

Sediment Transport and Depositional Processes

edited by **Kenneth Pye**, published in 1994 by Blackwell Scientific Publications, ISBN 0-632-03112-3, 397 pages, \$55.00.

Review by Christopher G. Kendall

This book is aimed at providing a summary of sediment transport and depositional processes within a variety of depositional settings including hillslope, fluvial settings, lacustrine settings, estuarine settings, beach and beach and nearshore settings, deep sea, eolian and volcanoclastic settings. This book should help scientists involved with problems associated with soil erosion, silting up of reservoirs and harbors, coastal erosion, flood defense, and waste disposal. Though this book is probably intended for upper level undergraduate and some graduate students, this book actually will be of considerable interest to scientists who need to get some background in this discipline of sediment transport.

The book is broken down into ten chapters. The first chapter by Pye deals with a discussion of the properties of sedimentary particles. These are described and characterized in terms of rounding and sorting, shape, with a discussion of the effect of shape on such things as settling velocity and porosity. Next is a chapter by Allen on the fundamental properties of fluids and their relationship to sediment transport processes. This chapter is illustrated with beautiful line drawings, diagramming the various mechanisms of turbulent flow, and a series of photographs of flow within a flume. Next is a chapter on hillslope sediment transport and deposition. This is illustrated by numerous photographs of the effects of talus transport and mass wasting, rilling and gully processes to be found on hill sides. Next is a paper by Reid and Frostick on fluvial sediment transport and deposition, illustrated with the requisite diagram showing channel flow, and graphing such things as relationship between sediment concentration, water discharge, velocity relative to the depth of channel, for various fluvial settings. It also has one or two photographs illustrating sediment transport by rivers. There follows a paper by Sly on sedimentary processes in lakes discussing such things as forcing functions. Dyer is next with a paper on estuarine sediment transport and deposition. The emphasis here is on suspended sediments and their relationship to tidal exchange and also the effect of rising sea level on the estuarine setting. Hardisty then presents a paper on beach and nearshore sediment transport. The emphasis here is on processes, with a discussion on the effects of waves, their height, wave length, the way they break on the shore and the sedimentary structures they produced. This is illustrated by a series of photographs of box cores of various sedimentary structures from a beach profile. Stow has a paper on the deep sea processes of sediment transport and deposition. This considers the source of sediment, various processes ranging from pelagic settling and hemipelagic processes ranging from debris flow, sliding, slumping, grain flow, turbidity currents, and bottom current processes including contourites, etc. This paper is extremely well illustrated with cross-sections, photographs of various types of bottom flow and a very complete diagrammatic descriptions of various kinds of bottom flow, with some nice summary diagrams of the types of sedimentary structures one might associate with these different settings. Next is a paper by Nickling on eolian sediment transport and deposition. This is an extremely complete paper describing how particles are raised into the air, the measurement of such events, and their graphing, illustrating them with photographs, the effect of moisture on retaining surface material, friction, the types of sedimentary structures that occur in eolian sediments ranging from ripples to draas, with beautiful photographs and diagrams explaining how these structures are formed and their relationship to wind direction and grain size, plus very nice summary diagrams showing the stratification of various dune types and their relationship to wind direction.

Finally there is a chapter by Fisher and Schmincke on volcanoclastic sediment transport and deposition. This is also an extremely complete description of various types of transported volcanic sediments and the types of ways in which these materials were carried, either suspended by convective flumes or transported by lahars and debris flows or by subaerial ignimbrite eruptions with development of ash clouds. There is also a consideration of proximal facies vs. distal facies, distal settings, the effect of particle size and shape on this relationship of sediments. Fisher and Schmincke provide a very clear classification of the various types of volcanic and pyroclastic deposits illustrated with very nice block diagrams and photographs of cross-sections showing various types of volcano-clastic sediment. This book will be an extremely helpful reference to sedimentologists. It provides an insight to sedimentary processes in so many forms and associated with so many features. These are described from both in the field and from cores.

There is a lot of information in the book, so if you are involved with the study of sedimentary structures and sedimentary geometries and are trying to establish how these form, you will find this book an exceptionally useful with timely references at the end of each of the chapters. Many of the reference lists cover several pages. The book is well edited and the illustrations are excellent. I would believe anyone who has interest in sediment transport and depositional processes will want to buy this book. It is not overly mathematical, so that if you are looking for a book with a mathematical description of sediment transport you are not going to find it here, but you will find the necessary references to mathematical descriptions and can track them down from here. This is definitely a source book and provides a most complete overview of sediment transport and depositional processes. The editors should be congratulated on its publication.