

***Modern and Ancient Carbonate Eolianites: Sedimentology, Sequence Stratigraphy, and Diagenesis*, by F.E. Abegg, P.M. Harris & D.B. Loope, 2001. SEPM Special Publication 71. SEPM, 1741 E 71st Street, Tulsa OK 74136-5108, USA; 207 pp. US\$ 90.00 (SEPM members), US\$ 125.00 (non-members). ISBN 1-56576-079-4.**

The new volume of the time-honored SEPM Special Publications series consists of a preface, twelve papers (with 143 figures + 20 tables) and an alphabetic index. The contributions are grouped under the three headings 'Carbonate Eolianite Overview' (2 papers), 'Quaternary Carbonate Eolianites' (6 papers) and 'Paleozoic and Mesozoic Carbonate Eolianites' (4 papers). The rationale for the publication of the book is adequately stated in the Preface and may be summarized as follows: (i) recognition of carbonate eolianites, (ii) understanding their sedimentologic and diagenetic variability, (iii) interpretation of carbonate eolianites in a sequence stratigraphic framework.

Identification of the subject sediment is seriously hampered by the 'subtidal bias', and this obstacle can be overcome only if reliable diagnostic criteria are available for differentiating eolian from high-energy shallow-marine carbonates. Virtually all contributing authors agree that a few specific types of sedimentary structures known from siliciclastic eolian dunes (and sand sheets) are the principal, if not the only attributes by which aeolian limestones and their subtidal counterparts can be distinguished. Diagenesis is another theme considered throughout most of the text. Surfaces of subaerial exposure marked by rhizoliths and terra-rossa paleosols, lithification of originally loose carbonate beds and changes in physical properties of limestones are results of this process.

Steep-sided, rimmed carbonate platforms (Bahamas), an open, gently sloping ramp (Southern Arabian Gulf), a fringing reef of a volcanic island (Kauai, Hawaii) and two different coastal barriers are the diverse settings of Quaternary carbonate eolianites reported about in Part II of the book. Can Quaternary carbonate eolianites serve as useful analogues for the interpretation of ancient rocks? This important question is raised in the paper on the Bahamian eolian limestones. In their thoughtful answer, the authors explain that "Eolianites may be deposited in a variety of positions and at various elevations during a single sea-level highstand .... In addition, multiple highstands, especially if they reach nearly the same approximate elevation, can further overprint and confuse the preexisting record". This statement sets the stage for the discussion on ancient (pre-Quaternary) carbonate eolianites.

In Part III ('Paleozoic and Mesozoic Carbonate Eolianites'), existing data and new, eolianite-directed research on Mississippian shallow-marine carbonates in the eastern United States have been combined. This fruitful approach has resulted in an improved sequence-stratigraphic framework and a refined, sea-level-related picture of eolian deposition in a carbonate-depositional environment. Thus, it is inferred that carbonate eolianites formed during both transgressive and regressive events, though in different spatial positions. Moreover, a distinction can be made between shoreline-attached, coastal dunes fed from an adjacent beach and inland dunes which migrated over sometimes considerable distances and formed by deflation of underlying carbonates exposed by a fall of sea level.

Other topics addressed in the various papers are reservoir potential,  $^{13}\text{C}$  values, ichnology and thin-section characteristics of carbonate eolianites. If we regard this sediment type as the youngest scion of the eolian family, it has been given a worthy birth certificate in the form of this SEPM publication.

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*The Satanic Gases* by Patrick J. Michaels and Robert C. Balling, 2000, Cato Institute, USA, 224 pages, US\$10.95, ISBN 1-88257-792-2.

In teaching a basic Earth System Science course, it is hard to find books that contain anything more than a doom and gloom approach based on predictions made by global circulation models. Prior experience in industry has taught me that you need to look at all the available geologic and geophysical data as well as use computer models. With respect to *The Satanic Gases*, I was happy to see that the authors considered the effect of water vapor (approx. 31 C out a total of 33 C) in the total greenhouse effect. In addition, they explained the relationship of stratospheric cooling to the greenhouse effect and briefly talked about the decreasing rate of methane gas increases to the atmosphere. The authors note that the Earth's climate has recovered from past periods of continental glaciation (i.e., icehouse conditions) rather than remaining stuck there as some theories predict.

*The Satanic Gases* is made up of thirteen chapters, most of which are very short and to the point. It opens with an overview of the authors intentions and then a first chapter discusses the gloom and doom approach of most of those working in global warming. This chapter also introduces the scientific paradigm of global warming, that General Circulation Models (GCMs) produce a realistic picture of the atmosphere as carbon dioxide concentrations increase. This paradigm also holds that the warming caused by the increased CO<sub>2</sub> concentrations will cause drastic changes in the earth's climate, which will be catastrophic to the environment.

In the second chapter, the authors offer a brief history of the global warming debate and the Intergovernmental Panel on Climate Change. This is helpful to understanding the current debate because it provides a more complete picture than is presented in the newspapers or on TV.

In the third chapter, the authors give a quick review of the mechanics of the earth's climate, and include comments on stratospheric cooling. They also include a section on the general stability of the earth's climate, which most books on global warming do not address. They point out that if the earth's climate were subject to runaway cooling as has been suggested by some writers on global warming, than the climate should have remained in a permanent ice age since at least the last major glacial activity during the Pennsylvanian, if not earlier. In other words, some major factors that affect the climate have not been considered in the debate on global warming.

The fourth chapter describes general circulation models and how these complex programs work. Also included is a discussion of the problems of quantifying many processes that affect climate, such as cloud cover and its effect on albedo. The GCM models project linear temperature increases indefinitely into the future. However, CO<sub>2</sub> concentrations are increasing exponentially. If a direct correlation between CO<sub>2</sub> concentrations and temperature increases exists, the linear increases do not fit. However, the authors note a tendency for the greenhouse response to level off or "damp down", so that later increases in CO<sub>2</sub> concentrations do not have as large an effect as earlier ones.

One criticism I have of *The Satanic Gases* is that because much of the debate on global warming is over which evidence of the global warming theory is valid, it might have been beneficial to include a discussion on what evidence should be considered conclusive proof of a theory. For example, an article by Oreskes, Scrader-Freechette and Belitz in *Science* (v. 263, 4 Feb. 1994) suggests that models cannot provide proof of global warming because closed mathematical formulas are used to represent open, complex, natural systems and that the solutions to these formulas in the GCMs are not unique. This issue needs to be considered in more detail because of the apparent confusion on this point.

The fifth chapter offers a discussion of the warming observed in instrumental records and systematic errors, such as the urban heat island effect and the difficulty of reconciling land and ocean temperature records. The authors also discuss the disparity between the land temperature records and satellite temperature records.

Chapter 9 presents an interesting discussion of the relationship between weather and mortality. As part of this discussion, they note that more people die from extreme cold spells than from extreme hot spells. The authors also note the effect of technology, (i.e., the development and spread of air conditioning), which has lowered the stress associated with extreme heat spells. By lowering this stress, the number of deaths related to heat spells has been reduced.

Chapter 10 discusses how adding CO<sub>2</sub> to the atmosphere should make the planet greener. The authors state that the increased CO<sub>2</sub> levels of the atmosphere will result in most plants thriving. Supporting this, a study by Knapp and Soule (*Annals of the Assoc. of Am. Geographers*, 96, v. 86 (3), p. 387-411) suggests that an increase in woody plants, with big increases in big sagebrush and Western Juniper in Central Oregon, is related to rising CO<sub>2</sub> levels in the atmosphere. This can be qualitatively observed in much of Central Oregon by the number of young Western Juniper relative to mature trees and the increasing density of trees. Knapp and Soule note a 41% increase in tree density occurred in their study area between 1960 and 1994. To determine if long-term suppression of wildfires has been the cause of the new tree growth, they compare wildfire frequency in the study area and find no apparent relationship between it and the increased density trees in the Central Oregon desert.

This book is recommended for anyone with an interest in the climate change/global warming debate. It explains complex concepts and processes in language that students and those not closely involved in this debate can understand. Another reason to recommend this book is that in a highly politicized subject like this, it provides a different perspective than is available in most textbooks. Therefore, this book should at least be available in all college libraries. It should also be part of the recommended reading for all classes that are studying the climate change/global warming issue.

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