RMS-SEPM Luncheon Talk, November 26th, 2013

**An Overview of Experimental Mudstone Sedimentology - Results of Experiments and Applications to the Rock Record**

Dr. Juergen Schieber
Department of Geological Sciences
Indiana University
1001 East 10th Street
Bloomington, IN 47405-1405

http://www.shale-mudstone-research-schieber.indiana.edu/

jschiebe@indiana.edu

ABSTRACT: The processes affecting the transport and deposition of mud in natural environments are still poorly understood, yet, understanding these processes is important because much of the earth's surface is covered with muddy substances, two thirds of the sedimentary rock record consist of mudstones, mud accumulation impacts water reservoirs, harbors, and shipping lanes, and because mudstones are an increasingly important energy resource.

From the perspective of a sedimentologist, the need for experimental work in mudstone sedimentology comes from the realization that many mudstones contain small-scale sedimentary structures that can potentially provide information about depositional conditions and history. However, as soon as one attempts to harness these features for interpretation of environments of deposition, one realizes that there simply is not much information available that allows us to link features observed in the rock record to measurable sets of physical variables in modern environments.

Although one might hope to glean the required information from studies of modern mud accumulating environments, the heterogeneity of modern sediments makes it quite difficult to connect observed sedimentary features and measured process variables. Thus, study under controlled conditions in flumes and other experimental apparatuses is essential for true improvement of our understanding of mud deposition.

Flumes can be used to obtain quantitative information about depositional and erosional parameters, but it is of critical importance that the flume be designed in a way that flocculated materials move under shear stress conditions that would be reasonable in natural environments. Recent flume studies have shown that muds can form deposits at flow velocities and shear stresses that would suffice to transport and deposit medium grained sand. Mud suspensions are prone to flocculation and the resulting floccules travel in bedload and form ripples that accrete into beds. The latter finding suggests that for example many laminated shales were deposited from currents rather than by settling from slow moving or still water. There are many other sedimentary features in shales that can be reproduced in flume studies.

As continued progress is being made, these will in coming years provide a quantitative basis for shale sedimentology, as well as offer the potential to better understand the parameters that determine the performance of shale gas reservoirs.

Speaker Biography:

Dr. Schieber is a specialist on shales. Published extensively (100 papers, 20 guidebook chapters, 2 books, 215 conference abstracts) he is also an invited lecturer at universities in the US, Canada, Europe, and Asia; at research organizations, industry short courses, and symposia. His research interests include: Basin Analysis and Sedimentology, Sedimentology of Shales, the Genesis of Black Shales and Sediment hosted Mineral Deposits, Evolution of the Belt Basin and the Devonian basins of the eastern US, Geochemistry of Sediments and Planetary geology and sedimentary geology of Mars. He is a member of the science team that currently explores the geology of Gale Crater on Mars with NASA's Curiosity rover.

His research is characterized by a holistic approach to shales, and consists of an integration of field studies (facies, stratigraphy) and lab studies (thin sections, electron microscopy, and geochemistry) in order to understand the various factors that are involved in the formation of shales. A key focus point is the experimental study of shale sedimentology via flume studies and related experimental work. Funding for this research is provided by government agencies (NSF, DOE, NASA), foundations (Petroleum Research Fund), and industry via the Indiana University Shale Research Consortium (ExxonMobil, Anadarko, Marathon, Shell, Chevron, ConocoPhillips, Wintershall) and separate research agreements (Schlumberger/TerraTek; Pioneer Natural Resources). He consults on matters pertaining to shale sedimentology, shale fabric and pore structure, and also teaches short courses on shale sedimentology and facies analysis, as well as microscope based petrography.

Education

B.Sc. (Vordiplom) in geology, 1978, University of TÃ¼bingen, Germany

Ph.D. in geology, 1985, University of Oregon, Dissertation:  The Relationship between Basin Evolution and Genesis of Stratiform Sulfide Horizons in Mid-Proterozoic Sediments of Central Montana (Belt Supergroup), 811pp.

Professional

UT Arlington, faculty (Professor), 1986-2002

Indiana University, faculty (Professor), 2002 to present

RMS-SEPM Main Page

RMS-SEPM Luncheon Page

RMS-SEPM Luncheon Abstract Archive