

that most of the book – although it can get very technical – is actually more accessible than that definition.

The concept ‘proxy’ has fortunately been interpreted in a broad sense by the various authors. That is appropriate, since palaeoceanography and palaeoclimatology rely as much on qualitative information as on quantitative information, and many of the proxies discussed have advanced the science by providing great qualitative information about past environments and constraints to natural processes. By including these aspects in the various chapters, the assorted authors have admirably succeeded in providing a sound context of developments that underlie the state-of-the-art quantification efforts.

The book runs through almost all of the major techniques applied in palaeoceanography. Some chapters seem a bit heavy on topics that the authors themselves work on, while other relevant aspects remain somewhat underrepresented. This is understandable, and if every little application had been included, then the book would have become at least twice as long as the 800+ pages it is already. It would also have lost its focus, and it is the focus and attention to detail that makes this book into an impressive reference work. All chapters progress from general background to salient details that will be useful to a wide readership on a graduate level. The book would be less suitable for undergraduate teaching, except if supported by extensive background teaching to each chapter. The extensive reference lists that are given with each chapter offer extremely valuable directions for further study. A CD is included with the book. It contains only good-quality pdf files of the figures and does not offer the type of PowerPoint support that many recent undergraduate-level textbooks have been spoiling us with. In the introduction, the book is presented as a graduate level (and above) text, and in my assessment it has been pitched exactly right. The consistency of level that has been achieved between virtually all chapters is a credit to the editors, and of course also the authors.

What do I miss? I think for a graduate level text, some worked examples on the CD or an accompanying website would have been nice. These might have been simple scripts or spreadsheets in which graduate students (and researchers) could work their way through basic examples, so that they would not just read about these exciting proxies, but also learn how to start working with them and thus develop a true understanding. I also miss – and this a bit of a personal hobbyhorse – attention to the wealth of proxies that is being used for sea-level reconstructions, but perhaps this was considered to be more appropriate for the ‘applied’ successor volume. Finally – and this is the only real omission in my view – there is not enough attention to the various problems, challenges, uncertainties, and sources of error. Sure, they get mentioned here and there, but rarely do they get a systematic treatment. If palaeoceanography and palaeoclimatology are to develop into proper quantitative disciplines, then the uncomfortable issues of uncertainties and error-propagation need to be tackled head-on. Calibrations are not the end of the story. Very often in these disciplines, one calibrated proxy gets compared with another calibrated proxy (or several times over, and – worse – the proxies are often not fully independent from one another). However, proper error-propagation is commonly omitted,

being replaced by a very favourable and rather subjective account of a mostly qualitative assessment of combined uncertainties. This book could and should have helped to train this bad habit out of the next generation of researchers, but in my view it has largely missed that opportunity.

Despite my little grumbles, I am overall very impressed with this book. I am positive that it will prove to be an extremely valuable reference book for anybody with an interest in reconstructing the past workings of the oceans and their involvement in climate change. I hope it will be accessibly priced and that paperbacks will be made available.

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LINNEMANN, U., NANCE, R. D., KRAFT, P. & ZULAUF, G. (eds) 2007. *The Evolution of the Rheic Ocean: From Avalonian–Cadomian Active Margin to Alleghenian–Variscan Collision*. Geological Society of America Special Paper no. 423. viii + 630 pp. Boulder: Geological Society of America. Price US \$149.00 (paperback). ISBN 9780 8137 2423 2. doi:10.1017/S0016756808005724

The opening and closure of the Palaeozoic oceans that lay between equatorial Laurentia and the southern polar Gondwana continue to fascinate geologists. The geological history of this region would have been simpler if there had only been one ocean between these two continents. As we now know, there was one other major continent (Baltica) and over a dozen microcontinents that complicated the intervening area. Most of these fragments were rifted off the Gondwanan margin and drifted northward to accrete with Laurentia. Baltica and the archipelago comprising the Rheno-Hercynian zone and Avalonia separated two oceanic branches. For a time, the research community was pre-occupied with the northern branch, the Iapetus Ocean. More recently, attention has shifted to the southern branch, the Rheic Ocean, whose closure culminated in the Late Palaeozoic Variscan Orogeny.

International Geological Correlation Program (IGCP) Project 497 has done much to coordinate research on remnants of the Rheic Ocean and its margins, now scattered across five continents. The present volume collects together research papers given at five meetings of this project held between September 2004 and July 2005. As is usual with such compilations, there is a mixture of content from reviews of substantial parts of the orogen to detailed studies of one small sector. However, the geographical spread is very broad. Iberia and the Mexican terranes are best represented (five papers each), with strong showings from the Saxothuringian and Barrandian zones (four papers each) and from South America (three papers). Other areas are represented by single papers only: Western Avalonia, Far Eastern Avalonia, Armorica, Baltica, North Africa, the Proto-Alpine terranes and Siberia. The volume will naturally arrive in many libraries as part of the Geological Society of America’s special paper series. Geologists who work on Palaeozoic palaeogeography and tectonics will certainly want access to a copy.

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