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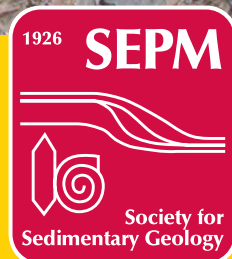
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Record

INSIDE:

A 'SEDIMENTARY RECORD' OF OPPORTUNITIES
PLUS: SGD NEWS,
PRESIDENT'S COMMENTS,
SEPM 2013 OFFICER ELECTION RESULTS

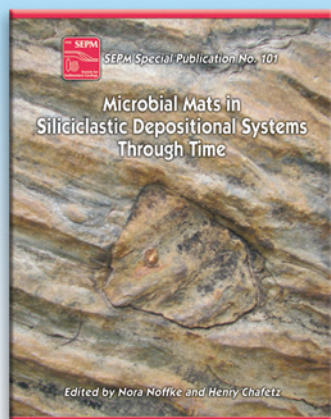


SEPM BOOKSTORE

Special Publication #101

Microbial Mats in Siliciclastic Depositional Systems Through Time

Edited by: Nora Noffke and Henry Chafetz



The research field on microbial mats in siliciclastic environmental settings has greatly developed since its establishment by studies of pioneering scientists such as Gisela Gerdes, Wolfgang Krumbein, Jürgen Schieber, David Bottjer and others. This SEPM Special Publication is the result of the SEPM Field Conference on Sandy Microbial Mats (modern and ancient), which was held in May 21st to 23rd, 2010 at Dinosaur Ridge, Denver, Colorado, USA. The volume presents peer reviewed individual case studies on microbial mats and on sedimentary structures (often called "microbially induced sedimentary structures—MISS") that occur in modern and ancient marine and terrestrial environments. The conference brought together sedimentologists, microbiologists, and paleontologists from 30 countries and all five continents. Topics discussed ranged from the evolution of cyanobacteria, the detection of quorum sensing in biofilms to the taxonomy of MISS and microbial mat ecology. The talks and posters presented fossil material from 3.2 Ga old rock successions to microbial mat samples from sediments of the present day. This volume is designed to present the wide spectrum of research in this multidisciplinary scientific field, and to integrate the many different points of views and approaches.

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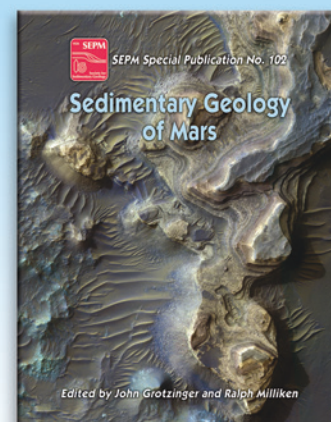
Special Publication #102

Sedimentary Geology of Mars

Edited by: John P. Grotzinger and Ralph E. Milliken

Often thought of as a volcanically dominated planet, the last several decades of Mars exploration have revealed with increasing clarity the role of sedimentary processes on the Red Planet. Data from recent orbiters have highlighted the role of sedimentary processes throughout the geologic evolution of Mars by providing evidence that such processes are preserved in a rock record that likely spans a period of over four billion years. Rover observations have provided complementary outcrop-scale evidence for ancient eolian and fluvial transport and deposition, as well as surprisingly Earth-like patterns of diagenesis that involve recrystallization and the formation of concretions. In addition, the detection of clay minerals and sulfate salts on Mars, coupled with large-scale morphologic features indicative of fluvial activity, indicate that water-rock interactions were once common on the martian surface. This is in stark contrast to the dry and cold surface environment that exists today, in which eolian processes appear to be the dominant mode for sediment transport on Mars. These issues and others were discussed at the First International Conference on Mars Sedimentology and Stratigraphy, held in El Paso, Texas in April of 2010. The papers presented in this volume are largely an extension of that workshop and cover topics ranging from laboratory studies of the geochemistry of Martian meteorites, to sediment transport and deposition on Mars, to studies of terrestrial analogs to gain insight into ancient Martian environments. These papers incorporate data from recent orbiter and rover missions and are designed to provide both terrestrial and planetary geologists with an overview of our current knowledge of Mars sedimentology as well as outstanding questions related to sedimentary processes on Mars.

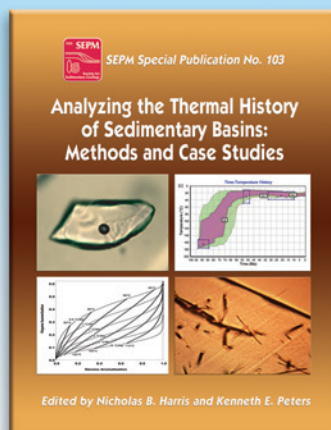
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Special Publication #103

Analyzing Thermal Histories of Sedimentary Basins: Methods and Case Studies

Edited by: Nicholas B. Harris and Kenneth E. Peters



Thermal histories of sedimentary basins are critical sources of scientific and practical information. They provide us with windows into past and present tectonic processes and the configuration of the crust and mantle. Using records of present and past temperature distributions, we can identify and constrain interpretations of tectonic events, distinguish different basin types and interpret pathways of fluid flow. These insights can be used to calibrate basin and petroleum system models and to interpret and predict the distribution of minerals and petroleum, diagenesis and reservoir quality, and the geomechanical properties of rock units. This volume summarizes the current state of the art for many modern approaches used to estimate paleotemperature. Many techniques are now available based on both organic and inorganic components in the rock. Even techniques that are now many years old, such as apatite fission track analysis, have undergone significant advances in the past decade. This volume provides comprehensive reviews of the fundamental science underpinning each method and the basic principles used to interpret data, as well as case studies illustrating practical applications and the complexity of paleotemperature interpretation. Geoscientists from all sectors will find this volume to be a valuable resource in their work.

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Cover photo: An enigma in the Late Devonian. While several argue that late Paleozoic glaciation began in the latest Devonian (Isaacson et al., 2008), the presence of 10^4 to 10^5 ky stratigraphic cycles in older Devonian successions, such as seen here at Devils Gate, Nevada, suggest the initiation of glaciation and glacioeustasy much earlier in the Devonian (Sandberg et al., 1988).

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Editors

Peter E. Isaacson

Isaacson@uidaho.edu

University of Idaho

Isabel P. Montañez

ipmontanez@ucdavis.edu

University of California at Davis

SEPM Staff

4111 S. Darlington, Suite 100, Tulsa, OK 74135-6373

Phone (North America): 800-865-9765

Phone (International): 918-610-3361

Dr. Howard Harper, Executive Director

hharper@sepm.org

Theresa Scott, Associate Director & Business Manager

tscott@sepm.org

Michele Tomlinson, Publications Coordinator

mtomlinson@sepm.org

Janice Curtis, Membership Associate

jcurtis@sepm.org

Edythe Ellis, Administrative Assistant

ellis@sepm.org

SEPM Council

David A. Budd, President

budd@colorado.edu

Evan Franseen, President-Elect

evanf@kgs.ku.edu

Maya Elrick, Secretary-Treasurer

dolomite@unm.edu

Stephen Flint, International Councilor

stephen.flint@manchester.ac.uk

Danita S. Brandt, Councilor for Paleontology

brandt@msu.edu

Janok Bhattacharya, Councilor for Sedimentology

jpbhattacharya@uh.edu

Beverley DeJarnett, Councilor for Research Activities

Bev.DeJarnett@beg.utexas.edu

Brian Romans, Web & Technology Councilor

romans@vt.edu

James MacEachern, Co-Editor, JSR

jmaceach@sfu.ca

Gene Rankey, Co-Editor, JSR

grankey@ku.edu

Stephen Hasiotis, Co-Editor, PALAIOS

hasiotis@ku.edu

John-Paul Zonneveld, Co-Editor, PALAIOS

zonneveld@ualberta.ca

Gary Nichols, Co-Editor, Special Publications

g.nichols@gl.rhul.ac.uk

Brian Ricketts, Co-Editor, Special Publications

Brian.ricketts@extra.co.nz

Rick Sarg, President, SEPM Foundation

jsarg@mines.edu

www.sepm.org

A 'Sedimentary Record' of Opportunities

Isabel P. Montañez¹ and Peter E. Isaacson²

¹Dept. of Earth and Planetary Sciences, University of California, Davis, 95616

email: ipmontanez@ucdavis.edu

²Dept. of Geological Sciences, University of Idaho, Moscow, ID 443022

email: isaacson@uidaho.edu

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EDITORS' MISSION

Several recent National Academy of Sciences publications (NRC 2005, 2010a, 2010b, 2011, 2012) and a subsequent community driven initiative report (*Transitions* 2012) provide the earth surface scientific community a framework of high-priority research targets for the next decade or so. Many of the research opportunities identified by these reports were defined through the efforts of the SEPM community, coordinated by workshops and initiatives (e.g., GeoSystems, Paleopedology, DETELON, and EARTHTIME), to articulate the most enduring scientific issues and associated challenges for the future. As the scientific research agenda has evolved so have the disciplinary boundaries of the scientific community, which now includes geochronologists, geochemists, geomorphologists, ecologists, microbiologists, atmospheric scientists, oceanographers, soil scientists, mathematicians and computer scientists.

A singular intellectual challenge, echoed throughout the aforementioned publications, further unifies the broad array of interests and efforts of this diverse scientific community: A better understanding of how earth system processes respond, interact,

and evolve over a range of climate states and conditions is pivotal to informing society on critical future issues including climate change, energy and water resources, landscape evolution and management, and ecosystem health and conservation under dynamic environmental conditions (*Transitions* 2012). The importance of broad-based and cross-disciplinary collaborations involving observation-based scientists and numerical modelers is now fully recognized as a means of realizing the potential of the sedimentary archive of dynamic earth system processes.

As the new editors of the *Sedimentary Record*, we consider this publication forum as an opportunity to articulate the vision and recent discoveries behind this community momentum. We propose a series of articles over the next three years that highlight exciting research directions and that delineate the cultural and technological infrastructure that will be required to fully develop such opportunities and overcome their associated challenges. This article provides an introduction to the proposed journal series; your participation and feedback as to how the 'Sedimentary Record of opportunities' might evolve is strongly encouraged.

A COMMUNITY BASED RESEARCH AGENDA

The following discussion highlights just a few of the growing and emerging research opportunities identified by various community based activities and assimilated in the aforementioned publications. This discussion is not comprehensive and unquestionably fails to identify all of the exciting research directions in which members of the SEPM community are involved. Our goal is that this prospectus and the papers to follow will stimulate discussion about emerging research opportunities and help to coordinate the building research momentum shared by many SEPM members.

CO-EVOLUTION OF LIFE AND CLIMATE

Environmental and climate conditions on Earth may well be changing faster than any time in the past 4.6 billion years of the planet's history. Two decades of research into past warm worlds and turnovers in climate

state have revealed that even the most abrupt periods of global warming (e.g., the early Cenozoic hyperthermals) occurred at minimally two orders of magnitude slower rates than is predicted for our near future (Kump 2011). Many of these past warmings were brought on by release of greenhouse gases of magnitude comparable to, or possibly larger, than that anticipated if we burn through most of our fossil fuel resources, but with release rates minimally an order of magnitude slower than present-day (NRC 2011). Despite the apparent 'sluggish pace' of these abrupt events, they impacted conditions widely in the oceans and on land. In this context, it is increasingly becoming clear that we lack a true analogue for the 'Great Geophysical Experiment' (Revelle & Suess 1957) currently being carried out on Earth.

If atmospheric CO₂ concentration, currently at 398.5 ppmv (Feb. 2013), continues to increase at its current rate and with no increase in



Figure 1: An enigma in the Late Devonian. While several argue that late Paleozoic glaciation began in the latest Devonian (Isaacson et al., 2008), the presence of 10^4 to 10^5 ky stratigraphic cycles in older Devonian successions, such as seen here at Devils Gate, Nevada, suggest the initiation of glaciation and glacioeustasy much earlier in the Devonian (Sandberg et al., 1988).

carbon sequestration efforts, the Earth could soon surpass CO_2 levels last experienced prior to the onset of our current glacial state 34 million years ago (NRC 2011). If observations of historic changes in climate and ecosystems under rising, but generally low atmospheric CO_2 levels are any indication, a future high CO_2 world will be drastically different than today. How different is the critical question. Without a clear analogue for our future, we proceed with great uncertainty with regards to how surface conditions and ecological processes will evolve with continued forcing (Hansen et al. 2008).

The deep-time geologic record provides a unique resource for better understanding how processes in the Earth system will function in the evolving and high CO_2 environment predicted for our future. Presently, this vast archive is largely underdeveloped thus offering the potential for significant scientific

discovery and for transformation of our scientific understanding of the dynamics of surface system processes. Well constrained reconstructions of how earth system processes have operated and responded to external forcing in the past not only provide natural baselines against which to assess change in the warming Anthropocene, but capture the sensitivity of processes to perturbation beyond that captured in records of the more recent past (Fig. 1). Moreover, only the deep-time record offers the temporal continuity and captures the full spectrum of environmental conditions needed to assess the signs of imminent climate and ecological thresholds (Barnosky et al. 2012) and to evaluate ecological response and resilience to perturbation.

The scientific community is embarking on multi- and inter-disciplinary team-based studies focused on mining this deep-time sedimentary and paleobiologic archive, fueled in part by new initiatives at the National Science Foundation

(*Earth-Life Transitions* and the STEPPE consortium (www.STEPPE.org)). Ongoing and future efforts will involve the development and calibration of new and existing proxies and systematic efforts to develop empirical datasets of temporal and spatial resolution of the scope produced for the post-Jurassic by the deep-sea and continental drilling communities. Such datasets have permitted refined understanding of the forcings and feedbacks involved in past equilibrium warm states (e.g., Pagani et al. 2013), abrupt climate change (reviewed in McInerney & Wing 2011), and greenhouse-icehouse transitions (e.g., Tripathi et al. 2005, Katz et al. 2008). Observation-based datasets of such scope will provide the framework and benchmarks for modeling of past climates, and deeper insight into the still yet poorly understood fundamental processes behind data-model mismatches. Modeling efforts by the community extend well beyond climate models

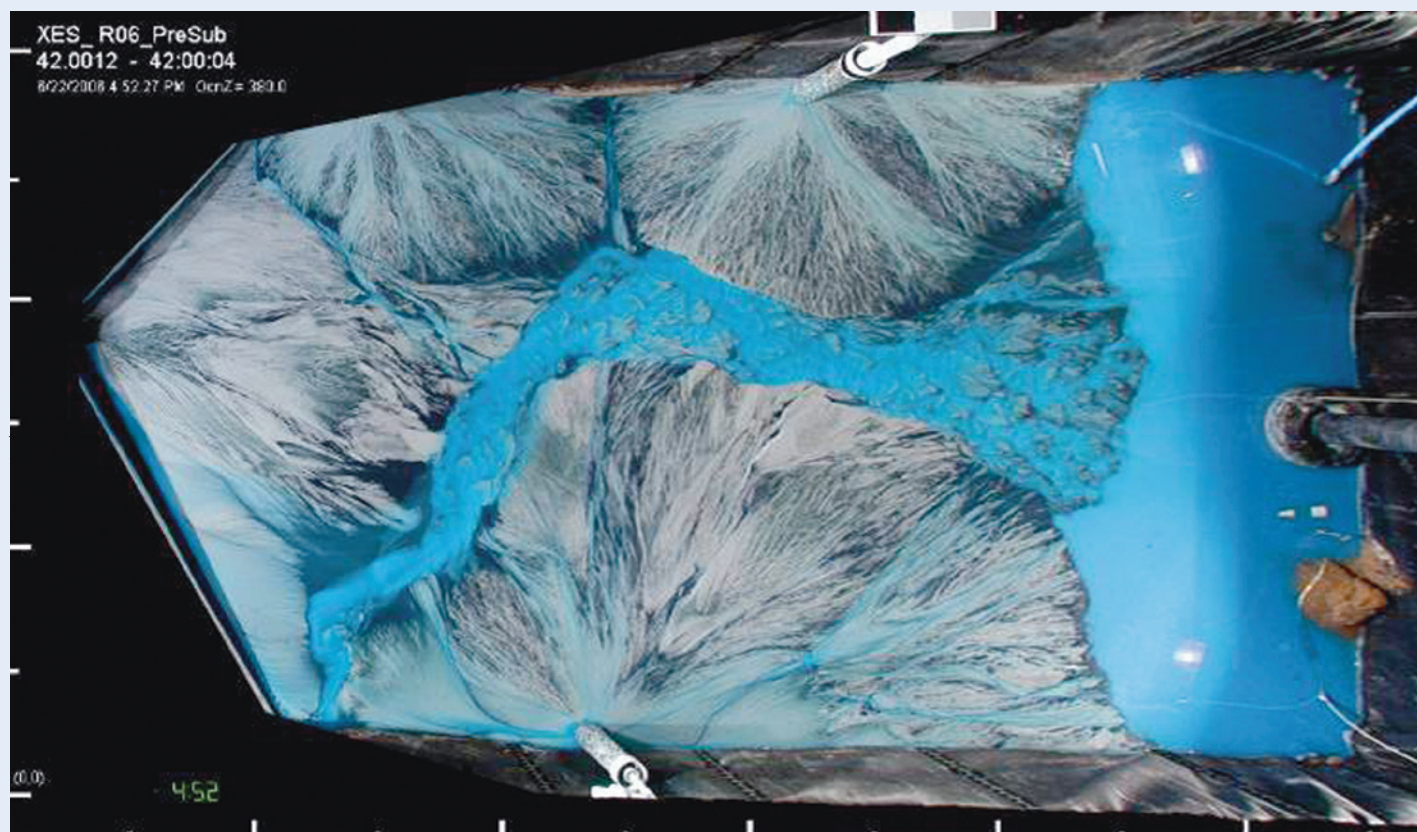


Figure 2: Interacting alluvial fans and channels generated from four point sources of sediment and water around the perimeter of the Experimental EarthScape (XES) basin at St Anthony Falls Laboratory, University of Minnesota, Minneapolis. For details, see Connell et al. 2012a, 2012b. Courtesy of C. Paola.

and integrate novel datasets obtained through new research approaches such as genomic and proteomic methods (NRC 2012).

THE EVOLVING EARTH SURFACE

The Earth's surface is the dynamic interface between the various components of the Earth system and is thus the locus of all environmental change. Within this dynamic interface, physical, chemical, biologic, and human processes interact across a realm of spatial and temporal scales to define and reshape it. Over the past two decades, studies in geomorphology, sedimentology, and neotectonics have greatly advanced our understanding of the mechanistic nature of feedbacks between landforms, topography, water and biogeochemical cycling, climate, ecosystems, deformation and sedimentation while providing insight into how the landscape has evolved under climate-, tectonic- and anthropogenic-forcing. Notably, the sedimentary record captures a unique aspect of the dynamics of the Earth's continental surface – i.e., how the system operates under climate states that differ from today and during abrupt

perturbation, including periods involving critical climate and ecological thresholds. Unraveling the intricacies of what governs change or maintains stability in continental surface environments is the only means to a complete picture of the resilience of this complex interface and how it may evolve in the future (NRC 2010a). The SEPM community plays a pivotal role in developing this critical 4th dimensional component of landscape evolution.

Coupling of experimental and modeling studies with natural experiments captured in the sedimentary record is rapidly changing our view of how physical and biotic processes of sedimentation have worked to shape the landscape and fill depositional basins. Laboratory-scale experiments (Fig. 2), such as those utilizing the Experimental EarthScape system at St. Anthony Falls laboratory, Univ. of Minnesota, permit 'real-time' study of hydrodynamic and sedimentation processes that typically evolve over much longer time-scales. Such experimental studies are capable of defining the full range of stochastic variability in notoriously dynamic systems such as fluvial and delta systems (e.g., Paola et al. 2009,

2011). Experimental representations of small-scale and short-term mechanics of fluid flow and sediment transport designed to reproduce aspects of natural landscapes have been shown to successfully scale up to reveal new insight regarding system-scale dynamics (Paola et al. 2009). On the theoretical side, open-source community tools for earth surface prediction such as the Community Surface Dynamics Modeling System (CSDMS, <http://csdms.colorado.edu>) provide testable models of complex environments. Efforts by the community to merge these tools is permitting rigorous analysis of how surface systems process and record information and the development of predictive models of how they evolve with time. Such insight is important not only for interpreting the natural sedimentary record but can be applied to the management of water resources, delta restoration, and ecosystem conservation and restoration.

An intricate component of the Earth's surface is the 'critical zone' – the interface between the earth's mineral surface (rock, soil) and the atmosphere, hydrosphere and terrestrial ecosystems (introduced in NRC 2001). Study of the critical zone has intensified over

the past decade given the realization of its unique role as a highly sensitive dipstick of environmental change. This complex 'system', responds to internal processes that determine its natural habitat and availability of life-sustaining resources (Brantley et al. 2011), and is further modified by climatic, tectonic and anthropogenic forcing. With the advent of paleopedology as a sub-discipline has come a growing appreciation for how paleo-critical zones, which developed on ancient landscapes, archive the response of this complex 'interface system' to different climate states and major transitions. The SEPM community is uniquely poised to mine this record of the interface between Earth system components through studies of paleosols and their geochemistry, associated terrestrial ecosystems, and modeling of the system dynamics. A core component of this community effort could be deep-time critical zone observatories —field- or virtually based (*Transitions* 2012).

SEPM'S PRESENCE IN THE DEVELOPING GREEN REVOLUTION

We are in the infancy of a second green revolution — one centered on a transition from a fossil-fuel powered world to one that incorporates alternative energy sources. The first green revolution, propelled by the development of fertilizers in the first half of the last century, permitted the exponential growth of the world population to seven billion people (Erisman et al. 2008). Resource sustainability and development of new energy sources is at the forefront of this second green revolution. A century of study of the fundamental processes that control the filling of sedimentary basins and the architecture of its deposits has been central to the development of subsurface reservoirs and the extraction of vast amounts of fossil fuels. These sedimentary basins host yet another large-scale energy source — heat energy (Tester et al. 2007). Deeply buried deposits in sedimentary basins offer the spatial continuity and petrophysical properties to yield geothermal resources of up to an order of magnitude greater scope than those generated presently by hydrothermal systems. Such resources could potentially replace a notable portion of fossil-fuel consumption in the US. Efforts to explore the nation's potential for geothermal energy in sedimentary basins, coordinated by members of the

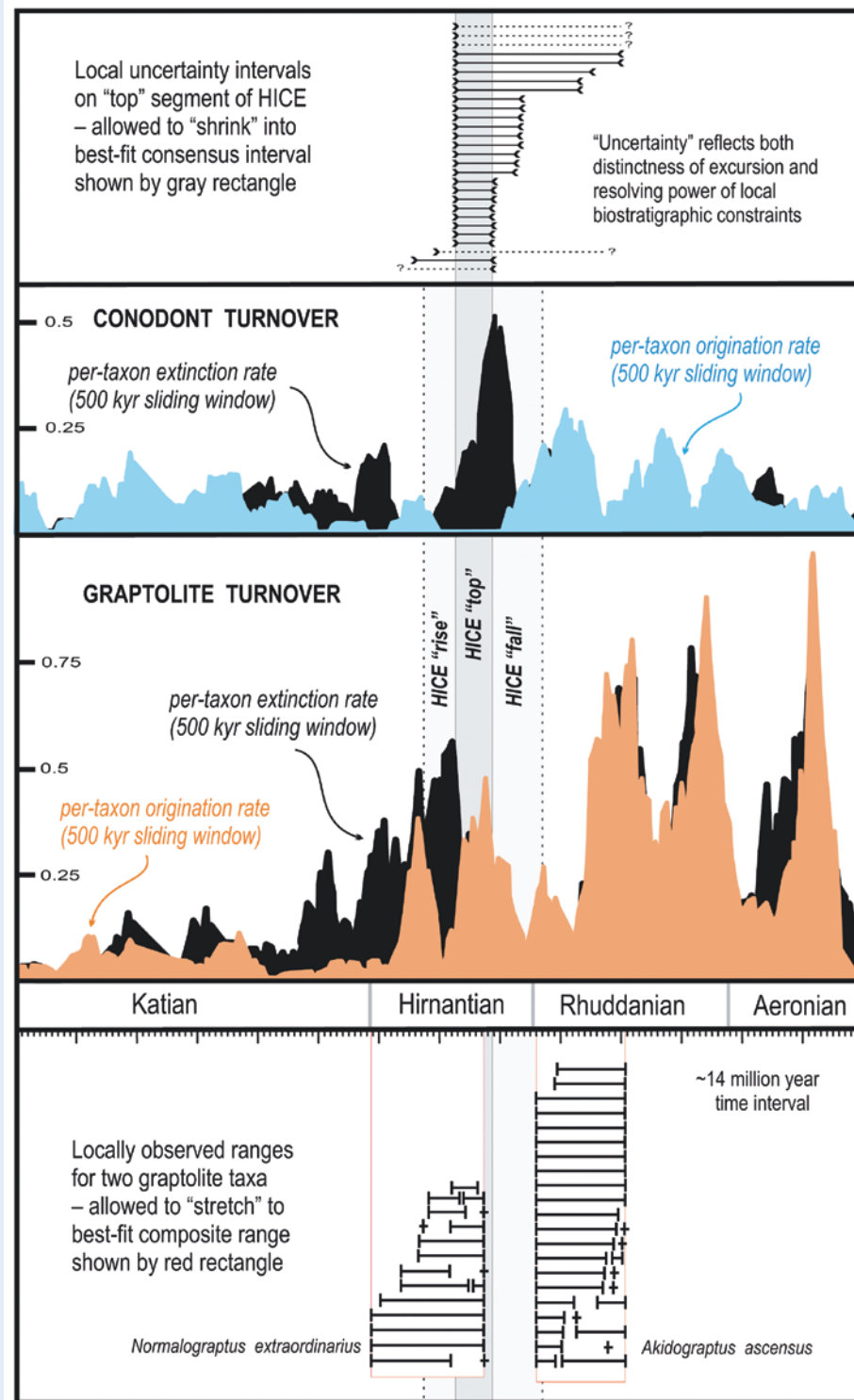


Figure 3: Macroevolutionary dynamics of the end-Ordovician (Hirnantian) extinction, extracted from a numerically-optimized, fully-resolved, calibrated, Sandbian through Telychian time-line of events. The underlying global data set includes first- and last-appearances of 1000 taxa (graptolites, conodonts, chitinozoa and acritarchs, noted in at least 3 of 401 published sections) plus 146 other time stratigraphic events (e.g. dated ash falls and segments of stable isotope excursions). Uppermost panel: optimal placement of HICE "top" segment by overlap of all local uncertainty intervals. Second and third panels: conodont and graptolite extinction and origination rates, expressed as fractions of taxon richness, and calculated at every event horizon. Origination graphs placed as masks in front of extinction rate time series to highlight the 2-phase extinction that straddles the isotope excursion; in the first phase, graptolites undergo 3 increasing extinction pulses, possibly on a ~400 kyr cycle; the single conodont extinction pulse marks the second phase. Lowermost panel: optimized composite ranges and all local ranges for two index taxa, possibly indicating diachronism. Courtesy of P. Sadler and students of GEO 206B.

sedimentary geology community, suggest “sedimentary basins have the potential to move geothermal toward a meaningful portion of our energy needs, and to do so with minimal environmental impact, negligible impact on global climate change, and without concerns of long-term depletion” (Holbrook et al. 2011). Sedimentary basins and the stratigraphic architecture of their deposits have an equally important role in efforts to develop subsurface carbon sequestration.

EVOLVING INFRASTRUCTURE & RESEARCH TOOLS

The community, endorsed by the National Research Council (NRC 2011, 2012), has identified the need for investments in new infrastructure that includes amongst other things continental drilling, improved chronostratigraphy, and data management sources capable of integrating diverse datasets through time and space. Here we briefly present three areas of developments driven in part by the SEPM community and which we plan to highlight in the *Sedimentary Record* series.

Continental Scientific Drilling: Efforts are underway to galvanize researchers interested in questions of Earth System evolution (see accompanying article by Soreghan & Cohen) that have been raised in the aforementioned NRC reports, workshop reports such as *Transitions* (2012), and defined by individuals in our community as part of their research efforts. The community has repeatedly reasoned, via these reports and publications, the need for recovery of high-quality continental core through drilling. This reflects the requisite preservational quality and sampling resolution needed to build the multiproxy archives of temporal and spatial resolution dictated by the scientific questions being asked by the community (NRC 2011). Continental drilling opens up opportunities to critically evaluate marine-terrestrial linkages and to directly compare their fundamentally different climate responses to the same forcings. Moreover, such data sets are likely the primary means of high-resolution calibration of critical climate transitions and thresholds. Soreghan and Cohen (this issue) define a path forward for scientific groups who share mutual research interests, which they aspire to be brought to ‘drilling fruition’.

Chronostratigraphy Revolutionized:

The common thread in many components of earth surface research is the increasing reliance on geochronology in order to quantitatively constrain ages, the rates of change in components of the earth system and their phasing, and the synchrony and causality between processes during major biological or climatic events. The past decade has seen major advances in analytical methods and calibrations of several dating methods as well as the introduction of novel numerical chronostratigraphic approaches. In radiometric dating, synergistic efforts by geochronologists, sedimentary geologists, and paleobiologists as part of the EARTHTIME initiative (<http://www.earth-time.org/>) now permits, through high-precision ID-TIMS U-Pb analysis, temporal resolution of (sub)orbital-scale (at times less than 0.05% precision) throughout the Phanerozoic. Novel computational approaches that integrate biostratigraphic and chemostratigraphic records with radiometric ages promise deep-time age models of unprecedented resolution and continuity. For example, applying unbinned global compilations of first and last appearances of taxa with chemostratigraphic data and radiometric ages to a trial-and-error optimization algorithm reveals previously unrecognized macroevolutionary dynamics across major faunal events in the early Paleozoic (Fig. 3). Variations in per-taxon extinction and origination rates, resolved at a sub-10⁶ yr scale by a multi-dimensional graphic correlation, provide unprecedented constraints on the nature of and possible forcings driving major climatic perturbation during the Late Ordovician Hirnantian glaciation (Fig. 3, Sadler, personal comm. 2013).

Cyberinfrastructure: A high priority associated with the development of large and diverse datasets, which are anticipated to result from the aforementioned research endeavors, is a pressing need for digital databases to store and facilitate the integration and sharing of data. There are several community-based efforts in this arena (e.g., Paleobiology Database, Macrostrat, summarized in NRC 2011, 2012, *Transitions* 2012), and most recently a coordinated effort to engage the sedimentary geology and paleobiology community in the EarthCube initiative (<http://earthcube.ning.com/groups>). A workshop for the sedimentary geology community in late March, coordinated

by Marjorie Chan (Univ. of Utah) and David Budd (University of Colorado Boulder), aims to define, for our community, (1) the nature, challenges and impediments of sharing data, (2) evaluate how access to digital data of the scale proposed by EarthCube could transform our ability to explore the complex interactions of the Earth system, and (3) establish the types of repositories, software and tools that would foster community-based “big-science” collaborations within our community. Stay tuned for further developments!

CONCLUDING REMARKS

The SEPM community has loudly and clearly through various venues articulated a research agenda for the future — one that is collaborative and inter- and multi-disciplinary and requires new resources and changing cultural and technical infrastructure. The advent of the new research track, *Earth-Life Transitions*, in the Sedimentary Geology and Paleobiology program at NSF and the STEPPE consortium office is a large, yet initial, step forward for the community. In an effort to contribute to the community’s building momentum, we solicit papers that present exciting research directions, articulate existing challenges and the resources needed to overcome them, and which highlight evolving research opportunities. We further hope that the *Sedimentary Record* will be a forum to evaluate and hone the vision of the community and promote multidisciplinary research.

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Accepted March 2013

PRESIDENT'S COMMENTS

My term expires this coming May, at which time Evan Franseen will become the new President. It has been a busy year and I have greatly enjoyed the opportunity to serve the membership as President. I want to thank Evan, my predecessor Chris Fielding, and the many other people with whom I have had the privilege of working this year. I have enjoyed the interactions with the staff at Headquarters, particularly our super business manager Theresa Scott and executive director Howard Harper. I have witnessed over the last year how valuable Howard is in representing SEPM to many other societies. We are well regarded by GSA and AGI due to Howard's efforts. I also thank members of Council, the Headquarters and Business Committee, and all the other volunteers who ensure that SEPM is a vigorous and well-organized society. The President's job is made easier by the hard work of those many individuals.

The transfer from one President and Council to another takes place at the Society's annual business luncheon, which will be held on Tuesday, May 21st during the annual AAPG/SEPM meeting. The business will be dispensed with quickly and Isabel Montañez of the University of California, Davis, will be the luncheon speaker. Her presentation will highlight the proxy sedimentary records of the Earth's climate system and how those records are being used to shed insight into Paleozoic climate dynamics. Also at the annual meeting (Tuesday night), the Society will honor its newest medalist – Paul Enos (Twenhofel), Tony Dickson (Pettijohn), Kenton Steward Wall Campbell (Moore), J. Casey Moore (Shepard), Kyle Staub (Wilson), Dale Leckie (Honorary Member), and John Snedden (Distinguished Service).

Please join me at both these events – and bring one of your students or younger colleagues. My first SEPM function was the 1981 business luncheon when Ron Perkins (one of my grad school mentors and then Secretary/Treasurer of SEPM) bought me a ticket and sat me down at a table with a number of people who I only knew at that time by their papers. I learned that the Society is more than just articles in a journal

– it is a network of interesting geoscientists that worked together through the Society for the betterment of our discipline. It was not long thereafter that I served on my first SEPM committee and I am forever grateful to Ron for making the “introduction”.

In my three prior columns in the *Sedimentary Record* I wrote about changes in how SEPM is doing business, such as the expansion of Council so more younger voices and perspectives are heard, the mobilization of our websites, the addition of Twitter to our means of communication, and the final steps in JSR's and Palaios' evolution to being just ejournals. These changes reflect SEPM's adaptation to the digital age and a new generation of geoscientists totally fluent and comfortable with an electronic world.

I have also had the opportunity this past year to promote and encourage changes that relate to the type of science associated with SEPM. The field of sedimentary geology has evolved tremendously over the past 20 years. Sedimentary sections are now mined to explore paleoclimate, the evolution of paleolandscapes, ancient critical-zone processes, paleoceanography, high-resolution geochronology, response of life and ecologic communities to dramatic environmental change, the role of microbes in everything, and the rigorous numerical modeling of all types of sedimentary processes and accumulations. Facies, systems tracts, and sequences may be characterized to establish a framework for those efforts, but those frameworks are not in themselves the research question except in applied sedimentology. This evolution in how sedimentary rocks and sediments are queried and the purposes for those queries represents a fundamental change in our discipline. I do not suggest that we abandon those areas of sedimentary geology and paleontology that have historically defined this society, but I do believe that the Society should be more aggressive in providing an inviting home to those geoscientists working in the greater range of sedimentary geology themes. We remain strong in terms of our historical focus, driven to a great extent by our long-standing association with the AAPG and the petroleum industry.

Yet, too narrow a thematic focus in our meetings, journals, and research conferences means we are not achieving our potential or broad mission.

Expanding SEPM's presence in developing the technical program for GSA's annual meeting is one change that has been implemented to address the issue of disciplinary diversification. Another is the initiative I wrote of last December – SEPM's partnering with the GSA and Paleontological Society to form a coordinating office for **STEPPE** research (*Sedimentary geology, Time, Environment, Paleontology, Paleoclimate, and Energy*). A third change is represented by the appointment of Isabel Montañez and Peter Isaacson as the new co-Editors of the *Sedimentary Record*. They envision the Record serving as a forum for the entire sedimentary geology and paleobiology community as we engage in the quest to understand the full range of earth system process behaviors through all of Earth history. Such a forum can highlight and evaluate ideas, opportunities, and research directions. I share their opinion that such an effort can position SEPM at the core of contemporary research in all aspects of our discipline and increase interactions with scientists external to our community.

More change will surely occur in the coming years regarding what type of science is fostered under the SEPM banner, how it is disseminated, who facilitates those efforts, and how many geoscientists support the endeavor through membership. I hope all members will see SEPM as worthy of their support – both financially and in terms of their time. Each of us has a potential role. Organize a SEPM theme session at a meeting, develop a research conference around a new and exciting topic, submit papers to our journals in those new research themes I mentioned above, and encourage others to do the same. A society is what its members make of it. Ours has had a wonderful history; I sincerely hope it has a bright and successful future.

David A. Budd, President



SEPM Society for Sedimentary Geology
“Bringing the Sedimentary Geology Community Together”
www.sepm.org

SEPM 2013 Officer Election Results

- **President-Elect:** Kitty Milliken, Bureau of Economic Geology, Austin, TX
- **Paleo Councilor:** Susan Kidwell, University of Chicago, Chicago, IL
- **Sed Councilor:** Greg Ludvigson, Kansas Geological Survey, Lawrence, KS
- **Student Councilor:** Tiffany Jobe, Colorado School of Mines, Golden, CO
- **PALAIOS Co-Editor:** Tom Olszewski, Texas A&M University, College Station, TX
- **Special Publications Co-Editor:** Brian Ricketts, Te Awamutu, New Zealand

SEPM also wishes to thank all of those candidates that agreed to run for office in order to help govern the society. Without these and people like them, SEPM would not be able to fulfill its mission.

SEPM at GSA 2013, Denver, CO

Call for abstracts in sedimentary geology.

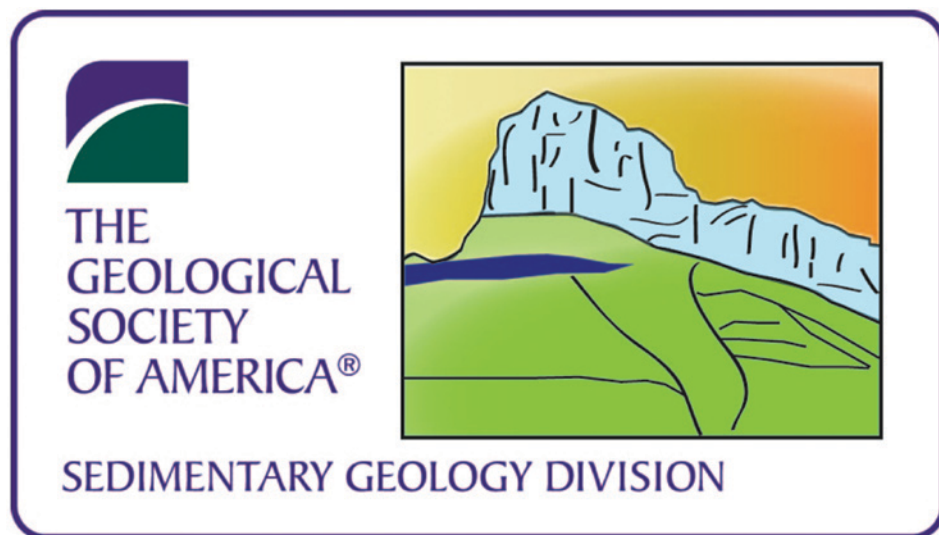
SEPM is sponsoring or co-sponsoring technical sessions at the Denver meeting. Abstracts for the meeting open April 1, 2013. For a full listing of the SEPM technical session topics see Appendix A in the online version of this Sedimentary Record, vol. 11, issue 1 (<http://www.sepm.org/pages.aspx?pageid=37>).

New Sedimentary Record Book Reviews

Mineralogical and geochemical approaches to provenance,
edited by E. Troy Rasbury, Sidney R. Hemming & Nancy R. Riggs, 2012.

The Baltic Sea Basin,
edited by Jan Harff, Svente Björck & Peer Hoth, 2011.

Landslides - types, mechanisms and modelling,
edited by John J. Clague & Douglas Stead, 2012



THE NEW LOGO

Note at the top of the page, the colorful new logo, for the division, which conforms to the new GSA standard.

2012 GSA ANNUAL MEETING

The Sedimentary Geology Division had a good representation at the 2012 GSA Annual Meeting in Charlotte, with the 22 theme sessions, and three short courses. The Sedimentary Geology Division also hosted the “Seds and Suds” Forum and Icebreaker, cosponsored by SEPM. This meeting was moved from our usual Saturday to Monday evening November 5., and the Joint Sedimentary Geology - Limnogeology Division Business Meeting and Awards Reception, also sponsored by SEPM, on Tuesday, November 6.

SUMMARY OF THE SEDS AND SUDS SYMPOSIUM AT THE ANNUAL GSA MEETING CHARLOTTE 2012.

Over 130 people attended the icebreaker and forum this year making the best attended ever, at its new, mid-meeting time. Ninety-one stayed for the complete presentation on three important research initiatives for the Sedimentary Community.

Judy Parrish and Rich Lane (NSF) outlined the

procedures for applying for the new TRANSITIONS program run through the Sedimentary Geology division at NSF. Solicitations will be every other year and the first deadline will be January 2013. Earth-Life Transitions. The goals of Earth-Life transitions are: 1) to develop multidisciplinary approaches to address critical questions about Earth-Life interactions in deep-time, and 2) develop teams using stratigraphy, sedimentology, paleontology, proxy development, calibration and application studies, geochronology, and climate modeling to understand major events of environmental, climate and biotic change at a mechanistic level. The Earth-Time announcement can be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13691.

Howard Harper, from SEPM highlighted the STEPPE program (Sedimentary Geology, Time, Environment, Paleontology, Paleoclimatology, and Energy).

STEPPE will be a voice for us to articulate our research needs. STEPPE will also help to develop collaborative and multidisciplinary research. STEPPE is an official partnership between GSA, SEPM and the Paleontological Society and should serve as a mechanism to help focus the earth-life transitions program. The program has started a website at <http://steppe.org/>.

Finally, Lisa Park Boush (NSF) presented an opportunity for the sedimentary geology division to host a workshop and participate in EarthCube, a

cyberstructure initiative. Now is an important time for sedimentary geologists to articulate our needs in an integrated Earth science database. While no funding will come to sedimentary geology, EarthCube may have a transformative effect on our science. Marjorie Chan (SGD Vice Chair) and David Budd (SEPM President) will be convening a sedimentary workshop in March 2013. Information about EarthCube and the sedimentary geology community workshop is available at <http://earthcube.ning.com/>.

JOINT SEDIMENTARY GEOLOGY/ LIMNOLOGY BUSINESS MEETING AND AWARDS CEREMONY

The Joint Sedimentary Geology Division/ Limnogeology Division Business Meeting and Awards Reception welcomed approximately 130 attendees, with a free drink and free food, while it lasted. This year, the major difficulty was that the room assigned to the meeting only would hold about half the participants, so we adjourned to the concourse, where there were no amplifiers, but plenty of loud mouthed speakers.



Gail Ashley,
2012 Laurence L. Sloss Award winner

Gail Ashley, of Rutgers University is the 14th recipient of the Laurence L. Sloss Award and joins an extremely distinguished company of scientists. Dr. Ashley is truly one of the pillars of the sedimentary geology community and has been a pioneer in expanding the boundaries of sedimentary research, expanding sedimentology to archeological studies and glacial deposits in addition to a career of achievements in bedforms and environmental reconstructions.

Erika Swanson, Cal Tech was the winner of the Stephen E. Laubach Award, a joint award from the Sedimentary Geology and the Structural Geology and Tectonics Division. Erika's project addresses a long-standing controversy in structural geology: the speed and mechanism of emplacement of the Heart Mountain block. She uses a unique application of diagenetic sedimentary petrology to resolve the heat and stress of during the slide.



Erika Colaiacomo,
this year's winner of the Student Research Grant!

Erika Colaiacomo is a master's student in fluvial geomorphology at the University of Montana. She is studying the downstream geomorphic effects of

the removal of Condit dam on the White Salmon River, WA with her advisor, Dr. Andrew Wilcox. Her integration of active sedimentation and geomorphology and commitment to data collection gave her the edge on an extremely competitive group of applicants.

Four students won grants for best poster at the SGD Student symposium.

Samantha Taylor, Department of Geology, University of Wisconsin-Eau Claire

Elizabeth Heness, Department of Physical Science, Kutztown University,

Marcelina Labaj, Dept. of Geological Sciences, University of Saskatchewan,

Meredith Strow, Department of Geography-Geology, Illinois State University.

We also welcome sponsors for the next event at the 125th GSA Annual Meeting in Denver in October 2013.

Continental Scientific Drilling and the Evolution of the Earth System

Gerilyn Soreghan, School of Geology and Geophysics, University of Oklahoma

Andrew Cohen, Department of Geosciences, University of Arizona

ABSTRACT

Over the past decade, numerous groups within the broad community of sedimentary geology, paleoclimatology, and paleobiology have repeatedly highlighted the need for continental scientific drilling (CSD) to address key science questions in climate and linked Earth systems. Additionally, advances in development of proxy and indicator data for climate parameters together with parallel advances in geochronologic resolution and accuracy, in ecosystem reconstruction, and in climate modeling are enabling us to mine sedimentary archives for paleoclimate and other paleoenvironmental information at unprecedented scales and resolution, even for deep-time targets. Application of these advances to pristine,

continuous, and well-preserved cores will be a key component to future advances in understanding earth history (Figure 1) -- a means to imagine our future by imaging our past (see also ICDP conference on this theme, 11-14 November 2013). This sustained surge of interest and advances forms the motivation for an upcoming workshop to be held May 17-19, 2013 in Norman, OK. This workshop is intended to galvanize researchers to plan proposals for pursuing specific, high-priority drilling targets, to address key science questions related to paleoclimate, paleobiology, and extreme events in Earth's history.

The full article on this topic is available in Appendix B of the online version of the *Sedimentary Record*, vol. 11, issue 1. (<http://www.sepm.org/pages.aspx?pageid=37>)

Call for Pre-Proposals: Scientific Drilling and the Evolution of the Earth System--NSF Workshop

May 17-19, 2013 in Norman, OK

Objectives: 1) galvanize researchers interested in using scientific drilling in Earth's sediment record to develop proposals for pursuing specific, high-priority targets to address key questions of Earth System evolution, and 2) offer these researchers direction on how to proceed.

To secure participation, submit a brief (3 pages, excluding references) pre-proposal identifying a viable continental scientific drilling target that addresses fundamental problems of scientific importance in

areas of paleoclimate, earth history, stratigraphy, paleoecology and/or paleobiology from any interval of Earth History.

Pre-proposals are due by Friday April 12, 2013. Submit via email as .pdf files to Dr. Lynn Soreghan (lsoreg@ou.edu) or Dr. Andrew Cohen (cohen@email.arizona.edu)

See the following web site for the application, and more information-- csdworkshops.geo.arizona.edu

SEPM Research Conferences

Do you want to have a small gathering for a group of colleagues to discuss your favorite research topic? Fifty to eighty researchers and students all deeply involved in the same area of research as you.

A highly interactive way – formal and informal discussions, talks, posters, dinners, field trips – to network and move the research forward. Well that describes an SEPM Research Conference!

Become a convener today and have your research topic energized in a way that only small group dynamic interaction can achieve. You pick the topic, you pick the location, you and your team set up the science program and SEPM handles the rest.

Recent topics have included:

- Geologic Problem Solving with Microfossils III Conference, University of Houston, Houston, Texas
- Digital Geospatial Context for 3-D Source-to-Sink, Carlsbad, New Mexico
- Paleosols and Soil Surface Analog Systems, Petrified Forest National Park, Arizona
- Sandy Microbial Mats from the Archean to Today, Dinosaur Ridge and Denver, Colorado
- Stratigraphic Evolution of Deep-Water Architecture, Torres del Paine National Park, Chile
- Clinoform Sedimentary Deposits, Rock Springs, Wyoming
- Outcrops Revitalized, Kilkee, Ireland

What's your topic?

For more information on how to propose a conference check out <http://www.sepm.org/pages.aspx?pageid=29>

Or contact SEPM Research Councilor Beverly Blakeney DeJarnett (bev.dejarnett@beg.utexas.edu) or Executive Director Howard Harper (hharper@sepm.org)

PALEOCLIMATES



DEEP WATER DEPOSITS



DEEPTIME MODELING



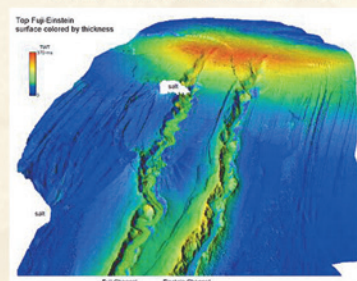
PALEOSOLS



CHANNELS



DEEP WATER SEISMIC



SEPM Pittsburgh Activities

Register for the meeting, short courses, field trips and SEPM Luncheon at <http://www.aapg.org/pittsburgh2013/>

Saturday, May 18

- SEPM Council Meeting (Omni Hotel)
- SC#5: Sequence-Stratigraphic Analysis of Shales (Day 1 of 1)(Omni Hotel)
- SC#7: Sequence Stratigraphy for Graduate Students (Day1 of 2)(Omni Hotel)

Sunday, May 19

- SC#7: Sequence Stratigraphy for Graduate Students (Day 2 of 2) (Omni Hotel)
- SC#11: Seismic Geomorphology and Seismic Stratigraphy (Day 1 of 1) (Omni Hotel)
- SC#12: Analogs for Carbonate Deposition in Early Rift Settings (Day 1 of 1) (Omni Hotel)
- Icebreaker, 5:00pm – 7:00pm: SEPM Booth #2115 at Convention Center

Monday, May 20

- SEPM Booth #2115 – Convention Center
- SEPM Foundation Board Meeting (Omni Hotel)
- SEPM Student Poster Sessions (Best Student Presentation Competition): 1:15 pm-5:00 pm
- AAPG/SEPM Student Reception
- SEPM Research Group Meetings and Reception (Omni Hotel)

Tuesday, May 21

- SEPM Booth #2115 – Convention Center
- SEPM Research Symposium: Depositional Systems and Sedimentology of Shale and Tight-Sand Reservoirs
- SEPM Business Meeting and Luncheon: Earth's Deep-Time Insight into Our Climate System (tickets required) (Omni Hotel)
- SEPM President's Reception and Awards Ceremony (open to all members) (Omni Hotel)

Wednesday, May 22

- SEPM Booth #2115 – Convention Center
- FT#8: Stratigraphy and Depositional Environments of Middle to Late Devonian Natural Gas Reservoirs in the central Pennsylvania Appalachian Basin (Students and Faculty Advisors only). AAPG-SC/SEPM, Wednesday – Friday.
- FT#9: Stratigraphy, Stratal Packaging, and Sedimentology of Devonian Shales in Ohio and Kentucky. Wednesday-Friday.
- FT#10: Sequence Stratigraphy and Palaeoenvironments of the Upper Ord. Strata of the Cincinnati Arch (Kentucky-Ohio-Indiana Tristate area). Wednesday-Saturday
- FT#11: Sequence Stratigraphy, Reservoir Architecture of a Coal-Bearing Fluvial Deltaic Sedimentary Succession. SEPM/EMD, Wednesday-Saturday.



SEPM sponsored and co-sponsored technical sessions proposed for GSA, Denver, 2013 – Abstracts open 1 April

<http://www.geosociety.org/meetings/2013/abstracts.htm>

- **Caves as Deep Time Repositories of Geological, Biological, and Anthropological Information**
 - Description: Caves serve as deep time repositories of scientific information. This session welcomes contributions utilizing cave deposits to create time series of original data that capture information about the evolution of geologic, biologic, and anthropological systems.
- **Lacustrine Basin Analysis and Petroleum Systems: Ancient Case Studies, Modern Analogs, New Frontiers**
 - Description: This session will encompass the evolution of our understanding of lacustrine geology including research on the geology, geochemistry, and geophysics of lake basins (modern and ancient), with special relevance to petroleum systems development.
- **Advances in X-ray Fluorescence and Diffraction and Their Role in Sedimentary Geochemistry and Chemostratigraphy**
 - Description: The proposed session seeks to evaluate the role of x-ray fluorescence and diffraction in stratigraphy, paleoceanography, paleolimnology, paleopedology, and paleoclimatology, and define modern approaches to answering questions in the various subdisciplines of sedimentary geochemistry.
- **Pedogenic Minerals as Indicators of Ecosystems: Understanding the Critical Zone Through Space and Time**
 - Description: This session will emphasize the occurrence and distribution of pedogenic minerals in response to a range of different soil-forming factors, and how those minerals in paleosol profiles provide proxies of ancient critical zones and paleoenvironments.
- **The Life and Death of Mobile Belts Along the North American Cordillera: Advances in Understanding the Long-Term Construction of Continental Margins (Posters)**
 - Description: This cross-disciplinary session will explore emerging ideas about tectonic processes that have shaped the Phanerozoic development of the North American Cordillera. Studies that utilize geochronology, geophysics, sedimentology/stratigraphy, and structural geology are encouraged.
- **Continental Carbonates**
 - Description: Continental carbonates contribute paleoenvironmental information for reconstructions of paleoclimate as well as landscape drainage patterns. Research on lacustrine and palustrine limestones, microbialites and spring deposits, and evaporites will be highlighted.
- **A Life in Earth History From Tectonics to Climate: The Scientific Legacy of Paul F. Hoffman**
 - Description: This session will focus on recent advances in crustal, climate, and biogeochemical evolution from tectonics to Snowball Earth.
- **Climate of the Late Paleozoic-- Earth's Last Icehouse and Icehouse Collapse**
 - Description: The late Paleozoic archives Earth's last icehouse collapse on a fully vegetated planet, and accompanied by a large CO₂ increase. We seek contributions on records of both data and modeling of this major climate transition.
- **Geologic Process Rates - Past, Present and Future**
 - Description: Recent advances in dating methods make it possible to better determine rates of geologic processes in the past. Humans are accelerating the rates of geologic change with uncertain consequences
- **Into the Frying PAN: The Early Triassic Hothouse of Pangea and Panthalassa**
 - Description: This session will feature new research related to extreme climate conditions of the Early Triassic, representing the aftermath of the largest mass extinction in Earth history.
- **Using the Past to Look to the Future: Reconstructing Terrestrial Paleoenvironments and Paleoecosystems of Past Warm Worlds**
 - Description: This session will bring together case studies using paleoclimate, proxy, and paleobiological data to investigate ancient warm worlds as models for understanding the potential biological and environmental impacts of a future warm world.
- **Celebrating Advances in Conodont Studies—134 Years of North American Conodonts**
 - Description: This session celebrates 134 years since the publication of Hinde's landmark study on Ordovician and Devonian conodonts from eastern North America and welcomes contributions on all things conodont-related, be it historical, modern, or futuristic.
- **Advances in the Application of Biogeochemical Datasets in Paleoenvironmental and Paleoecological Studies**
 - Description: This session will emphasize new and refined methods for collecting, screening, and modeling biogeochemical data (e.g., light stable isotope data) to be used in paleoenvironmental and paleoecological studies.
- **Ancient Polar Ecosystems and Climate History in Deep Time**
 - Description: Understanding climate change is relevant as societal impacts of global warming are considerable. For deep-geologic time studies, multiple proxies are used to reconstruct ancient climates. This session will provide an empirical deep-time perspective for modeling polar ecosystems and climates.
- **The Arthropoda: Paleoecology, Diversity, Taphonomy, and Phylogeny**
 - Description: Today, arthropods are the most diverse animal group. From the fossil record on the order of tens of thousands of species are known. This session presents research on broad, cutting-edge topics dealing with fossil arthropods.
- **New Advances in Pore System Characterization Cross Geologic Boundaries**
 - Description: Recent advances in shale characterization have spurred the application of new imaging and modeling techniques to non-shale reservoirs. This session highlights techniques and concepts of pore system characterization and modeling for all 21st century reservoirs.

Continental Scientific Drilling and the Evolution of the Earth System

Gerilyn Soreghan, School of Geology and Geophysics, University of Oklahoma

Andrew Cohen, Department of Geosciences, University of Arizona

ABSTRACT

Over the past decade, numerous groups within the broad community of sedimentary geology, paleoclimatology, and paleobiology have repeatedly highlighted the need for continental scientific drilling (CSD) to address key science questions in climate and linked Earth systems. Additionally, advances in development of proxy and indicator data for climate parameters such as atmospheric composition, air and water temperatures, effective moisture, atmospheric circulation, and productivity, together with parallel advances in geochronologic resolution and accuracy, in ecosystem reconstruction, and in climate modeling are enabling us to mine sedimentary archives for paleoclimate and other paleoenvironmental information at unprecedented scales and resolution, even for deep-time targets. Application of these advances to pristine, continuous, and well-preserved cores will be a key component to future advances in understanding earth history-- a means to imagine our future by imaging our past (see also ICDP conference on this theme, 11-14 November 2013). This sustained surge of interest and advances forms the motivation for an upcoming workshop to be held May 17-19, 2013 in Norman, OK. This workshop is intended to galvanize researchers to plan proposals for pursuing specific, high-priority drilling targets, to address key science questions related to paleoclimate, paleobiology, and extreme events in Earth's history.

EARTH'S LAB BOOK: IMAGING OUR PAST TO IMAGINE OUR FUTURE

The nearly 4 billion years of history preserved in Earth's sedimentary cover record the results of innumerable experiments in environmental and ecological change. We can harness the results of these past experiments as preserved in the sedimentary record to expand our knowledge of Earth system behavior, particularly of coupling between and among components of the Earth System and coupling of climate processes that operate at a variety of rates. Doing so is particularly critical because major gaps remain in our ability to understand Earth's climate system, contributing to modeling failures and climate-prediction uncertainty. For example, models cannot yet capture abrupt climate change (Valdes, 2011), changes in clouds due to aerosol forcing (e.g., Mahowald et al., 2006; Kump and Pollard, 2008), or simulations of ENSO phenomena (e.g. Philander and Federov, 2003; Guilyardi et al., 2009). The importance of studying Earth's past to clarify its future is well understood by researchers investigating both the "near-time" (e.g. Quaternary) record and the "deep-time" record. Such studies, however, are commonly hampered by lack of access to continuous, pristine, ideally sited sedimentary sections.

Scientific drilling is widely regarded as key in advancing our understanding of critical questions of Earth's past, and indeed several success stories bolster this claim. In the last two decades, several drilling campaigns in sedimentary systems have addressed fundamental questions in the surficial archive of Earth, its biosphere, and the physio-chemical processes that mold the outer veneer of our planet (e.g., Melles et al., 2012; Schulte et al., 2010). These efforts have emanated from two distinct communities: 1) Geoscientists focusing on the recent past (primarily Quaternary) paleoclimates and paleoenvironments (largely the lake science community), and 2) deep-time geoscientists focusing on pre-Quaternary stratigraphy, Earth history, paleobiology, and biogeochemistry. The key science questions posed by both of these communities, however, increasingly overlap, and the time frames of interest are converging. Given that the boundaries that have traditionally separated these communities are both fluid and artificial, it is time to join forces to seek common ground on questions and research targets.

In the past 15 years, multiple initiatives and workshops have occurred involving the sedimentary geology and paleobiology communities, and have resulted in repeated calls for scientific drilling to address key questions. The PAGES report *Continental Drilling for Paleoclimatic Records* (Colman, 1996) was particularly instrumental in galvanizing the lakes community to embrace scientific drilling as an investigatory tool for obtaining long earth historical records. Seventeen years after the publication of that report many of the workshop's goals (i.e. target lakes) have been drilled.

Subsequently, the *GeoSystems* workshops (Soreghan et al., 2003, 2004; Montanez and Soreghan, 2006) brought together representatives from the deep-time community to advocate for systematically expanding Earth history and especially paleoclimate investigations into Earth's pre-Quaternary record. Both this and the PAGES workshop stressed drilling as an essential path toward recovering critical records that had not been compromised by surface weathering or limited by the vagaries of outcrop exposure, and indeed a jointly sponsored 2005 NSF-DOSECC workshop was specifically convened to address issues in drilling for recovery of deep time records. More recently, workshops on "Grand Challenges in Sedimentary Geology" (Montanez, 2010), Earth's "Deep Time Earth Life Observatory Network" (DETELON, Bottjer and Irwin, 2010), and "Transitions" (Parrish, 2012) have further elevated and reiterated the community's collective need for scientific drilling to address fundamental concepts in Earth System history, as did the 2010 and 2011 National Research Council Reports on "*Understanding Climate's Influence on Human Evolution*" and "*Understanding Earth's Deep Past--Lessons for Our Climate Future*" (NRC, 2011).

Advances in development of proxy and indicator data for climate parameters such as atmospheric composition, air and water temperatures, effective moisture, atmospheric circulation, and productivity, together

with parallel advances in geochronologic resolution and accuracy (even for deep time), in ecosystem reconstruction, and in climate modeling are enabling us to mine sedimentary archives for paleoclimate and other paleoenvironmental information at unprecedented scales and resolution. Application of these advances to pristine, continuous, and well-preserved cores will be a key component to future advances in understanding earth history.

SCIENCE THEMES—A SAMPLING OF KEY ISSUES IN EVOLUTION OF THE EARTH SYSTEM

The “*Future of Continental Scientific Drilling*” workshop (Walton et al., 2009, 2010) identified several needs related to exploring Earth System history: 1) global environmental and ecological change, 2) the history of Earth and its biota through time series studies based optimally on drill cores, 3) lake records containing climate proxies of temperature, winds, precipitation, and watershed biotic evolution, 4) high-resolution records of Earth’s magnetic field, 5) deep-time records addressing analogous questions to those of near-time, but including a wider spectrum of boundary conditions, including those potentially relevant to Earth’s near-term future return to a pre-Quaternary state (in terms of atmospheric composition). The 2012 *Transitions* report pushed deeper into identifying key science questions answerable in both deep- and near-time archives:

- 1) What is the full range of potential climate system states and transitions experienced on earth?
- 2) What are the thresholds, feedbacks and tipping points in the climate system and how do they vary among different climate states?
- 3) What are the ranges of ecosystem response, modes of vulnerability and resilience to change in different Earth system states?
- 4) How have climate, the oceans, the Earth’s sedimentary crust, carbon sinks and soils and life itself evolved together, through both near- and deep-time, and what does this tell us about the future trajectory of the integrated Earth-life system?

Drilling is essential for recovering high-resolution paleoclimate records to address the above questions. Drilling enables recovery of strata in which the effects of modern weathering

are minimized, necessary for many geochemical, biogeochemical and geochronologic studies. Drilling also is essential for obtaining uninterrupted, high-resolution records from thick, basin depocenter sections where stratigraphic completeness is greater than along basin margins. Finally, drill core records enable validation and testing of climate model hindcasts for earth system states that fundamentally differ from the modern; e.g. recent data results from Antarctica are helping to refine problematic climate model predictions (Pross et al., 2012).

THE PATH FORWARD

At this point in time, we must move beyond reiterations of these common goals and actually identify drilling targets as the continental scientific drilling contribution toward meeting these long-standing objectives. Consider the case of the Lakes Drilling Task Force. In 1995, as part of a PAGES effort on drilling for continental paleoclimate records (Colman, 1995), this Task Force identified 62 lakes as “high priority” for drilling. To date, 12

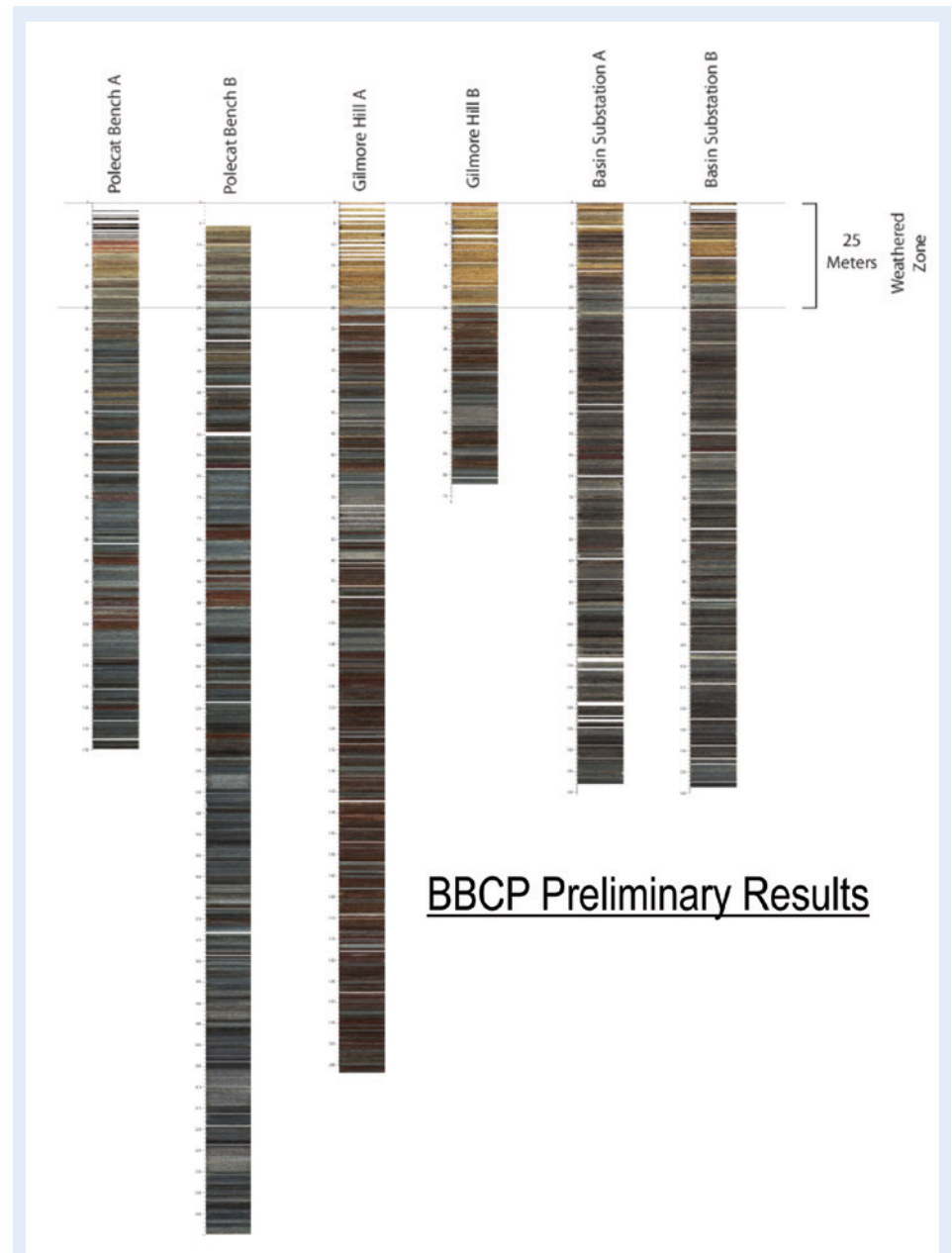


Figure 1: Core image scans from the Bighorn Basin, Wyoming, illustrating subsurface stratigraphy at a key location for understanding continental climate history through the early Paleogene hyperthermal events. A strong weathering profile is evident from the core color changes below ~25m, providing a clear rationale for why obtaining unweathered drill core is critical for a variety of geochemical and paleoecological indicators of environmental history. Figure courtesy of the Bighorn Basin Coring Project.

have been drilled, and four are in an advanced stage of planning. In addition, 8 others not on the original list have either been drilled or are in a planning stage. Given the technical and financial hurdles attendant with any drilling program, especially for lake drilling, this is a very positive result. This success occurred because the PAGES workshop moved beyond stating generalities of the need to acquire core, to actually identifying targets for specific sites to answer critical science questions.

We are following this model in convening a workshop on scientific drilling and the evolution of the earth system. Any interested participant may apply to attend the workshop by submitting a brief (2-3 page) pre-proposal identifying a potential drilling target. We will also consider drilling project proposals submitted by scientists who for whatever reason are unable to attend the workshop. Our primary goal is to 1) help galvanize a community of scientists with related interests in seeing CSD applications to Earth and life history move forward, and 2) to provide information and feedback for scientists who may or may not have prior experience with continental drilling, to help them understand what makes for a competitive proposal in CSD. This NSF-supported workshop will occur May 17-19, 2013, on the University of Oklahoma campus in Norman, Oklahoma. NSF personnel will be there to discuss funding options for research involving drilling. Details of the application process appear below. Please join and be part of a major transformation of how we collect and interpret records of Earth history.

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