Seminars of geology

Department of Earth Sciences - Torino

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4.30 pm (Rome time) - Aula Fratianni, *Dip. Scienze della Terra, Torino*

Or via webex at this LINK

New Horizons in Shale Sedimentology
How Experimental Advances Allow a New Look at the Rock Record

Prof. Juergen Schieber

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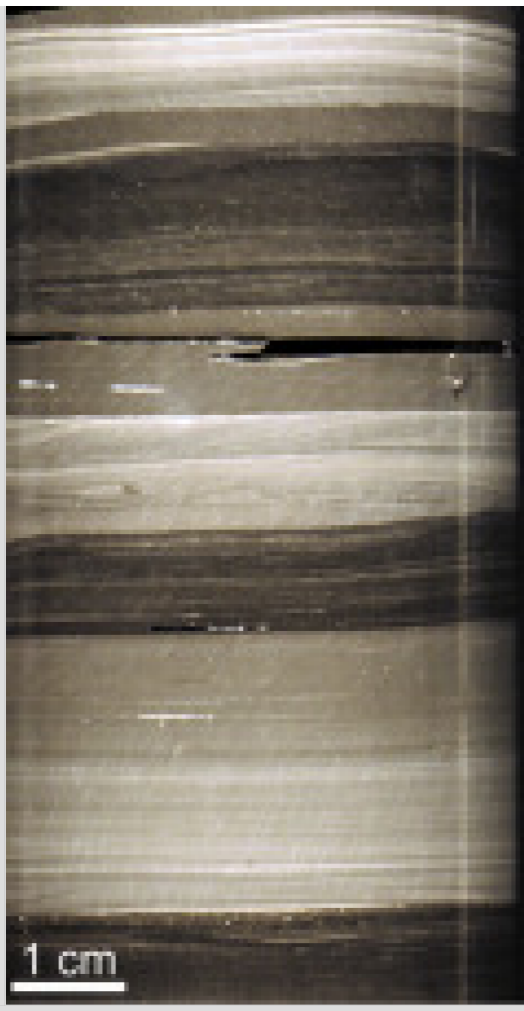

Mud is everywhere. Much of the Earth is covered by it, on land as well as under the sea. It influences what crops we can grow, how stable our landscapes are, the navigability of our rivers, how much effort we have to expend to keep open harbors and canals, as well as the habitability of shelf seas and the deep oceans for benthic life (shellfish, crabs, etc.) and associated fish crops. Mud is the main substrate for the microbial biomass of Earth, and as such is intricately woven in with biogeochemical cycles that exert control on the composition of atmosphere and ocean. Mud is important. When buried mud becomes mudstone, a fine-grained sedimentary rock composed dominantly of clay-sized (< 4 µm) and silt-sized (4 - 62.5 µm) particles, that constitutes 2/3 of the sedimentary rock record and contain the lion's share of recorded geologic time. For petroleum systems, mudstones are essential as source rocks and seals, and more recently also as unconventional hydrocarbon reservoirs.

In contemporary petroleum geology mudstones are a key resource that we need to be able to read accurately if we are to make correct predictions about the economic viability of hydrocarbon production in sedimentary basins. The first step towards that goal is to abandon long held notions about mud accumulation and embracing new emerging paradigms about energetic and dynamic mud transport and depositional processes. Experimental studies are the key towards that end, and they will be the focus of this presentation. We will examine key experimental studies, their functional premises and experimental outcomes, and what we learn from them about how mudstones may have formed in the past.

Parallel to this we will examine what features observable in the rock record indicate that these experiments indeed mirror key processes in mudstone transport and deposition. Out of this a conceptual framework is evolving that in the not too distant future will allow us to make predictions about the spatial distribution of mudstone facies within sedimentary facies.

Petroleum geologists are a unique breed. They look for rocks they might like, for example black, dripping with oil and fizzing with gas, and then they try to find more of them and make a profit. The experimental work we are doing in mudstone sedimentology has definite applications in that regard.

The Speaker

J. Schieber is a professor of geology at Indiana University and a specialist on shales. He has published more than 220 papers, 20 guidebook chapters, 4 books, 400+ conference abstracts). He is a member of the science team that currently explores the geology of Gale Crater on Mars with NASA's Curiosity rover, the 2022 recipient of the Sorby Medal by IAS, and a 2023 Fulbright Scholar.

Characterized by a holistic approach to shales, his research 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 focal point is the experimental study of shale sedimentology via flume studies and related experimental work.

His research interests include: Basin Analysis and Sedimentology, Sedimentology, Diagenesis, and Pore Systems 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, Planetary Geology and sedimentary geology of Mars.