

An Australian Phanerozoic Timescale

edited by **G. C. Young and J. R. Laurie**, published by the Oxford University Press in Melbourne, Australia, ISBN 0-19-553951-6, 279 pages, 1996.

Review by Christopher G. Kendall

This book and the accompanying 12 biostratigraphic charts represent a major undertaking by Australian geologists funded by the Australian Geological Survey and the Australian Petroleum Industry Research Association. The importance of this text and the accompanying charts is that it links together Phanerozoic timescales from all over the world, illustrating the relationship between Australian stratigraphy and that of Europe, Asia, South America, North America, and Africa. The study has combined biostratigraphic timescales to high-resolution age determinations based on argon40 argon39 dates and magnetostratigraphy. The accompanying text to the charts describes in considerable detail the schemes by which the biochronology, isotopic geochronology and magnetostratigraphy were put together. In particular it describes the standard biochronological scales, their various fossils, and their ranges. This is an extremely professional work which is well referenced and well illustrated by the magnificent charts that accompany it. The key to the importance of this text is the charts that in many cases show the relationship of the local Australian stratigraphy to that of other locations from all over the world.

The only major criticism I have of this compilation is that the various biostratigraphic and chronologic charts from different geological eras use different conventions in their display. I suspect that the authors of these different charts were indirectly trying to make a statement about their scientific objectivity reflecting this in the style of the charts. For instance, some charts have magnetostratigraphy on them and others don't; some charts show relative coastal onlap and sea level, others don't; or some list the major fossils used in the age dating and provide radiometric ages to match the biostratigraphy, etc., etc.

Similarly some authors are tentative in the use of radiometric ages, others are much more ambitious and lay out sharp subdivisions for their radiometric ages and the latter relationship to the associated fossil zones. I think that the next edition of this publication would be improved if the charts had consistent styles, and included magnetic stratigraphy, coastal onlap and eustatic signal, and tectonic events.

Despite this criticism, it should be recognized that the readers can collate the paleomagnetic information and the potential relationship to eustatic signals to charts as "do it yourself" projects. However, though one can draw existing eustatic information onto the charts oneself, the relationship to sea level and tectonics to the development of the accommodation filled by Australian sedimentary sequences may be difficult to unravel for geologists who have no local information.

This work represents the state of the art for age dating, but it should be recognized that the science of sequence stratigraphy is advancing extremely rapidly, and we can expect the ages of the radiometric dates to change, the biozones to have different resolution and the magnetostratigraphy and eustatic data to alter and improve.

This timescale provides a means to put numerical and biostratigraphical constraints on the ages of the various sedimentary fills found in Australian basins. It is a clearly written, well illustrated and referenced compendium of extremely valuable information, providing a means for Australians to correlate the rocks within their continent while enabling expatriot scientists to relate their local stratigraphy to that of Australia. Sequence stratigraphy is now widely used in both the oil industry and the mining industry and is accepted as a means to develop an understanding how Australian sedimentary basins have filled and how they have evolved

through time. The local considerations are extremely important to the Australian petroleum and mining industries while the global implications are important to scientists who are using the concepts of sequence stratigraphy to understand the development of their basins using sea level curves to age date their sedimentary sequences. The use of eustatic charts in Australia is important because it helps geologists working in other parts of the world to separate local tectonic events from those produced by global sea level change. This text is a magnificent work and the authors should be congratulated on an extremely professional product.

Any geologist or geophysicist working in the Australian continent will need to have access to these charts at some time in their career, particularly if they are trying to correlate from sedimentary basin to another or within individual sedimentary basins.