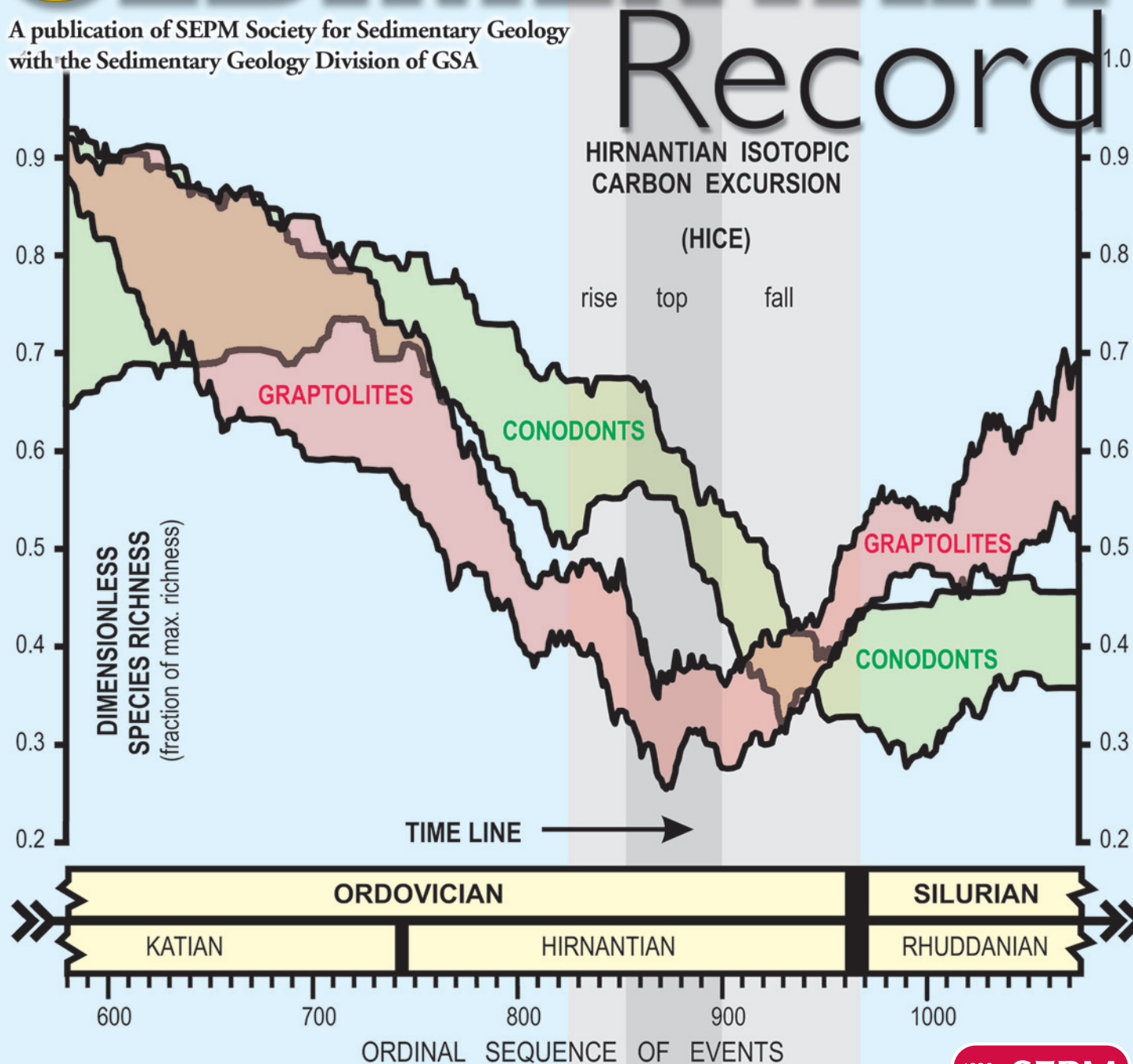


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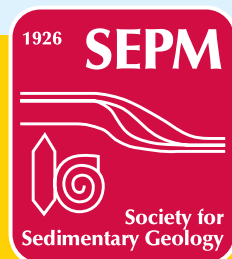
doi: 10.2110/sedred.2014.3
Volume 12, No. 3, September 2014

A publication of SEPM Society for Sedimentary Geology
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INSIDE: HIGH-RESOLUTION GEOBIOLOGIC TIME-LINES:
PROGRESS AND POTENTIAL, FIFTY YEARS AFTER
THE ADVENT OF GRAPHIC CORRELATION

PLUS: PRESIDENT'S COMMENTS, SGD NEWS,
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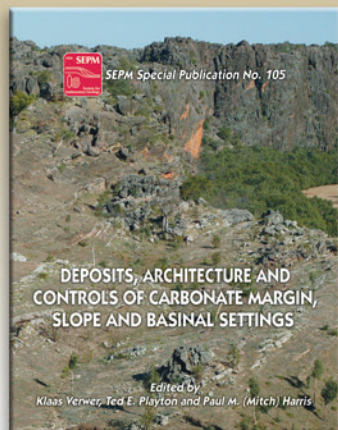


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Special Publication #105

Deposits, Architecture, and Controls of Carbonate Margin, Slope, and Basinal Settings

Edited by: Klaas Verwer, Ted E. Playton, and Paul M. (Mitch) Harris



Carbonate margin, slope and basinal depositional environments, and their transitions, are highly dynamic and heterogeneous components of carbonate platform systems. Carbonate slopes are of particular interest because they form repositories for volumetrically significant amounts of sediment produced from nearly all carbonate environments, and form the links between shallow-water carbonate platform settings where prevailing in situ factories reside and their equivalent deeper-water settings dominated by resedimentation processes. Slope environments also provide an extensive stratigraphic record that, although is preserved differently than platform-top or basinal strata, can be utilized to unravel the growth evolution, sediment factories, and intrinsic to extrinsic parameters that control carbonate platform systems. In addition to many stimulating academic aspects of carbonate margin, slope, and basinal settings, they are increasingly recognized as significant conventional hydrocarbon reservoirs as well. The papers in this volume, which are drawn from the presentations made at the AAPG Annual Meeting in Long Beach, California (USA), in May 2012, as well as solicited submissions, provide insights into the spectrum of deposit types, stratal configurations, styles of growth, spatial architectures, controlling factors behind variations, and the hydrocarbon reservoir potential observed across the globe in these systems. The sixteen papers in this Special Publication include conceptual works, subsurface studies and outcrop studies, and are grouped into sections on conceptual works or syntheses, margin to basin development and controlling factors, architecture and controls on carbonate margins, and carbonate distal slope and basin floor development.

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Concepts in Sedimentology and Paleontology 11

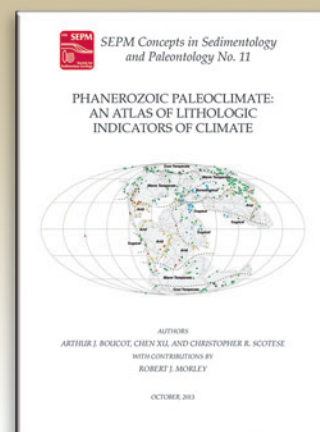
Phanerozoic Paleoclimate: An Atlas of Lithologic Indicators of Climate

By: Arthur J. Boucot, Chen Xu, and Christopher R. Scotese, with contributions by Robert J. Morley

This publication combines the interpretations of two major sets of data. One is the geophysical data that is used to interpret the position of the tectonic plates through geologic time. The other is based on a long time search of the geological literature to find, record, and evaluate the lithologic descriptions of countless reports around the globe; paying careful attention to those lithologies that have climatic implications. The introduction to this volume includes a detailed discussion of the lithologies, mineralogies and biogeographies that are considered to be the most reliable in identifying the climatic conditions existing during their formation and how they are used or not used in this compilation. Global paleoclimatic zones based on the climatically interpreted data points are identified during twenty-eight time periods from Cambrian to Miocene using paleotectonic reconstructed maps. The paleoclimate of each time period is summarized and includes a discussion of the specific referenced data points that have been interpreted to be the most reliable available for that time period and location.

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Short Course Notes 56

Evaluating Water-Depth Variation and Mapping Depositional Facies on the Great Bahama Bank – a “Flat-Topped” Isolated Carbonate Platform

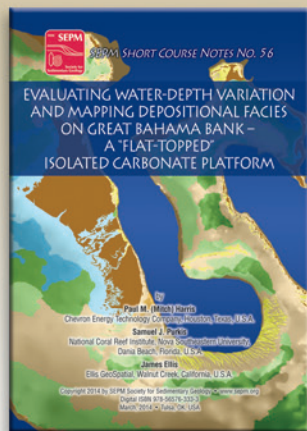
By: Paul M. (Mitch) Harris, Samuel J. Purkis, and James Ellis

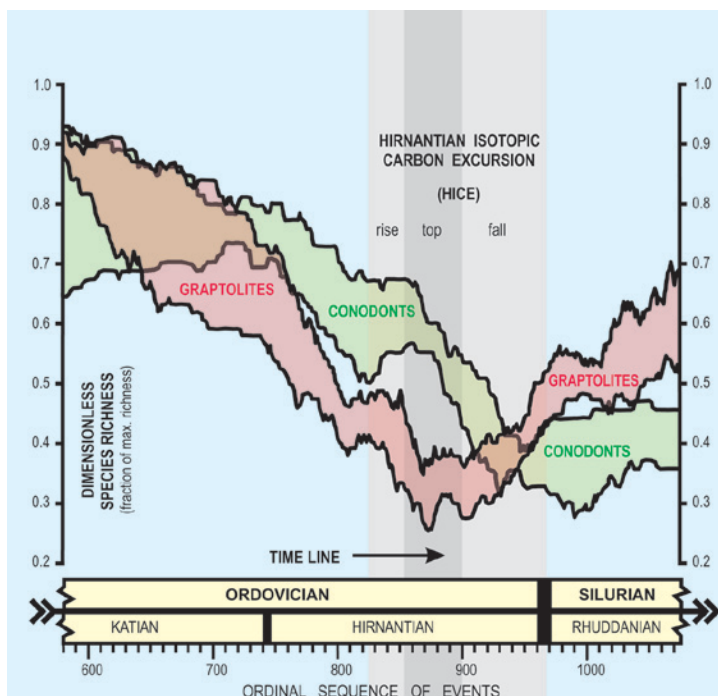
Great Bahama Bank (GBB) has long served as a frequently visited and well-studied example of a flat-topped, isolated carbonate platform. As such, GBB stands behind much of our understanding of modern processes and products of carbonate sedimentation. The geological models derived from studies on GBB are commonly used to illustrate depositional facies variations and frequently serve as reservoir analogs.

We have used Landsat TM and ETM+ imagery and an extensive set of water depth measurements to first critically evaluate the magnitude and patterns of bathymetry across GBB. We then integrated the seafloor sample data of Reijmer et al (2009) along with a small number of additional samples with the Landsat imagery compiled into ArcGIS and analyzed with eCognition to develop a depositional facies map that is more robust than previous versions. The new maps, in our opinion, can serve as a template for better characterizing GBB at all scales, highlight future research areas where “ground-truthing” is needed to further investigate facies patterns, and facilitate better use of this isolated carbonate platform as an analog for both exploration- and reservoir-scale facies analysis. As examples of information that can be extracted from the maps, we analyze the platform margins of GBB with respect to their orientation, examine the relationship between water depth and facies type, interrogate facies position and breadth across the platform top, and relook at the occurrences of whittings relative to the distribution of mud on the platform.

The geospatial data for GBB are compiled into a 3.9 GB GIS database which is included on the DVD of this digital publication. The GIS contains raw data, interpretive products, and visualization examples that were produced during development of the water depth and facies maps of GBB, including the Landsat TM imagery, DEM, images developed by combining layers in the GIS, and facies and whittings maps. In addition, the Projects folder of the GIS contains files that automatically display images, maps, and DEMs with an appropriate symbology in ArcGIS version 10.1 (.mxd), ArcGIS Explorer version (Build) 1750 and 2500 (.nmf), and GlobalMapper version 14-1 (.wks).

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Cover image: Global graptolite diversity was decreasing prior to the Hirnantian carbon isotope excursion (HICE) and before the loss of conodont diversity. The red and green uncertainty bands were generated by superimposing running totals from six time-lines of origination and extinction events that fit global occurrence data equally well (see figure 4, p. 9).

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The Sedimentary Record (ISSN 1543-8740) is published quarterly by the Society for Sedimentary Geology with offices at 4111 S. Darlington, Suite 100, Tulsa, OK 74135-6373, USA.

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High-Resolution Geobiologic Time-Lines: Progress and Potential, Fifty Years after the Advent of Graphic Correlation

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ABSTRACT

Constructing a time-line of events in the co-evolution of life, climate and landscape demands less of data than correlating in detail all the stratigraphic sections that provide data. A wide range of information can be included without overstating the fidelity of any of it. Computer algorithms build global time-lines from thousands of local observations of stratigraphic superposition and supply explicit uncertainty statements about the position of each event in the time-line. Community databases and on-line search engines ease the compilation of data. There remains a need to analyze more stratigraphic sections for multiple fossil clades and to publish chemostratigraphic data more often against raw taxon range charts rather than derived biozone boundaries. Better algorithms would handle both unique and repetitive events.

TIME SCALES AND TIME LINES

The editors (Montanez and Isaacson, 2013) wrote of two developments for resolving ancient episodes of global change: analytical improvement in age determination and computational advances in sequencing events on a global scale. We review the simple logic of the computational advances, illustrate the wealth of information involved, and identify challenges that remain. Calibration of the geologic time scale benefits from both developments (Smith et al., 2014). Our title refers to time-lines rather than time scales to emphasize a more fundamental endeavor -- arranging in their most likely order as many ancient evolutionary, ecological, geochemical and geophysical events as possible. Numerical ages assist considerably in this sequencing task (Sadler, 2006), but the sequence of most events must be determined using local and conflicted evidence of stratigraphic superposition.

UNRELIABLE WITNESSES OF GLOBAL CHANGE

To reconstruct events leading to a crime, detectives compile time-lines from witnesses with incomplete recollections and unique vantage points. The composite time-line becomes far more complete and reliable than the recollection of the best witness. Similarly, geologists need composite time-lines (Fig. 1) to reconstruct global co-evolution of life, climate, and landscape. Our witnesses are local outcrops and well cores. Individually they are incomplete, fallible, and parochial (Kowalewski and Bambach, 2003; Erwin, 2006.). They routinely contradict one another concerning the sequence of species appearances and disappearances (Fig. 2A). Signals and noise mingle among these contradictions. Records of real ecological patch dynamics, biogeographic habitat shifts and evolutionary turnover are confounded by incomplete preservation and collection. We can mitigate local noise by including many neighboring sections, but painstaking and exhaustive local collection cannot resolve true origination, migration and extinction signals; that requires global coverage.

Fifty years ago, Alan Shaw (1964) published a method to deal explicitly with contradictory stratigraphic sections. Earlier biostratigraphers had sought exceptional taxon appearance or disappearance events that are typically recorded in the same order everywhere; using these, they divided geologic time into biozones. Realizing that local range-ends were *not* correlative, Shaw sought the earliest local first occurrence and youngest local last occurrence for each taxon. He projected information from all sections into the best of them to make a composite reference section. Shaw had experimented with graphic correlation as a petroleum geologist seeking to resolve controversial questions of diachronism. The attempt cost him his job (Shaw, 1995), but inspired a revolution.

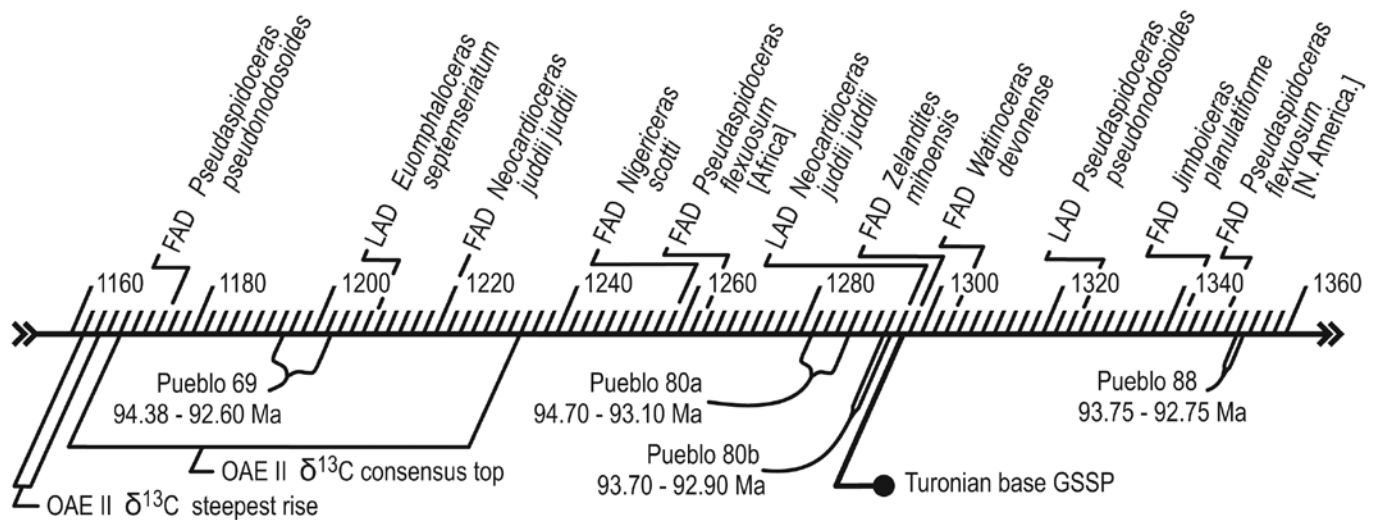


Figure 1: Key events in a fragment of a composite time-line for 1213 Albian through Maastrichtian ammonite species reported from two or more of 562 globally distributed locations, plus dated ash fall events and stable isotope excursions. FAD and LAD = first- and last-appearance datums. Fragment spans 200 of 2588 composite event levels, constrained by 15,205 local event observations. This time-line is purely ordinal – events are uniformly spaced, neither scaled by stratigraphic separation nor calibrated. After scaling, some neighboring events collapse to one level; their spacing is not resolvable.

BEYOND BIOZONES

Shaw shifted the focus from correlating sections to building composite time-lines. To appreciate his method, consider untangling figure 2A. Traditional biostratigraphy challenges us to cull the fewest tie-lines such that none of those remaining cross one another. Shaw changed the rules: keep all the tie-lines and find the smallest set of adjustments that removes all the crossings.

In fifty years since Shaw's book appeared, several key developments have made it feasible and urgent to build time-lines of global scope. 1) Event stratigraphy (Kauffman, 1988) increased the range of information we include. 2) Sequence stratigraphy (Mitchum et al., 1976) gave eustatic hiatuses a logical place in the sequence of range-end events (Holland, 2000). 3) Numerical algorithms (reviews by Tipper, 1988; Sadler, 2004) made the adjusting process faster, explicitly reproducible, and amenable to far more information. 4) Following Sepkoski's (1982, 1993) compilations, community databases and on-line search engines improved access to information. 5) On-going global change placed a premium on high resolution, total-data reconstruction of ancient global change.

The volume of stratigraphic information relevant to a global time-line is overwhelming and yet inadequate – insufficient to constrain uniquely the position of every event. This shortfall is no argument for culling: the set of equally good solutions leads directly to explicit uncertainty statements. Also, constructing a high resolution time-line makes more modest demands on data than correlating stratigraphic sections in detail. A section that contains too little information for correlation with other sections may, nevertheless, provide key evidence for the composite time-line – the only observation that two taxa coexisted, for example.

EXPLICIT UNCERTAINTY FOR INPUT DATA

Having chosen to adjust local event horizons rather than cull them, we need rules about permissible adjustments. These rules vary with event type. Geologists recognize a wealth of different types: first- and last-appearances of taxa, carbon isotope excursions, geomagnetic polarity reversals, ash fall tuffs, sequence boundaries, radioisotopic dates, and more. Fortunately, data input for the sequencing algorithms uses a small set of types (Sadler and Cervato,

2011), based on the expected fidelity of their observed stratigraphic position. Some events, like a dated ash fall tuff, are sampled at the correct level and are not adjustable; the local datum is “nailed” in the sense it may be removed, but not moved. Local first appearances of taxa most likely lie above the horizon deposited at the time of true evolutionary appearance (FAD) or even local immigration; they belong in a category of events that may be adjusted downward only. Local last occurrences may be restricted to upward adjustment or, if reworking is suspected, a category that may be adjusted up or down section (at higher cost for downward adjustment; Cody et al., 2008).

Many input events are paired. Ends of a local taxon range are a pair that may be stretched farther apart to fit the composite sequence. Imagine them separated by a jack (Fig. 3); then Shaw's method minimizes mechanical effort of adjustment. Other events need a conservative uncertainty interval that shrinks to fit, with mechanical effort represented by a clamp (Fig. 3); examples include segments of stable isotope excursions, seismic reflectors projected into a well, and locations of paleomagnetic reversals between samples of opposite polarity. Events are treated

as clamps, jacks or nails in order to include as much information as possible without overstating the fidelity of any of it.

MEASURES OF FITNESS

The sum of all necessary adjustments measures the fitness of hypothetical time-lines. In usefully large data sets (Table 1) the number of local observations of pairwise event superposition becomes dauntingly large, but programs like Graphcor (Hood, 1986) and Sinocor (Fan and Zhang, 2000) partially automate the task of minimizing adjustments. A different measure of fitness counts the number of implied global coexistences of taxa that have not been observed locally. Minimizing this count generates time-lines from sections and samples that do not overlap in time. This approach is commonplace in archaeology, was adopted as ecostratigraphy (Cisne, 1978) and has been fully automated by the Biograph (Guex, 1991) and Conjunction (Alroy, 1992) programs. Coexistence of two taxa means that both first appearances must precede either last occurrence. Thus, programs can readily incorporate both superposition and coexistence constraints; e.g. Constrained Optimization (Sadler and Cooper, 2003), Appearance Event Ordination (Alroy, 1994) and Horizon Annealing (Sheets et al., 2012).

EXPLICIT UNCERTAINTY FOR TIME-LINES

Figure 4 illustrates three options for uncertainty statements. For time series output, such as histories of taxon richness (Fig. 4A) or turnover, superimpose the results from a number of equally best-fit time-lines (e.g. Shen et al., 2011). For each event, report a best fit interval that spans all positions occupied by the event in the set of best fit time lines (e.g. taxon range ends, Fig. 4C) and add relaxed fit curves (Sadler and Cooper, 2003) to show how fit deteriorates beyond that interval. Support for the composite range of a taxon (Fig 4B) can be represented as a count of the contributing local ranges, mapped into the time-line to reveal diachronism; this also exposes erroneous outliers and disjunct ranges (Sadler, 2010).

CHALLENGES FOR ALGORITHMS

Taxon ranges have loose stratigraphic fidelity, but taxa are inherently unique. Isotopic excursions, seismic sequence boundaries, and paleomagnetic reversals have better fidelity (Cooper et al., 2000; Cramer et al., 2010), but are repetitive events, whose unique matching requires associated taxa or runs of events with distinctive spacing. Currently, this kind of

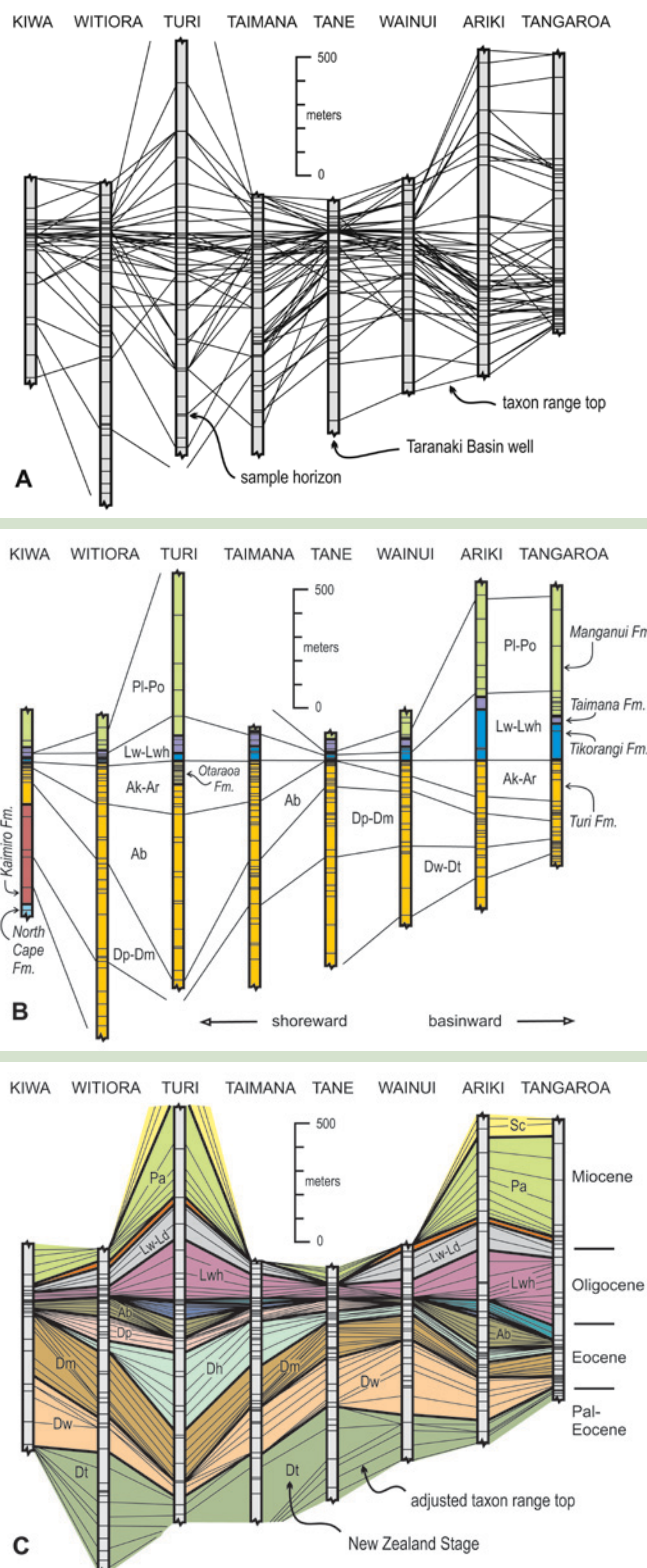


Figure 2: Correlation of foraminifera, nannofossils, dinoflagellates, spores and pollen from 8 wells in New Zealand's hydrocarbon-producing Taranaki Basin. **A:** Literal correlation of range tops of the 87 most reliable of 351 taxa prepared during the Cooper et al. (2001) study and older biostratigraphy. Range bases were potentially compromised by borehole caving. **B:** Lithostratigraphy and traditional biostratigraphic correlation prior to 2001 study. **C:** Outcome of automated correlation to a fully-resolved, composite, scaled time-line by minimal adjustment of observed ranges and insertion of missing taxa (Cooper et al. 2001). New Zealand stages explained in Cooper (2004).

matching must be undertaken before data entry and/or tested through successive and progressively specified iterations of analysis. Better algorithms would match repetitive events and optimize sequences of unique and repetitive events in one pass. Horizon annealing may have the best potential for this (David Sheets, personal communication). As data sets grow, there is always a premium on faster algorithms. The Geobiodiversity Database managers in Nanjing are pursuing faster solutions in partnership with commercial programmers (Fan Jun-Xuan, personal communication).

DEMANDS ON DATA

Constraining power derives from pairs of events known from the same section so that superpositional information exists for them ("constraint" column in Table 1). This information is typically weakest between taxa of different clades, preserved in different facies or prepared by different techniques. More robust time lines need more stratigraphic sections sampled for multiple clades (Cramer et al., 2010). Chemostratigraphic data should be published wherever possible against raw taxon range charts rather than derived biozone boundaries. Databases of fossil biotas should supply evidence of physical stratigraphic superposition, not simply assign zones or stages.

A FUTURE

Once upon a time, Amoco committed resources to continual maintenance of a grand Phanerozoic time-line. We might plan for a future in which sequencing the fossil record passes from the hands of individuals to community search engines and distributed computing tools. Human expertise can focus on quality control.

ACKNOWLEDGEMENTS

Isabel Montanez, Peter Isaacson, Brad Cramer, Mark Kleffner, and Dan Goldman gave valuable encouragement during preparation of this article, which is a contribution to IGCP project 591: "The Early to Middle Paleozoic Revolution."

Case History	Sections or Localities	Taxa	Other Events	Local Records	Constraints	Method*
Three Estonian Hirnantian Clades (Fig. 3)	7	9	6	27	?	
Plio-Pleistocene Omo Group Mammals (Alroy, 1994)	29	109		720	?	A
Cambrian Trilobites of S. California (Webster et al., 2003)	88**	76	55	879	1,064	Cp
Late Cretaceous dinoflagellates (Crampton et al., 2006)	15	245	0	891	5,521	Cp
Taranaki Basin, culled (Fig. 2) (Cooper et al., 2001)	8	87	0	1,018	6,129	Cp, G, R
Antarctic Neogene Diatoms (Cody et al., 2008)	33	191	59	3,064	17,168	Cp
Taranaki Basin, before cull (Fig. 2) (Cooper et al., 2001)	8	573	0	3,276	133,065	Cp
Three Baltic Silurian Clades (Sadler, 2012)	82	696	119	4,229	60,315	Cp
Permo-Triassic of Peri-Gondwana (Shen et al., 2011)	20	1,450	39	4,322	251,662	Cp
Ordovician-Silurian Conodonts (Sadler & Sabado, 2009)	276	1,312	33	12,773	83,763	Cp
Albian-Maastrichtian Ammonites (Fig. 1)	562	1,213	162	15,215	348,888	Cp
Four Sandbian-Aeronian Clades (Fig. 4)	414	1,018	139	17,465	122,331	Cp
Global Graptolite Clade (Cooper et al., 2014)	519	2,117	196	22,006	378,215	Cp
North American Land Mammals (Alroy, 2000)	4978	4,484	186	?	724,487	A
Moroccan Devonian Ammonoids (Monet et al., 2011)	15	53	0	>165	?	B
Global Marine Cretaceous (Scott, 2014)	~300	>3,500	many	?	?	G

Table 1: Scope of some published composite time-lines.

* A = Appearance Event Ordination; B = Biograph; Cp = Conop; G = Graphcor; R = RASC

** includes individual museum slabs

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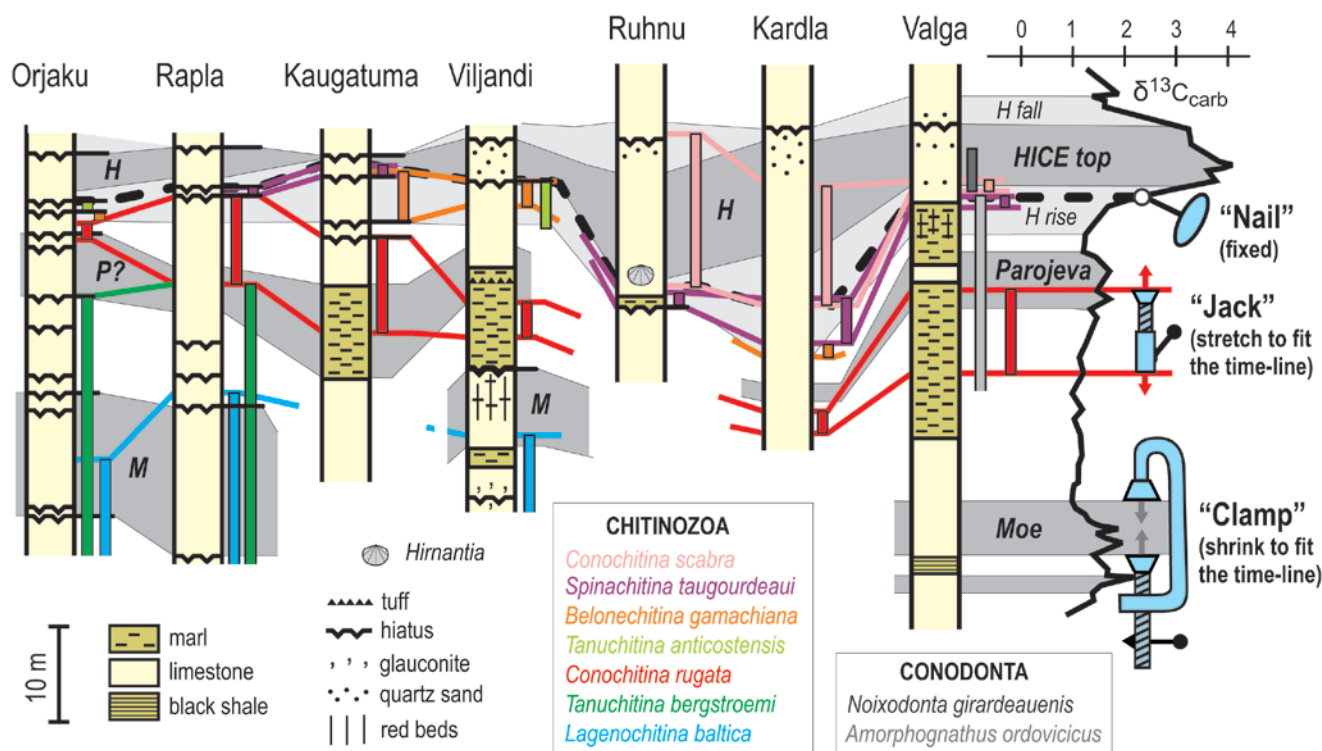


Figure 3: A tiny fraction of end-Ordovician (Hirnantian) information: 9 taxon ranges and 3 stable isotope excursions constrained by 92 local event observations from 7 Estonian cores (Kaljo, et al. 2004, 2008; Ainsa et al., 2010). To align all cores with one sequence of events, some observed event pairs may be jacked farther apart (e.g. taxon range ends); others may be clamped closer together (e.g. uncertainty intervals on parts of stable isotope excursions); and some must be left in-place – the nailed horizons of steepest onset (thick dashed line) of the Hirnantian Isotopic Carbon Excursion (HICE).

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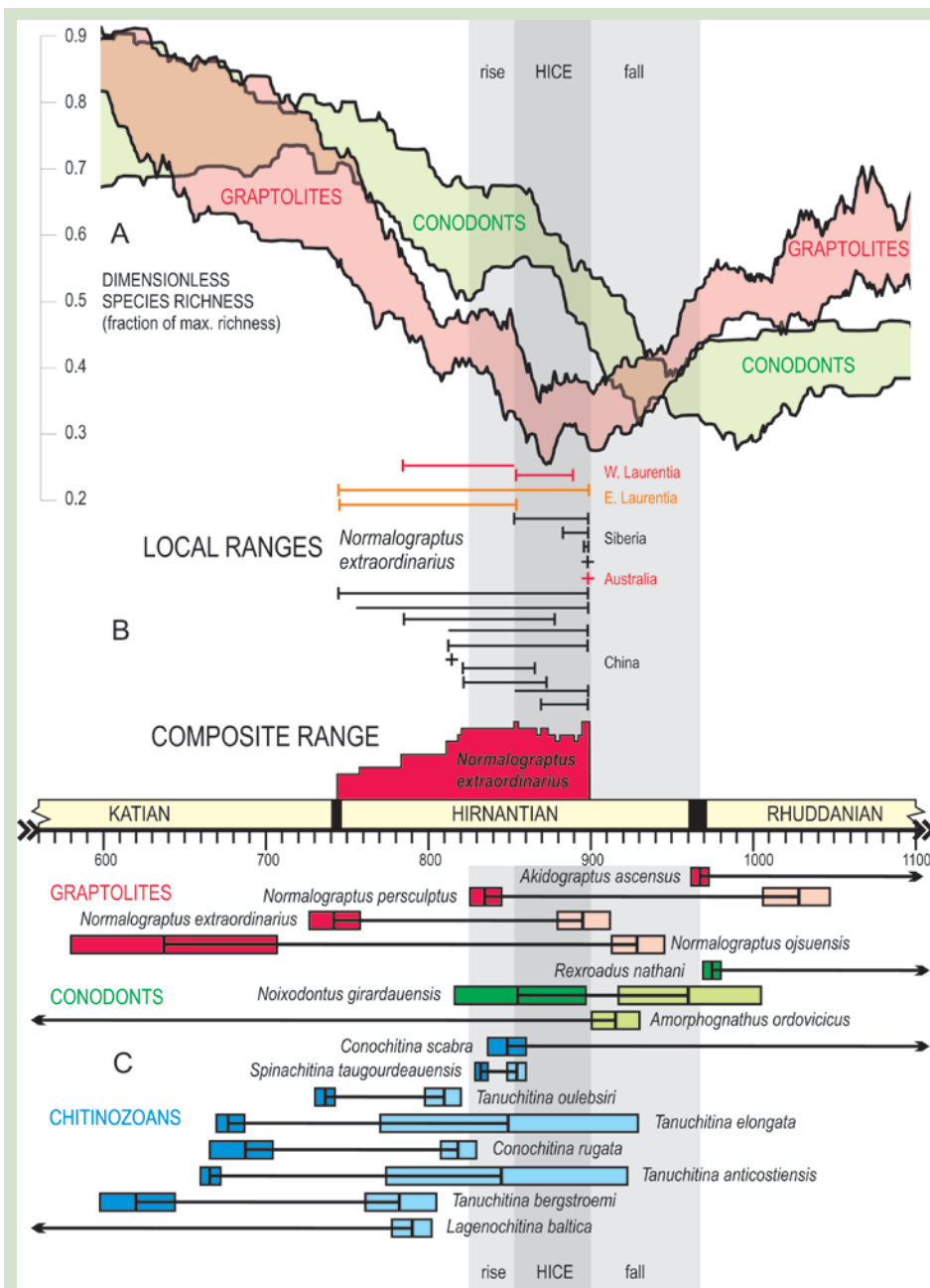


Figure 4: Some uncertainty statements for Hirnantian time-line of 1018 taxa (graptolites, conodonts, chitinozoans and acritarchs) known from at least three of 414 localities, constrained by 17,465 local event observations. **A:** Range of species richness curves derived by superimposing six different optimization outcomes. **B:** Support for a composite taxon range as number of local ranges contributing to different parts. Local ranges reveal patterns of diachronism. **C:** Best-fit intervals (colored rectangles) for ends of composite ranges of selected index taxa; rectangles span all positions taken by range end in set of equally best-fit time-lines (based on thousands of the millions of trial sequences tested during six optimization runs). Overlapping best-fit intervals explain the large set of equally best-fit time lines; the differences are generally small and local, but the number of combinations is vast.

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Accepted August 2014

PRESIDENT'S COMMENTS

Science presents an ever-changing and fast-paced world to its participants. If you aren't comfortable with change, a life in science could seem like a bumpy ride. Scientific societies, if they expect to be around for the long haul, face the same challenge, and so, must to re-invent themselves again and again, in ways both small and large, responding to the needs of the active communities they serve. SEPM has long-recognized this reality and has an established tradition of holding strategic planning meetings every five years or so. The goal is to evaluate the effectiveness of SEPM organizational structure and activities, both internal and external, and to decide how to better serve our membership and if new activities should be instituted instead of, or alongside, old ones. This past May SEPM held its latest strategic planning meeting in Boulder, Colorado. The meeting was organized through the efforts of Past Presidents David Budd and Evan Franseen and was kindly hosted in David's home institution, the Department of Geological Sciences at the University of Colorado.

A diverse participant list ensured that the constituencies within SEPM would be able to contribute their particular experiences and perspectives. Long-time members and relatively new ones; some students; young professionals and some near retirement; academia and industry; major research institutions and smaller, undergraduate-focused programs; physical sedimentologists and paleontologists. We're all sedimentary geoscientists but the SEPM umbrella covers quite a mixed and interesting crowd! Twenty-one SEPM members contributed to our strategic planning effort plus two members of our

Headquarters staff (Table 1). Over two days three working groups held deliberations on the broad topics shown in Table 2, and reported their ideas back to the total assembly. David Budd facilitated the ensuing conversations and in-coming President Janok Bhattacharya took detailed notes. I will say that group dynamic turned out to be wonderful and effective--the active participation, thoughtfulness, and creativity were just what one hopes to see at this sort of meeting. Please take time thank the colleagues you see listed in Table 1 because they put out a fine effort on behalf of SEPM.

There's not room in this column to give a complete listing of the many ideas generated in Boulder. Suffice it to say that ideas were put forth on items both great and small, and these ideas have been translated into action items for myself, current council members, and headquarters staff. These items will take up no small part of the agenda for the upcoming SEPM Council meeting in at the Vancouver GSA. There are items that look to the future structure of headquarters and its staff; initiatives that will bring more engagement with our far-flung and growing international membership; ideas for fostering an improved line-up of research conferences and short courses and continuing improvement of our on-line educational resources. The SEPM Strategic Planning Meeting was a priceless moment for reflection and deliberation. For all its worth however, I know in my heart that even greater resources of ideas and solutions are just waiting out there in the heads of our broader membership---don't hesitate to convey your ideas for a better SEPM to me, Executive Director Howard Harper, or any Council member.

Kitty Milliken, SEPM President

Table 1. Attendee List

Santanu Banerjee	Janok Bhattacharya
Mike Blum	Danita Brandt
Andrea Fildani	Alyssa Franklin
Evan Franseen	Bosiljka Glumac
Howard Harper	Joe Macquaker
Don McNeil	Kitty Milliken
Jason Mintz	Tom Olszewski
Max Pommer	Brian Ricketts
John Robinson	Brian Romans
Rick Sarg	Theresa Scott
John Snedden	Kyle Straub

Table 2. SEPM 2014 Strategic Planning Meeting Breakout Groups

TOPIC 1. *What does SEPM want to be?*

How do these desires translate into a focused mission?

Spheres of influence and responsibility:

- Group 1: SEPM and its members
- Group 2: SEPM and sedimentary geosciences
- Group 3: SEPM and the broader world

TOPIC 2. *What should SEPM do? What concrete actions will satisfy our mission?*

Spheres of action:

- Group 1: SEPM and its members
- Group 2: SEPM and sedimentary geosciences
- Group 3: SEPM and the broader world

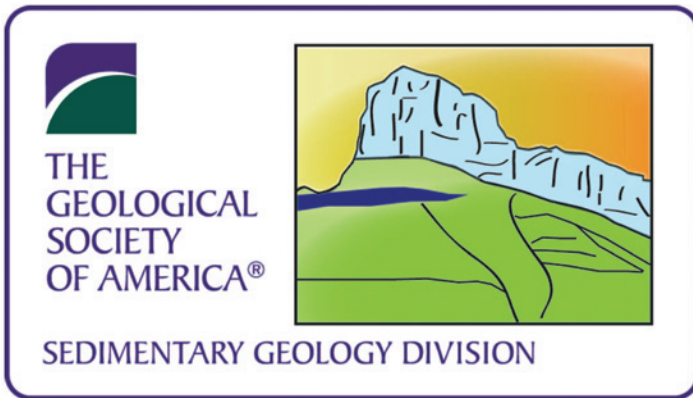
TOPIC 3. *What should SEPM look like in action? How can SEPM be effective in its mission relative to its members, sedimentary geoscience, and the broader world?*

Operational areas:

- Group 1: SEPM's members
- Group 2: SEPM's staff
- Group 3: SEPM's internal governance and finances



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



divisions). Also, GSA has launched a new online networking and collaboration site for members featuring communities, directories, and resources. Be sure to join in if you haven't already!

<http://community.geosociety.org>

2014 LAURENCE L. SLOSS AWARD RECIPIENT



Dr. Chris Paola - Sloss Awardee

The Sedimentary Geology Division is pleased to announce Dr. Chris Paola (University of Minnesota) as the 2014 Laurence L. Sloss Award recipient.

Dr. Paola is an international expert in fluid dynamics and physical processes of sedimentation. He has been a leader in studies of basin filling and controls on physical stratigraphy, dynamics of braided streams including vegetation interaction, particle fractionation in depositional systems, bedform

THE ANNUAL GSA MEETING IN VANCOUVER, B.C. IS COMING THIS OCTOBER 2014

Greetings to all the GSA Sedimentary Geology Division (SGD) members, and especially a warm welcome to the new student members! As many of you know, many of our interests, activities, and events are shared with SEPM (Society for Sedimentary Geology).

The SGD will have some great events coming up soon at the Annual 2014 meeting in Vancouver, British Columbia. The technical program is diverse and integrated with research in other disciplines (see the sessions SGD has endorsed at the end of this newsletter, particularly the **T238**.

Sedimentary Geology student posters.

Mark your calendars for these GSA Annual Meeting special events: Seds and Suds (with SEPM and STEPPE) on Monday evening Oct. 20, and the Joint Sedimentary Geology and Limnogeology Divisions Annual Business Meeting & Awards Reception with SEPM on Tuesday evening Oct. 21.

Stay connected by making sure you're a current SGD Division member and encourage others you know to join (cost is very modest and you can be a member of multiple

dynamics, as well as autogenic processes and self-organization in landscape evolution.

Dr. Paola has published over 130 peer-reviewed publications, and is well known for his innovations with “Jurassic Tank”, and his contributions in the National Center for Earth-Surface Dynamics (a Science and Technology Center funded by the NSF), and the Community Sediment Dynamics Modeling System (a NSF-funded effort designed to assemble and allow for interlinking of numerical models of morphodynamics, sedimentology, and stratigraphy).

Of equal importance to his research are his community contributions to grappling with the future of sedimentary geology, and the mentoring of graduate students, many of who have gone on to distinguished careers of their own. We are proud to award Dr. Paola with the 2014 Laurence L. Sloss Award.

SGD would like to grow the endowment of the Laurence L. Sloss Award so we can keep the award at the same levels as in the past. Please consider a tax-deductible donation to the GSAF (earmarked for the Sloss Award endowment).

2014 SGD STUDENT RESEARCH AWARD RECIPIENTS

The division congratulates the 2014 winner of the SGD Student Research Award- Kelsi Ustipak of The University of Texas at Austin. Her research project is entitled “Experiment-to-outcrop comparison of grain size distribution in transitional sediment gravity flow deposits in the deep water environment”. She examines the complexities of banding in sediment gravity flows and how they might

represent multiple surges within a single flow, and will conduct experiments to look at the rheological parameters in transitional flows.

At the SEPM-sponsored SGD and Limnogeology Division Joint Business Meeting and Awards Reception we will recognize Kelsi Ustipak, as well as new winners (to be announced) who will receive the SGD/SEPM sponsored student poster and student travel awards.

2014 STEPHEN E. LAUBACH STRUCTURAL DIAGENESIS AWARD

Randolph Williams - Laubach Research Award Recipient

The Stephen E. Laubach award is an interdisciplinary award that promotes research combining structural geology and diagenesis. The award is given jointly by the Sedimentary Geology and Structural Geology and Tectonics divisions and is presented at our respective awards ceremonies. This 2014 year, the Structure Geology & Tectonics Division will be presenting the award to Ph.D. student Randolph Williams from the University of Wisconsin-Madison on the Loma Blanca fault zone in New Mexico.

2013 GSA ANNUAL MEETING RECAP

At the 125th anniversary of GSA’s annual meeting held in Denver, we had enthusiastic crowds at both our Seds and Suds event as well the Joint Sedimentary Geology and Limnogeology Divisions Annual Business Meeting & Awards Reception with SEPM. Many of us enjoyed the special 125th anniversary beer brewed especially for GSA, and of course the free food at the business meeting. Last year SGD recognized the 2013 award winners:

Laurence Sloss Award - Dr. Fred Read of Virginia Tech University; Stephen Laubach Structural Diagenesis Award - Dr. Peter Mozley of New Mexico Tech University, and the Student Research Award Latisha A. Brengman-University of Tennessee at Knoxville.

LOOKING FORWARD

Starting at the 2014 GSA Annual Meeting, SGD will have a new student representative who will serve on the GSA Student Advisory Council. This is a great opportunity for our young scientists to have a voice in guiding GSA's future.

At 2014 GSA Seds and Suds, we will receive updates on the new STEPPE program, designed to promote multi-disciplinary research and education on Earth's deep-time sedimentary crust. <http://www.steppe.org>

We will also highlight new developments in EarthCube- a new initiative to create a community-driven data and knowledge management system that will allow for unprecedented data sharing across the geosciences. There have already been several sedimentary-related end-user community workshops including:

- Sedimentary Geology Workshop
- Meetings of Young Researchers in Earth Science (MYRES) V: The Sedimentary Record of Landscape Dynamics
- Integrating Inland Waters, Geochemistry Biogeochemistry and Fluvial Sedimentology Communities
- Cyberinfrastructure for Paleogeoscience
- Experimental Stratigraphy
- Integrating Inland Waters, Geochemistry Biogeochemistry and Fluvial Sedimentology Communities

Find out more about EarthCube at earthcube.org, and at EarthCube activities planned for the GSA and AGU annual meetings.

Sedimentary Geology continues to serve as a point of integration with many other scientific fields, which is a hallmark of our specialization at this year's at GSA Annual Meeting. The variety and importance of these sessions, on both scientific and societal levels highlights the importance of our discipline.

SGD OFFICERS:

Marjorie A. Chan (Chair)

Katherine A. Giles (Vice Chair)

Linda Kah (Secretary-Treasurer)

Kelly Dillard (Webmaster)

Gregory A. Ludvigson (2014 JTP representative)

Kelly Dilliard (2015 JTP representative)

Do you know a colleague who would be particularly deserving of the Laurence L. Sloss Award for Sedimentary Geology? Please forward nominations to Linda Kah, lkah@utk.edu

2014 GSA ANNUAL MEETING SGD-ENDORSED SESSIONS

28 topical sessions, 7 short courses, and 1 field trip

Technical Sessions sponsored by SGD

T19. The Geodynamics of Flat-Slab Subduction and Its Influence on Upper Plate Deformation, Magmatism, and Basin Evolution

T29. Geologic Processes That Influence the Tectonic Development and Economic Resources of the Northern North American Cordillera

T41. Advances in Tsunami and Storm Research

T45. Tracking Sediment Movement across Earth's Surface

T57. Digital Geology Sandpit (Digital Posters)

T59. A Grand Tour of the World's Most Important Geological Sites on Google Earth

T119. Organic Carbon Proxies in Terrestrial Paleoecology

T120. Proxies for Paleoprecipitation

T126. Stable and Clumped Isotope Record of Topography, Climate, and Environments: Challenges and Recent Advances

T130. A Shifting Balance: Microbial versus Metazoan Influences on Ecology and Sedimentation in Space and Time

T135. New Developments in Microbialites

T138. Geoscience Investigations of the Polar Regions

T175. Time Critical: Age-Depth Modeling in Quaternary Continental Sedimentary Records

T176. Microfossils in the Coastal Zone: Indicators of Coastal Change over Short- and Long-Term Timescales

T177. Antarctic Fjords, Interaction of Biotic, Oceanographic, and Cryospheric Systems under Changing Climate

T186. Natural Carbon Dioxide Accumulations as Analogs for Geologic Storage

T195. Extreme Environmental Conditions and Biotic Responses during the Permian-Triassic Boundary Crisis and Early Triassic Recovery

T197. Deep-Time Paleosols and Sediments from the Boundary Events (Flood Basalt Eruptions and Bolide Impacts): Their Applications and Limitations as Geological Proxies in Understanding the Paleo-Environmental Conditions during the Mass Extinctions

T198. The Ordovician Revolution: Co-Evolution of Climate and the Biosphere

T205. Major Evolutionary Events of the Early Mesozoic—Paleontology and Paleoecology from the Middle Triassic to the Late Jurassic

T222. Curiosity on Mars—Inspiring the Young Generation

T234. Precambrian Geology of the North American Cordillera: An Exploration of New Developments in Laurentia's Ancient History

T237. Carbonate Reservoirs—Characterization, Geochemical Modeling, and Case Studies

T238. Sedimentary Geology: The Now and the Next Generations of Scientists (Posters)

T239. Precambrian Sedimentology: From the Field to the Laboratory

T240. Bedforms: Genesis and Development Processes, Morphology, Stratigraphy, and Insights into Planetary Environment

T241. Paleoenvironmental Reconstruction of Hominin Sites: Techniques—From the Unique and New to the Tried and True

T244. New Advances and Applications in Sequence Stratigraphy

SHORT COURSES sponsored by SGD

501. Sequence Stratigraphy for Graduate Students

504. Structural and Stratigraphic Concepts Applied to Basin Exploration

505. Siliciclastic Core-Logging for Graduate Students

519A. Digital Mapping and Data Collection for Field Environments

519B. GigaPan and GigaMacro for the Geosciences

519C. Google Maps Engine, Earth Engine, and Big GeoData

519D. Using Google Earth to Teach Interpretation of Geologic Processes, Bedrock Structures, and Geologic History

FIELD TRIP sponsored by SGD

420. Tertiary Stratigraphy and Structure of the Eastern Flank of the Cascade Range, Washington

Note: The GSA SGD student poster session T238 will be on Monday, Oct. 27, 2014. We hope you'll be sure to stop in and talk with the students about their exciting research!

UPCOMING SEPM CONFERENCES AND SEPM SPONSORED MEETINGS

- GSL - William Smith Meeting: September 22-23, 2014. London, UK. *The Future of Sequence Stratigraphy*. www.geolsoc.org.uk/wsmith14
- AAPG/SEPM Hedberg: September 29-October 1, 2014. Banff, Canada. *Latitudinal Controls on Stratigraphic Models & Sedimentary Concepts*. <http://www.aapg.org/events/research/hedbergs/details/articleid/8036/latitudinal-controls-on-stratigraphic-models-and-sedimentary-concepts>
- STRATI 2015: July 19-25, 2015. Graz, Austria. *2nd International Congress on Stratigraphy*. <http://strati2015.uni-graz.at/>
- SEPM/CSPG Mountjoy I: August 23-29, 2015. Banff, Canada. *Advances in Characterization and Modeling of Complex Carbonate Reservoirs*. www.sepm.org

Do you have a focused topic suitable for a small research oriented meeting?

How to propose a SEPM conference -

<http://www.sepm.org/pages.aspx?pageid=29>



SEPM Thanks All of its Sustaining Members

Vitor Abreu
Donna S. Anderson
John B. Anderson
Jan Andsbjerg
Michael Ashton
Sue Ann Bilbey
Graeme R. Bloy
Kevin M. Bohacs
David J. Bottjer
Alton A. Brown
David A. Budd
Joseph L. Castillo
Kenneth W. Ciriacks
Robert M. Cluff
Robert W. Dalrymple
Beverly Blakeney DeJarnett
Steven G. Driese
John B. Dunham
Gregor P. Eberli
David E. Eby
Nancy L. Engelhardt-Moore

Thomas E. Ewing
Michael D. Fawcett
William M. Fitchen
Evan K. Franseen
Carolyn A. Green
Pamela Hallock-Muller
Chuck D. Howell, Jr.
Jean C. Hsieh
Robert Clarence Hulse
Tiffany Dawn Jobe
Charles Kerans
Erik P. Kvale
Robert H. Lander
H. Richard Lane
Patrick J. Lehmann
Jeff J. Lukasik
James H. Macquaker
James Ross Markello
Gale D. Martin
Peter J. McCabe
Eujay McCartain

Donald Francis McNeill
William A. Morgan
Colin P. North
S. George Pemberton
Edward B. Picou, Jr.
Walter C. Pusey, III
John W. Robinson
Edward Leonard Simpson
Mark Sutcliffe
John Robert Suter
Michael L. Sweet
Jon L. Thompson
Gregory P. Wahlman
Ron F. Waszczak
Lawrence James Weber, Jr.
Wan Yang



SEPM at GSA Vancouver, Canada

GSA Sedimentary Geology Sessions sponsored by SEPM

- T41. Advances in Tsunami and Storm Research: Breanyn MacInnes, Andrew Moore
- T119. Organic Carbon Proxies in Terrestrial Paleoecology: James M. Fulton, William C. Hockaday, Todd L. Longbottom, Lauren A. Michel
- T120. Proxies for Paleoprecipitation: Neil J. Tabor, Greg A. Ludvigson
- T130. A Shifting Balance: Microbial versus Metazoan Influences on Ecology and Sedimentation in Space and Time: Kathleen A. Ritterbush, Katherine N. Marengo, Rowan C. Martindale
- T135. New Developments in Microbialites: Frank A. Corsetti, Victoria A. Petryshyn, Yadira Ibarra
- T176. Microfossils in the Coastal Zone: Indicators of Coastal Change over Short- and Long-Term Timescales: Andrea D. Hawkes, Jessica Pilarczyk, Tina Dura
- T186. Natural Carbon Dioxide Accumulations as Analogs for Geologic Storage: Marc L. Buursink, Matthew D. Merrill, Martin Cassidy
- T195. Extreme Environmental Conditions and Biotic Responses during the Permian-Triassic Boundary Crisis and Early Triassic Recovery: Thomas J. Algeo, Hugo Bucher, Peter Roopnarine, Arne M.E. Winguth
- T198. The Ordovician Revolution: Co-Evolution of Climate and the Biosphere: Thomas J. Algeo, Pedro J. Marengo, Matthew R. Saltzman
- T201. Eocene Northern North America: Biotic Change and Environmental Context: S. Bruce Archibald, Kathleen B. Pigg, David R. Greenwood, Melanie L. DeVore
- T237. Carbonate Reservoirs-Characterization, Geochemical Modeling, and Case Studies: Tina L. Roberts-Ashby, Lester Williams
- T238. Sedimentary Geology: The Now and the Next Generations of Scientists (Posters): Katherine A. Giles, Marjorie Chan
- T241. Paleoenvironmental Reconstruction of Hominin Sites: Techniques-From the Unique and New to the Tried and True: Cynthia M. Liutkus-Pierce, Gail M. Ashley
- T243. Road-Testing the Placement of the GSSP Golden Spikes: Arthur D. Donovan, Lucy E. Edwards, Stanley C. Finney, Brian R. Pratt
- T244. New Advances and Applications in Sequence Stratigraphy: G. Michael Grammer, Christopher Fielding

Other SEPM Activities at GSA

Saturday, October 18: SEPM Council Meeting

Sunday, October 19: Ice Breaker at VCC – 5:00pm-7:00pm. SEPM Booth #743; STEPPE Booth #1104

Monday, October 20: Sediments and Suds Annual Icebreaker and Forum – 5:30pm-7:00pm (VCC-West, 223/224)

Tuesday, October 21:

- Cyberinfrastructure Resources in Paleobiology and Paleoecology Work Shop (STEPPE) – 2:00pm-5:00pm (Hyatt Regency, English Bay Room).
- SEPM sponsored reception at the SGD & Limnology Meeting – 6:00pm-8:00pm (VCC-West, Ballroom A)

