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Cool-Water Carbonates - *Depositional Systems and Palaeoenvironmental Controls*, edited by H.M. Pedley & G. Carannante, 2006. Geological Society of London, Special publication 255. The Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath BA1 3JN, United Kingdom; Hardback, 373 pages. Price GBP 90.00. ISBN 1-86239-193-9.

A range of diverse research results is presented in 19 papers on cool-water carbonate processes and environments. They are preceded by an editorial introductory paper and followed by a subject index. Cool-water carbonates are defined as “skeletal debris-covered sea-bottom facies with biological assemblages without hermatypic coral reefs but with calcified green algae and non-skeletal particles”.

The nucleus of this volume consists of papers on microtidal Mediterranean carbonates of (sub)recent and ancient age, selected from the papers presented at the 2004 International Geological Congress in Florence. Additional papers deal with oceanic macrotidal environments in Mexico, New Zealand and Australia. The editors point out that gathering these papers in one volume is only an initial step, and that a formidable task still lies ahead, such as understanding the preservation potential of such carbonates, unravelling their early diagenesis, re-examining the older sedimentary record to ascertain relationships between cool-water carbonates and their better studied tropical equivalents, and to perhaps reinterpret successions that have been believed to be tropical. In this volume, the following range of concepts on carbonate morphology, diagenesis and sequence stratigraphy is presented.

Nalin et al. discuss coralliferous bancs of encrusting red algae on soft bottoms in the Mediterranean that are scarcely known from the fossil record. Basso et al. present results from a study of four cores showing a transition of Late Pleistocene circa littoral coastal assemblages grading to deep muds. Bassi et al. show Miocene temperate-carbonate channel carbonates with a range of coralline algal assemblages, rodolith shapes and inner structures, reflecting different facies and paleoecological settings. Kershaw & Guo draw attention to a marine versus a fresh-water origin of peritidal carbonates with cyanobacterial mounds, thus highlighting possible conflicting conclusions from a geochemical versus palaeontological approach. Fornós & Ahr studied mid-ramp autotrophic red algae transported up-dip and down-dip, and markedly differing from tropical examples with carbonate factories at various depths. Toscano et al. review seafloor morphology in a volcanically active area where morphological differences control carbonate growth in the rhodalgal carbonate factory. Massari & Chiocci analyse the architecture of basin-ward prograding clinoform bioclastic sand bodies detached from the coastline and developed on a distally steepened ramp. The efficiency of the carbonate factory is related to vigorous atmospheric/marine circulation accompanying the long-term climatic changes the last 3.1 Ma. Braga et al show that Neogene temperate bioclastic carbonate accumulations in Betic intramontane basins formed on ramps and are controlled by a depositional surface profile and local hydrodynamic conditions. Pedley & Grasso relate cool-water carbonate depositional and

early digenetic facies with rapid interglacial sea-level oscillations. Reuter et al. document stratal geometries of a late Miocene tropical to cool-water carbonate transition within a chronostratigraphic framework with sediment bodies developed in relation to active fault movements and 4th-order and 3rd-order eustatic sea-level changes. Ruberti et al. present shallow-water foramol limestones and evolving rudist biostromal accumulations on open peloidal-muddy shelves.

In the section on macrotidal settings, examples are presented from New Zealand, Australia and Mexico. Halfar et al. discuss cool-water-type carbonates at temperatures where a warm-water association would be expected in the northern Gulf of California (Mexico). By using integrated high-resolution oceanographic monitoring techniques, four acoustic facies have been recognised. Lukasik & James establish climatic changes affecting facies, accumulation rates, productivity and the style of stratigraphic packaging in an epeiric temperate-water carbonate system in South Australia. Anastas et al review processes in carbonate-dominated seaways and recognise that mutually related lithofacies allow recognition of large-scale processes influencing their development, thus arriving at a conceptual general seaway model. Kindler et al. recognise isolated carbonate platforms as carbonate factories during sea-level highstands. They shut off during low sea-level stands when bank tops emerge. A reverse depositional model, however, with shallow-water carbonates production at low sea-level stands and interruption at high sea-level stands when bank tops are drowned, is proposed. Hendy et al. highlight strata geometry of 5th-order and 6th-order glacio-eustatic sequences based on shell beds. Their taphonomic properties relate to a sequence stratigraphic position. Mutti et al. studied both Australian and Mediterranean carbon-, oxygen- and strontium-isotope ratios in carbonates. They offer a viable low-resolution alternative for dating young Neogene unconsolidated platform sediments where biostratigraphic markers are lacking. Knoerich & Mutti review literature on diagenetic environments for precipitation of epitaxial cements and complement such data with study results from shallow-water Oligo-Miocene heterozoan carbonates of Malta and Sicily. Finally, Caron et al. analyse sedimentary outcrop successions to help elucidating the cementation history in a New Zealand Pliocene limestone. Cement suites are separated by diagenetic discontinuities or breaks in cement growth. Regional distributions of such suites constrain the nature and scale of fluid systems involved. Thus offlap and downlap cementation trends are established for cool-water carbonates.

There is now an urgent need to improve this dataset with further information on other cool-water carbonates of recent and (sub)ancient origin. Also, in order to become a fully developed sub-discipline, a comprehensive textbook on cool-water carbonates is urgently required, in which modern concepts of morphology of constituents, facies, diagenesis and their position in a sequence stratigraphic framework are discussed. Then modelling of cool-water carbonates may result in economic opportunities as potential regional aquifers and hydrocarbon reservoirs.

The present book is an interesting first compilation of papers that may open into a new subdiscipline in carbonate sedimentology and is as such recommended to research workers and graduate students.

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