in which an analogy is drawn between the development of individual oceanic island volcanoes, and the growth of oceanic plates. The same authors also speculate that some ophiolite complexes in Kamchatka represent abducted remnants of the Hawaiian–Emperor volcanic chain, where its northward extension appears to have been involved in subduction. (M.A. 93M/1073–1090)

Minor quibbles include the poor quality of the field photographs in an otherwise excellent account of the Josephine ophiolite; the lack of any diagrams in the valuable review article on the volcano-tectonic setting of oceanic lithosphere generation; and the frequent perpetuation of the unfortunate term ‘sheeted dykes’—a tautology if ever there was one.

Overall, this compilation provides a stimulating basis for further research, and if it adds up to slightly less than the sum of its parts, this is surely a reflection of the current state of the ophiolite/oceanic crust debate, in which the detailed complications outweigh the overall simplicity of the concept.

W. J. WADSWORTH

Tossell, J. A. and Vaughan, D. J. *Theoretical Geochemistry: Applications of Quantum Mechanics in the Earth and Mineral Sciences*. Oxford (Oxford University Press), 1992. xiv + 514 pp. Price £60.00

This text by Tossell and Vaughan is outstanding and timely. At the beginning of this century, the applications of chemistry revolutionised the way in which we study the Earth and its constituent minerals. Today thanks to advances in super-computing, we are in a position to apply more sophisticated aspects of chemistry to geology. This book provides the first major introduction and review of such advanced geochemical methods and shows how they can be applied to mineralogy.

After a brief introduction to the subject, the next eighty pages are dedicated to a discussion of the major advanced experimental methods which are used to measure the behaviour, properties and characteristics of solids. This includes a review of diffraction methods and of adsorption, vibration and nuclear spectroscopic techniques. There then follows a clearly and authoritatively written chapter on the basic theoretical methods used in quantum mechanics, including discussions of the Hartree-Fock method and density functional theory, which ends by bringing the reader to the forefront of research with a discussion of quantum molecular dynamics.

The three following chapters provide an outstanding review of the progress to date in the simulation and calculation of the properties of oxides, silicates and sulphides. The literature is well and fairly covered, and references to work done as recently as 1990 are included. Subsequently, progress on specific topics is reviewed, with fascinating discussions on, for example, the reinterpretation of Pauling’s rules, the problems of studying the properties of the minerals of the Earth’s deep interior, and of industrial minerals such as zeolites. A chapter on geochemical problems includes a discussion on the nature of melts and solutions, modelling of mineral surfaces, and the partitioning of elements.

For anybody interested in the way in which geochemistry will evolve in the 21st century, this book is essential reading. The authors are to be congratulated in producing a first-class contribution to literature.

R. J. PRICE

Butt, C. R. M. and Zeegers, H. (eds.). *Handbook of Exploration Geochemistry in Tropical and Subtropical Terrains*. Amsterdam (Elsevier Science Publishers), 1992. 630 pp. Price Dfl360.00 (\$205.50).

Exploration geologists, to whom this Handbook is mainly directed, and who use geochemistry of surface and near-surface materials as one of their major ore-finding techniques will particularly welcome this large and comprehensive collection of data on the subject of the origin and interpretation of the regolith and its geochemistry in tropical and subtropical terrain. The regolith is incredibly complex and the interpretation of the results of mapping and geochemical surveys is often a frustrating experience. With climatic changes having superimposed different weathering products on older deposits the exercise in decoding the data is daunting. In addition it must also be remembered that the duricrust not only conceals ore bodies, but it also hosts them.

The message that this book delivers to all exploration geologists using geochemistry is quite clear. Prepare a regolith landform map and use it in the preparation of the sampling programme and in the interpretation of the results. If this is not done then the survey will be inadequate and most probably miss many of the important clues. If the authors’ advice is followed then the chances of success will be greatly enhanced. How often do we hear of soil sample surveys being carried out with samples having been taken at a constant depth without any thought being given to the genetic significance that the samples have in the