

include palaeontological evidence for the initiation of cooling during the late middle Eocene.

The final paper (Hambrey & Smellie) presents evidence for the response of Antarctica to global climate and sea level change with the development of the Antarctic Ice Sheet during the Neogene.

As would be expected from the Geological Society Publishing House, this is a high quality, well structured production in hardback format. The clear descriptions and varied techniques described in this book make it a useful resource for undergraduate students approaching palaeoenvironmental or palaeoclimate studies for the first time. Specialists will use the book as a reference in stratigraphic correlation studies across the whole of the Southern Hemisphere, including proposed offshore drilling programmes (e.g. ANDRILL), and for comparison with Northern Hemisphere sections. It provides evidence for climatic conditions on Antarctica that can be used by climatologists and palaeoclimatologists in varied climate change studies. The book will also be a valuable resource for palaeobotanists and palaeontologists, providing a comparison to other key Cretaceous–Paleogene outcrops in the Southern Hemisphere, thus allowing radiations and extinctions to be tracked across the region.

In summary this book will be an important addition to any library that has researchers in Earth Sciences and will be of additional interest to colleagues from many other disciplines.

Melise Harland

SARMIENTO, J. L. & GRUBER, N. 2006. *Ocean Biogeochemical Dynamics*. xiii + 503 pp. Princeton, Woodstock: Princeton University Press. Price £48.95 (hard covers). 0 691 01707 7.
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The authors of *Ocean Biogeochemical Dynamics* aim to provide a theoretical framework for the study of biogeochemical processes in the oceans. They set out an overview of the distribution of major and trace chemicals in the oceans and provide a review of ocean circulation. They adopt a hypothesis-driven approach to tackle some of the key issues, including air–sea exchange, organic matter production and its export to deep water, remineralization and ultimately burial in sediments. They then use the tools developed in earlier chapters to tackle the cycles of carbon, silicon and calcium carbonate and finally discuss the issue of CO₂ and climate.

Those expecting a cosy, qualitative view of the oceans should look elsewhere. This is a seriously quantitative effort! The authors make no apologies; the material is designed for those with a good grounding in maths and physics rather than chemistry and biology. The authors structure the chapters by first identifying the important questions, then examining available data and developing thought experiments and models and ultimately setting up hypotheses or paradigms to be tested. I found this approach to be stimulating and thought provoking. It is an excellent means of getting the message across and in instructing students how problems should be tackled, particularly in ocean biogeochemistry when there are often few data. For example, in the chapter on production, Sarmiento & Gruber develop their arguments regarding the efficiency of the biological pump in the different oceanic biomes by using a combination of observations and modelling. They explain the link between nutrient recycling efficiency and surface nutrient concentration in terms of consumption by phytoplankton, iron supply, light limitation and temperature. They suggest that even in the iron-limited Southern Ocean the system

behaves like a large phytoplankton-dominated region, with potentially high export efficiency, rather than a picoplankton-dominated biome with low export efficiency. Why then does experimental addition of iron to surface waters of the Southern Ocean produce only a modest reduction in nutrient concentration? Primarily, the authors argue, because of light limitation. In developing this argument, the authors unravel the literature and provide their own insight to clarify a potentially tricky problem.

In the final chapter, Sarmiento & Gruber discuss the carbon cycle, CO₂ and climate. They identify the Southern Ocean as key in best explaining the variations in atmospheric CO₂ associated with glacial–interglacial cycles. They describe a synthesis hypothesis which links cooling with changes in productivity in the Southern Ocean, which in turn leads to a change in the distribution of nutrients and dissolved inorganic carbon even at low latitude. Ultimately the carbonate compensation depth shoals, leading to drawdown of atmospheric CO₂. Their hypothesis is compelling; their book will stimulate a new generation of oceanographers to prove them right, or wrong! I will certainly be recommending this excellent volume to my students and will no doubt be using it myself very frequently.

George Wolff

SHA JINGENG, WANG YONGDONG, & TURNER, S. (eds) 2006. *Marine and Non-Marine Jurassic: Boundary Events and Correlation* (Proceedings of the International Symposium on the Jurassic Boundary Events and the First Annual Symposium of the International Geoscience Program IGCP 506: Marine and Non-marine Jurassic). Special Issue of *Progress in Natural Science*, Volume 16. vi + 322 pp. Beijing: Science in China Press; Abingdon: Taylor & Francis. Price £32.77 (incl. p&p; paperback). ISSN 1002-0071.
doi:10.1017/S0016756807003664

I suspect that many institutions will lack the wherewithal for a subscription to *Progress in Natural Science*. However, librarians (and individual scientists) may wish to purchase this special issue, available on its own at a reasonable price, for the wealth of information on Jurassic stratigraphy, environments and biotas that it contains.

There are three ‘general’ papers: a preface to the issue and outline of IGCP 506 (Sha *et al.*); a review of Jurassic chronostratigraphic units (Morton); and a synopsis of new and existing isotopic data from Jurassic (and Cretaceous) cephalopods, interpreted largely in terms of global climate change (Zakharov *et al.*). Of the remaining 27 studies, 23 have a locus in south and east Asia (India, Thailand, Vietnam, Japan, far-eastern Russia and China, with fully 16 papers devoted to the last country). The results are usually interpreted within a larger geographic context so there is a good deal to interest Jurassic workers based elsewhere. British Jurassic researchers, familiar only with non-marine facies from the mid- and uppermost parts of the system, will be fascinated by the descriptions of non-marine sediments and biotas from other horizons; for example in Xinjiang province, NW China, there is a thick and almost complete Jurassic sequence entirely in non-marine facies (Shi *et al.*). Fully 11 papers, however, deal with mid-Jurassic non-marine environments and biotas, greatly enlarging existing knowledge of this interval. Fossil preservation is generally very good, and sometimes exceptional, allowing determination of the internal structure (Wang *et al.*; Zhang *et al.*), organic geochemistry (Sun *et al.*), and stomatal