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BOOK REVIEW

INTRAPLATE VOLCANISM IN EASTERN AUSTRALIA AND NEW ZEALAND. Compiled and edited by R. W. Johnson, J. Knutson, and S. R. Taylor, Cambridge University Press, Cambridge, England, 1989. 408 pages. $75.00.

For the typical multiauthored text to be transformed into a coherent, structured, erudite, and comprehensive volume that draws upon many facets of the geological sciences takes a rare energy on the part of the editors. In this respect, Wally Johnson and colleagues have excelled with a marvelous example for others to follow. The individual contributors have allowed their data, hypotheses, and speculations to be edited, cut, and pasted as appropriate, so that the net impact of the whole book is considerably enhanced.

Despite many impressions to the contrary, the eastern margin of Australia has experienced considerable tectonic and igneous activity from the Late Mesozoic through the Tertiary. First, there was the development of a strongly uplifted passive margin on the western flank of the Tasman Sea spreading activity ~95–53 Ma, perhaps associated with detachment faulting. Concurrent and continuing separation of Australia from Antarctica has resulted in the northward passage of eastern Australia over at least three hot spots—the active locus of one of these is now to the southeast of Tasmania, and at least two other active traces are present in the Tasman Sea.

A well-defined age progression of the so-called central volcanoes, marking the surface igneous expression of the intracontinental hot spots, was presented by P. Wellman and I. McDougall (1974, Tectonophysics 23, 49–65) and seems well established by subsequent work. In addition, many other examples of isolated eruptive activity unrelated to these major hot-spot traces are documented in eastern Australia and New Zealand. The names of several of these centers are well known in the petrologic literature, but for the first time a temporal and broader geographic framework in which to place these occurrences is presented in a single book.

A history of early work and a brief description of volcano distribution and the classification systems used introduces subsequent chapters on the plate tectonic setting, geological framework, geophysical characteristics, physical volcanology, a province-by-province description of volcanic geology, volcanic petrology, geochemistry and isotope systematics, and upper mantle and lower crustal xenoliths.

The final section is entitled "Towards a General Model" and represents a synthesis of facts and hypotheses relating to the origin and development of intraplate igneous activity. A group of petrologists, structural geologists, geophysicists, and geochemists have combined forces in this part to produce an excellent perspective of what is known and where future research effort could be profitably expended. It is clear from the text and figures that a vast amount of analytical data now exists for the volcanic rocks of this part of the world, and I trust that the availability of these data (advertised on p. 13) ensures wide dissemination for comparative and further study purposes.

I have some criticisms that temper only slightly my enthusiastic overall recommendation of this book. There are places where the reading cannot be described as light, particularly in the encyclopedic descriptions of the volcanic geology of individual provinces. However, this part of the book stands as a comprehensive, up-to-date reference section for work that has been completed. It is unfortunate that a parochial volcanic rock classification scheme has been employed, rather than the version presented by the International Union of Geological Sciences (Le Bas et al., 1986, Journal of Petrology, 27, 745–750), but at least the classification used is straightforward and simple.

The black-and-white photographs lack contrast in some figures, but the color photographs are superb. In general, the quality of type is excellent, and very few typographic errors have survived (e.g., in Fig. 3.3.2, the axis labels are inverted; on page 175, it should be crystal fractionation rather than crustal; data points are badly faded in Fig. 5.5.6).

Overall, this is an outstanding volume that deserves to be seen and read and its style emulated by a wide variety of Earth scientists involved in tectonics, geophysics, and igneous petrology.

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