BOOK REVIEWS

EFFECTS OF SCALE ON ARCHAEOLOGICAL AND GEOSCIENTFIC PERSPECTIVES

Julie K. Stein and Angela R. Linse, (eds.) Geological Society of America Special Paper Number 283, 1993

Many readers, like myself, may be confused by the title of this slim volume, a recent GSA publication. The title suggests a broadly based discussion of the effects of scale on studies in the earth sciences, particularly in archaeology. Instead, it is a collection of papers presented at the symposium, organised by the Archaeological Geology Division of the GSA, at the 1990 Annual Meeting in Dallas, Texas. The discussion is thus more narrowly focused on aspects of archaeological studies. In addition, the majority of the papers are not directly related to the subject of scale effects, and much of the discussion of scale effects is relatively basic. While many, if not most, of us in geophysics and hydrology have been aware, for some time, of the importance of scale in our work, archaeologists, apparently, have only recently become aware of the major influence of spatial and temporal scale.

Much of the discussion that is specifically about scale concentrates on the problems associated with interdisciplinary work, again at a relatively naive level. Broad general statements are made, many of which may not be accurate any longer, even if they were some time ago. For example, in the lead article, by Stein, she flatly states that: "In geology, meteorology, and oceanography, as well as most disciplines dealing with the planet, the scale at which the practitioners operate is greater than ten thousand kilometres and hundreds of thousands of years". The statement is a broad generalisation, at best, and is, as presented, simply wrong. Most earth scientists that I know, myself included, work at a broad range of spatial and temporal scales, from sub-millimetre scale through to 10's and 100's of kilometres, though rarely have I known anyone to work at scales of ten thousand kilometres, and from seconds through years and decades to millions of years. We try to examine the problems we have at the scales that are both appropriate and practical; as technology develops, the scales can be expanded in both directions. I found other examples of similar oversimplifications.

Some of the papers appear to have been cast in such a way as to conform to the title of the symposium and the subsequent Special Paper, regardless of the actual content of the papers; many articles instead deal with particular techniques or results of specific surveys. Consider the other six papers in the volume that follow Stein's lead article. The paper by Linse, for example, is more an example of the integration of geological information with archaeological studies to obtain more complete and accurate interpretation; the paper by Holliday et al. is a consideration of the similarity of the scales and procedures between soil science and archaeology, and comes close to fitting the title; the contribution from Blackwell and Schwarcz is a good introduction to applications of geochronology to archaeology, with a useful consideration of errors and precision; Dean discusses the influence of precision in the application of different chronological methods to archaeological dating, which is relevant to the topic of the title; Dalan considers the role of geophysical exploration techniques in archaeological surveys, not a new topic; and

in the last paper in the volume, Hughes and Smith commendably do not even try to pretend to fit their work into the theme of scales, but instead show the utility of geological provenance studies in archaeology, again not a new area of study. I recall reading and hearing of work on geological provenance for archaeological studies more than a decade ago.

In summary then, GSA Special Paper 238 would have been better titled "The Utility and Influence of Interdisciplinary Studies in Archaeology". I would not recommend the purchase of this volume, even by specialists.

David C Nobes

TECHNOLOGIES FOR ENVIRONMENTAL CLEAN-UP: SOIL AND GROUNDWATER

A Avogadro and R C Ragaini, (eds.), Kluwer Academic Publishers, 1993, 466 pp, price 260 Dfl. {ISBN 0792321456}

This book is a collection of 19 papers used as a teaching text for a course organised by the Joint Research Centre of the Commission of the European Communities. This course and book on soil and groundwater are meant to be followed in coming years by similar treatments of waste management, air pollution and surface waters. The excellent introduction by R C Ragaini sets out the principal issues in the field, and provides a coherent approach to solving problems emphasising systems analysis. Unfortunately, the book loses coherence after the introduction with few papers fitting within the framework established in the introduction.

For an edited book to be more than a bound volume of individual papers, it should provide a useful index linking chapters covering similar topics, have cross references to other material in the text, avoid repetition of concepts and material, and give approximately equal levels of detail in each chapter.

This book meets none of these criteria.

The individual chapters vary in quality. Some are devoted to research topics, some provide a summary of recent field work, while others attempt overviews of specific aspects of soil and goundwater cleanup. The range of topics covered is admirably wide with discussion of chemistry, field remediation, modelling, site characterisation, contaminant transport, monitoring and risk analysis. Yet the lack of coherence between papers, combined with the broad scope leads to a poor overall coverage of the topic — I found only 20 pages in the middle of the book on practical techniques for soil and groundwater cleanup, but over 100 pages on advanced research techniques.

Four chapters I found particularly useful. The chapter on analytical chemistry was detailed, but still understandable, and provided insight into why certain analytical techniques are preferred over others. The chapter on pore-liquid monitoring in the vadose zone has similar advantages to the chemistry chapter, and serves as a good teaching tool. The chapter on uncertainty is an excellent overview of an increasingly important topic. Finally, I found a chapter on elicitation of expert judgement to be unique, with the subject well treated. Risk assessments often rely on expert judgement, and since the judgements often find their way into quantitative analyses, it becomes important that expert judgements are taken in

ways that minimise bias. This chapter does an excellent job of making this topic approachable. All of these chapters have good graphics, crisp prose, clear organisation, and ample references — if only the rest of the book could have met the standard set by these four chapters.

In summary, I find it hard to believe that this book served as a teaching text. With the exception of a few useful chapters, I believe it would be difficult to learn from this book, and would recommend to hydrologists interested in this topic that they look elsewhere.

M W Milke