The SEDIMENTARY Record

doi: 10.2110/sedred.2019.4
Volume 17, No. 4, December 2019

A publication of SEPM Society for Sedimentary Geology
with the Sedimentary Geology Division of GSA

INSIDE: MUD BEDFORMS IN A NATURAL ICE FLUME

PLUS: PRESIDENT'S COMMENTS, #SEPM- SEDIMENTARY GEOLOGY IN THE TWITTERVERSE, SEPM ON SOCIAL MEDIA, ISGC DETAILS

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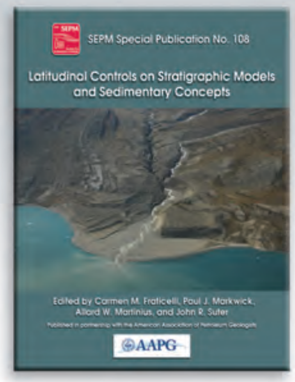

Special Publication #108

Latitudinal Controls on Stratigraphic Models and Sedimentary Concepts

Edited by: Carmen M. Fraticelli, Paul J. Markwick, Allard W. Martinius and John R. Suter

It is self-evident that a better understanding of depositional systems and analogs leads to better inputs for geological models and better assessment of risk for plays and prospects in hydrocarbon exploration, as well as enhancing interpretations of earth history. Depositional environments—clastic and carbonate, fine- and coarse-grained, continental, marginal marine and deep marine—show latitudinal variations, which are sometimes extreme. Most familiar facies models derive from temperate and, to a lesser extent, tropical examples. By comparison, depositional analogs from higher latitudes are sparser in number and more poorly understood. Numerous processes are amplified and/or diminished at higher latitudes, producing variations in stratigraphic architecture from more familiar depositional "norms." The joint AAPG/SEPM Hedberg Conference held in Banff, Alberta, Canada in October 2014 brought together broad studies looking at global databases to identify differences in stratigraphic models and sedimentary concepts that arise due to differences in latitude and to search for insights that may be applicable for subsurface interpretations. The articles in this Special Publication represent a cross-section of the work presented at the conference, along with the abstracts of the remaining presentations. This volume should be of great interest to all those working with stratigraphic models and sedimentary concepts.

Catalog #40108 • Hardcover POD • List Price: $100.00 • SEPM Member Price: $60.00

Special Publication #110

From the Mountains to the Abyss: The California Borderland as an Archive of Southern California Geologic Evolution

Edited by: Kathleen M. Marsaglia, Jon R. Schwalbach, and Richard J. Behl

This SEPM/PS-SEPM volume celebrates the life and scientific achievements of Donn S. Gorsline focusing on the California Continental Borderland, a region where Donn worked extensively. The 18 papers in this volume span offshore Borderland basin settings and exposures in onshore, inner Borderland regions affected by tectonic uplift. They touch on aspects of sedimentation in the modern source-to-sink sedimentary systems, encompassing some world-class Miocene to Pleistocene outcrops and the subsurface distribution of submarine fan and hemipelagic facies, as well as the structural evolution of the Borderland basins and their associated magmatic components. The broad topics covered will be of interest to a spectrum of geologists and geophysicists interested in transtensional to transpressional basin settings, the Cenozoic tectonic evolution of southern California, models of deep-marine to coastal depositional systems, as well as regional hydrocarbon exploration. Additionally, the geologic history and structure of the California Continental Borderland are connected with the distribution of modern seafloor life and marine ecosystems. This volume serves as a benchmark of current research in the region with the aim of spurring future exploration and study.

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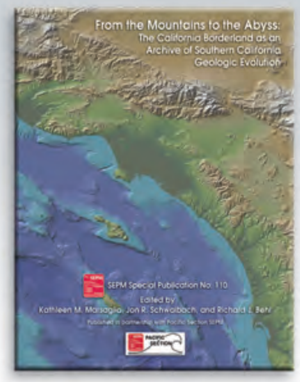

Special Publication #111

Geologic Problem Solving with Microfossils IV

Edited by: Richard A. Denne and Alicia Kahn

Every four years micropaleontologists from across the globe gather in Houston, Texas for the quadrennial conference of the North American Micropaleontology Section–SEPM (NAMS) to learn, share, and network on applied micropaleontology. Geologic Problem Solving with Microfossils IV was held on April 5–8, 2017 with 130 participants. Fourteen of the 95 presentations were selected for publication, which includes papers on geologic applications utilizing foraminifera (benthic and planktic), calcareous nannofossils, palynology, and conodonts, in studies of rocks and sediments ranging from the Pennsylvanian to the modern.

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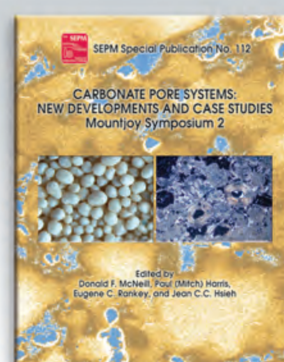
Special Publication #112

Carbonate Pore Systems: New Developments and Case Studies

Edited by: Donald F. McNeil, Paul (Mitch) Harris, Eugene C. Rankey, and Jean C.C. Hsieh

SEPM (Society for Sedimentary Geology) and the CSPG (Canadian Society of Petroleum Geologists) convened the Mountjoy II Carbonate Research Conference in Austin, Texas, from June 25-29, 2017. The conference, honoring Eric Mountjoy and his numerous contributions as a geologist and graduate student supervisor, was attended by ~140 professors, students, and industry geologists and engineers from around the world. The theme for the conference and now SEPM Special Publication 112—Carbonate Pore Systems—follows the general concept to have topics that are relevant to the petroleum industry and therefore blend the best of cutting-edge geoscience research with industry needs by offering a major publication featuring studies with significant new results in the analysis of carbonate pore systems. This new SEPM–CSPG Special Publication is timely given the renewed interest in carbonate reservoirs, including those in carbonate mudrock deposits, as well as the many new technical advances and approaches that are being utilized in diagenetic studies.

Catalog #40112 • Hardcover POD • List Price: $110.00 • SEPM Member Price: $66.00



Cover image: Overview of the ice flume looking downstream. The flooded portion of the ice varied between 3-4 m wide and was up to ~10 cm deep.

CONTENTS

The Sedimentary Record (ISSN 1543-8740) is published quarterly by the Society for Sedimentary Geology with offices at 1621 S. Eucalyptus Ave., Suite 204, Broken Arrow, OK 74012, USA.

The Sedimentary Record is provided as part of membership dues to the Society for Sedimentary Geology.

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Mud bedforms in a natural ice flume

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ABSTRACT

An ephemeral, ice-based flume developed in Medway Creek (London, Ontario) during a February thaw when water at ~1°C flowed over the ice surface forming a < 10 cm deep, ~ 3 m wide channel. Eroded muddy bank sediment, composed of silt to medium-sand sized aggregates, formed linear streamers that revealed streaks in the boundary layer. In water 6-8 cm deep with a flow velocity of ~ 8-12 cm/s, mud aggregates were molded into lunate, transverse, and ovoid ripples a few mm high. Clear water allowed mud aggregates in streamers to be observed accreting to, and migrating over mud ripples. Downstream of larger ripples, mud streamers were swept clear of the bed, perhaps due to vortices shed by the ripple. Where flow exceeded ~ 12 cm/s, mud ripples were gradually replaced by mud aggregate streamers which in turn were washed out in an area of faster (undetermined rate) flow. The flow conditions and bedforms in this ephemeral, natural flume are closely comparable to those described from laboratory flumes at 25°C; however the increased viscosity of water at 1°C may alter the stability field of mud ripples.

A NATURAL FLUME

For about 90 minutes, from about 9:00 on February 20th, 2016, a natural ice flume existed in Medway Creek (London, Ontario, Canada; 43°00′ 35.12″N, 81°17″ 41.18″W), because a thaw caused water level to rise and partially flood the ice on the surface of the creek. Mud aggregates were eroded from melting alluvial sediment that formed the stream bank. This unconsolidated alluvium was probably derived from Late Wisconsinan (approx 14 -13 ka; Barnett, 1992) glacial diamictites and glacio-lacustrine deposits exposed in the walls of the Medway valley (Fig. 1).

When the wholly impromptu observations were made, the flooded portion of the ice surface formed a shallow trough, 3-4 m wide, in which water depth increased from ~ 6 cm close to the bank to ~ 8 cm about 1 m farther out, reaching a maximum of about 10 cm before gradually shallowing to nil towards the center of the creek where the ice surface bowed up (Fig. 1). Mud aggregates eroded from the bank were carried across the smooth surface of the ice where they were moulded into ripples and streamers (Fig. 1).

Although no tape measure was to hand, a metre stick was fashioned from a straight plant stem and measured using the cm scale engraved on a Swiss Army Knife. Another plant stem served as a dipstick to measure water depth. The passage of floating plant debris parallel to the 1 m scale was timed using the second hand of a watch. Closer to the bank, in ~ 6 cm of water, debris took ~13 sec. to travel 1 m (or ~ 8 cm/s), whereas about 1 m further out, in ~ 8 cm of water, debris took ~8 sec. to travel 1 m (or ~12 cm/s; Fig. 2). The water temperature was ~1° C measured with a small skiing thermometer. Mud aggregates were estimated by eye to move at 5 to 10 mm/s on the bed.

Simplifying the dimensions to a channel 3 m wide x 0.08 m deep, water density 1000 kg/m^3 and dynamic viscosity at 1°C of 0.00173 Ns/m^2, yields a Reynolds number of ~3,470 for flow at 8 cm/s and ~5,200 for flow at 12 cm/s. Corresponding Froude numbers are 0.104 for 6 cm depth x 8 cm/s flow and 0.306 for 8 cm depth x 12 cm/s. The ice was deemed too thin to walk on safely, so observations and photographs were made leaning out from the bank, clinging to trees. By about 10:30 am, continued warming caused both water level and flow velocity to rise markedly, causing all the mud ripples to be swept from the surface of the ice. The muddy sediment forming the bank material (Fig. 1B), was sampled at a later date.

RIPPLES

In the most bank-proximal part of the ice flume, ripples did not develop (Fig. 3). Broadly lunate, transverse to ovoid mud ripples, estimated to be 1-4 mm high, developed a little further from the bank

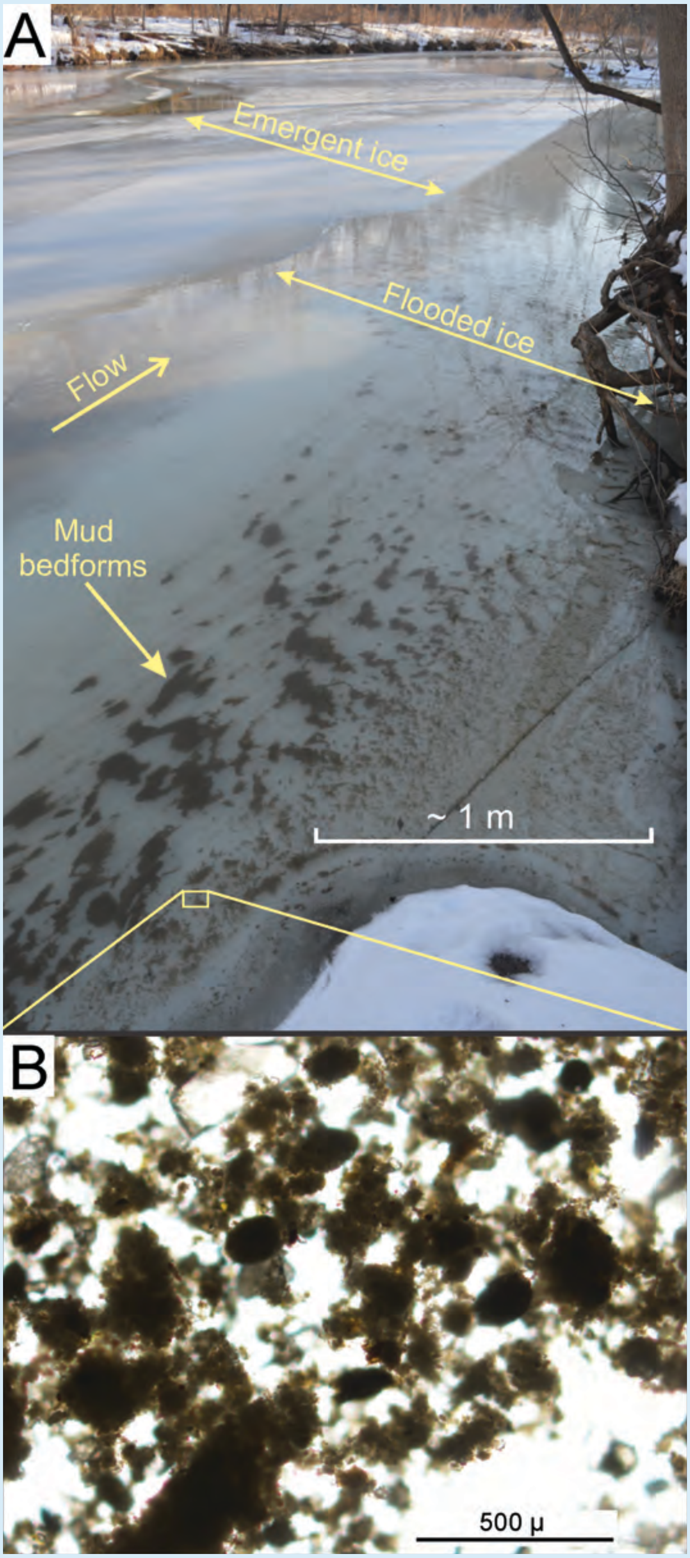

Figure 1: A. Overview of the ice flume looking downstream. The flooded portion of the ice varied between 3-4 m wide and was up to ~10 cm deep.
B. Transmitted light micrograph of a freshwater suspension of muddy bed material, comprising a mixture of loose aggregates of clay minerals, organic matter, and siliceous mineral grains (the latter largely out of focus below the mud aggregates). The sample was collected after the ice flume had melted, but at the same place that mud was being eroded on the day the mud ripples were observed.

in a region where water was 5-8 cm deep and flow was about 8 to 12 cm/sec (Figs. 2, 3). Even farther from the bank, where flow was > ~12 cm/s, ripples became smaller and changed from lunate to ovoid in a region transitional to slightly faster flow, which was dominated by near-parallel mud streamers that revealed the presence of streamwise vortices in the viscous sublayer (Allen, 1985; Figs. 3, 4, video S-1). Vortices inferred to be shed from the crests of the mud ripples appeared to 'sweep' the region downstream clear of mud streamers (Fig. 4A).

Because the sediment concentration was very low, the water clear, and the ice substrate white, it was easy to see the bedload of mud aggregates moving as discrete, non-cohesive particles over the ice surface. Aggregates consist mainly of very loosely-packed clay particles and range in size from silt to medium sand (Fig. 1B). Mud aggregates, moving in streamers, could be seen accreting to the stoss side of mud ripples. Close observation (see video recording, S-1) showed that mud aggregates migrated right over the ripples and then continued to travel downstream beyond the lee face, forming new streamers.

COMPARISON WITH A LABORATORY FLUME

Although the flow conditions and bedforms observed in this serendipitous natural flume could not be documented with the accuracy of those made in a laboratory flume, they do provide some comparative and corroborative information on the development of mud ripples in water at ~1°C, where dynamic vicosity is higher than in laboratory flume runs (cf. Schieber et al. 2007; Schieber and Southard 2009; Schieber and Yawar, 2009; Schieber, 2011), which were conducted with water at 25°C (e.g. 0.00173 Ns/m^2 vs. 0.00089 Ns/m^2). Schieber et al. (2007) observed that for a low sediment concentration of 0.03 g/l, the critical velocity for sedimentation was about 10 cm/s, rising to at least 26 cm/s for concentrations of 1 to 2g/l. In the ice flume, the suspended sediment concentration could not be measured, but appeared to be low. In consequence, water clarity, and visibility of bedforms, was excellent (in contrast to the high turbidity "sedimentology of milk" that prevails in experimental settings; Schieber, 2011), and also hinders observation in nature (Shchepetkina et al. 2018). The best-developed ripples, interspersed with mud streamers, formed in water flowing at about 8-12 cm/s. Southard and Schieber (2009) documented the passage of discrete mud (kaolinite)

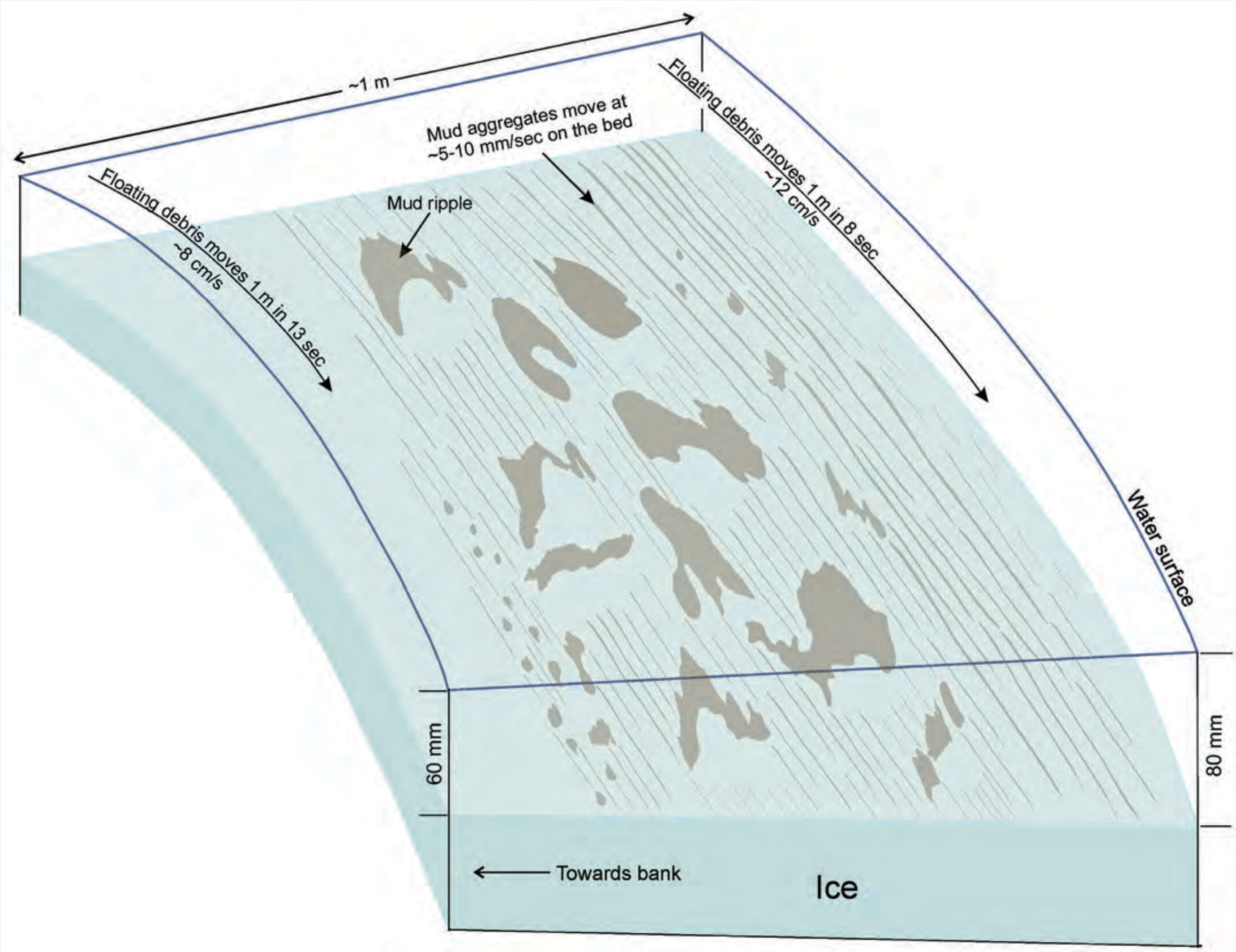

Figure 2: Diagram summarizing the water depth, flow velocity and distribution of mud ripples and mud streamers across the near-bank, accessible portion of the ice flume.

floccules over ripples, and their accumulation to form cross-lamination, exactly analogous to those formed in sand ripples. They also observed that mud particles avalanched episodically down the lee faces of ripples before being swept off in the flow. Although it was not possible to observe ripples very closely in the ice flume, examination of the video (S-1) taken looking obliquely down, shows that darker 'slugs' of mud slowly detach from the lee side of some ripples and are then abruptly swept off into the flow. It is possible that this is a manifestation of the episodic avalanching of mud aggregates. Schieber and Southard (2009) did not discuss the 'sweeping' of mud streamers from the region immediately downstream of ripples (Fig. 4A). This phenomenon may not have been observed due to a lack of contrast between streamers and a mud bed, as opposed to an ice bed.

Overall, both the flow conditions and mud bedforms observed in this natural ice flume appear to be comparable to those documented by Schieber et al. (2007) and Schieber and Southard (2009) under laboratory conditions. The increase in the viscosity of water with decreasing temperature would cause an increase in critical shear velocity (cf. Krögel and Flemming, 1998). It is possible that in cold water, mud ripples may form at a lower flow velocity than the ~10 to 26 cm/s range limit observed in the 25°C flume runs. The ice flume illustrates that both ripples and mud streamers can form and migrate at a flow velocity of about 8 cm/s, and perhaps slightly slower still. Cold water conditions may be the norm in some natural areas, such as the deep sea, and in nearshore areas subject to cold winter conditions (e.g. Shchepetkina et al. 2018). Experimental sedimentologists might consider introducing a chiller in flume experiments to further explore bedform development in cold-water environments!

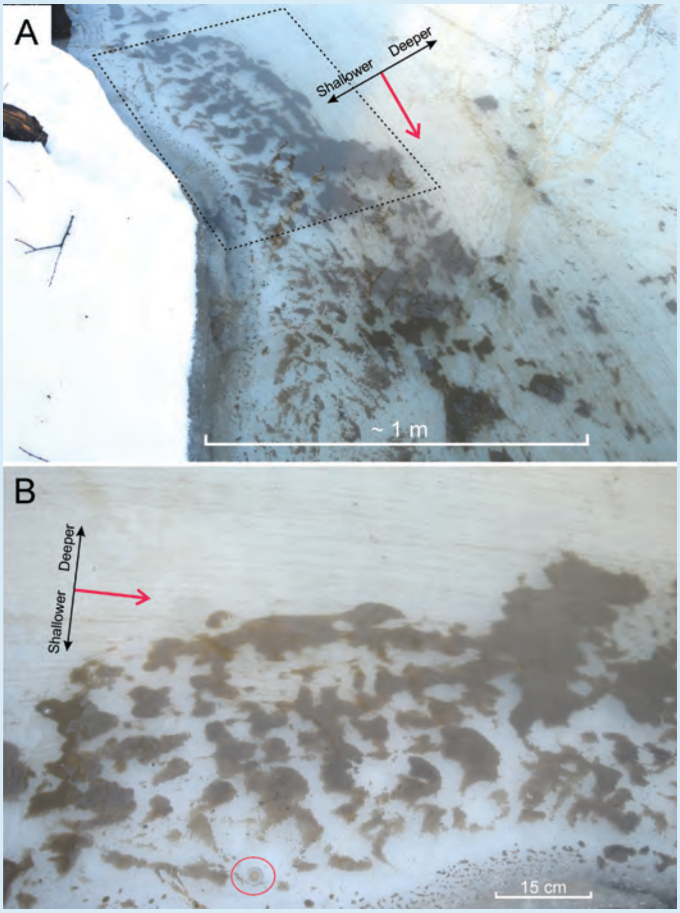

Figure 3: A. View upstream showing concentration of mud ripples in the near-bank portion of the flume, giving way laterally to long parallel mud streamers in slightly faster-flowing water in the center of the flume. Broken line outlines area of image in B.
B. Detail of rather irregular mud ripples passing laterally into streamers of mud aggregates. Canadian two dollar coin (encircled) is 28 mm wide.

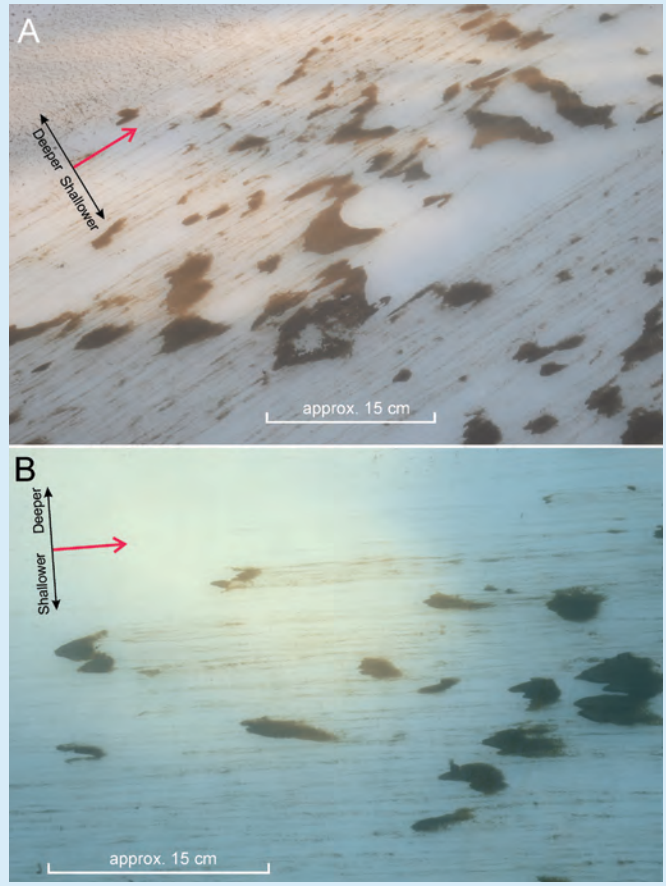

Figure 4: A. Detail of mud ripples showing lunate, transverse and ovoid planforms. It is postulated that vortices shed from the crests of the larger ripples were responsible for sweeping mud streamers from the region immediately downstream.
B. Detail of bank-distal portion of mud ripple field, showing small ovoid to lunate ripples, and their transition to an area dominated by mud streamers. The transition to streamers takes place where flow velocity appears to exceed about 12 cm/s.

ACKNOWLEDGEMENTS

I thank the Natural Sciences and Engineering Research Council of Canada for their long-term support of my research, and Omar Al-Mufti for an informal review of the ms. I thank John-Paul Zonneveld and Murry Gingras for their reviews of the manuscript. The author declares no conflict of interest with regard to this study.

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SUPPLEMENTARY DATA

S1. Video showing streamers of mud aggregates, and the episodic sweeping effect of flow streaks in the viscous sub-layer. Mud aggregates can be seen accreting to the stoss sides of ripples, and also migrating over the entire ripple. On some ripples, it is possible to see darker 'slugs' of mud slowly detach from the lee side, and then be abruptly swept off into the flow. This may be a manifestation of the episodic avalanching of mud aggregates. https://youtu.be/YkfEyXifv6c

Accepted December 2019

PRESIDENT'S COMMENTS

At first I thought those wily paleoichnologists were pulling my gullible sedimentologist's leg with their story of these (traces) belonging to the actions of a pink fairy armadillo. But they were serious, and went on to show us the tracks of Big Bird's Miocene ancestors, mixed with those of a mama llama's toes. Occasionally, I would attempt to attract attention with some comparably quotidian cross bedding, or fantastical flame structures. Then, they would up the ante with tiered *Ophiomorpha-Thalassinoides* traces, or — worse— *Glossifungites*, which I can't seem to divorce in my mind's eye from the vision of a terribly shiny dermatological condition to be avoided at all costs.

I'm writing this— my final column as SEPM President— from northeastern Patagonia, as a sedimentology mentor for SEPM's inaugural Field Experience Program (FEP), the brainchild of former Councilor Dr. Gabriela Mángano. Gabriela conceived the FEP as a means to bring SEPM to students and young professionals (YPs) of the world beyond North America and Western Europe. Organized by a local committee of SEPM members comprising Drs. Noelia Carmona, Juan Ponce, and Silvio Casadio, this first FEP is engaging 12 students/YPs from four countries (Argentina, Chile, Colombia, and Trinidad) in a field school to study the sedimentology, stratigraphy, paleontology and paleoichnology of the Miocene-Pliocene Rio Negro Formation of northeastern Patagonia. Together with the local organizing committee, Dr. Sally Walker (the paleontology mentor) and I have spent each day in the field mentoring student groups as they measure the section and make detailed observations intended to teach varied concepts of our allied subdisciplines. In the evenings, the mentors presented talks and led exercises, and the students worked on their columns.

The Rio Negro Formation encompasses a coastal eolian succession encasing a shallow shelf succession, so preserves stories of ancient environments, climates, and sea level changes along a coastline that was a veritable oasis of productivity. The students are— to a person— incredibly engaged, poring over every detail of the strata, and staying up past midnight honing and discussing interpretations. They are passionate, clearly relishing this opportunity to learn from professionals and from one another. Many are from Chile, and more Chilean students had registered, but were unable to attend owing to the political unrest there. During our "icebreaker" evening, we heard first-hand accounts of the violence, and the Chilean government's closures of the universities, and sensed the fear the students harbored. But the next day, I watched as their fear dissolved into total immersion in their chosen field of study, because— truly— discovering the fossil burrow of a pink fairy armadillo is deeply therapeutic.

Figure 1: ***Ophiomorpha-Thalassinoides*** **assemblage**

Studying the complexity of Earth's surficial systems requires a global and diverse community. We are better off when we merge our experiences and knowledge to advance our collective understanding. Our group composes paleontologists, sedimentologists, and

Figure 2: Pink fairy armadillo burrow

PRESIDENT'S COMMENTS

paleoichnologists, we have fully 50% women (42% amongst the students/YPs and 67% amongst the mentors), including Chile's very first female B.S. paleontologist, and we collectively represent five countries. The idea exchange *es muy rico*, and the networking rivals a multi-tiered *Ophiomorpha-Thalassinoides* assemblage.

Figure 3: Studying the cliffs

Life on the Patagonian Miocene coast was apparently pretty cushy: intermittently wet coastal dunes and interdunes hosted newly expanded grasses populated by llamas, giant ground sloths, armadillos, and rheas, while the nearby sea teemed with pectins, oysters, barnacles, and a vast variety of encrusters and bioeroders. Geoscience teaches us that a diverse community is a happy community, replete with mutualism enabling opportunities for more and newer ecosystems to evolve. Diversity is a metric we use to assess levels of stress; high diversity signals to us that life was a party. Our professional society as well as greater society will prosper when we fully embrace diversity in all of its varied forms, and the Field Experience Program moves the needle in the right direction.

I'm not saying we should return to the world of the Miocene, although a world with pink fairy armadillos and Big Bird is nearly irresistible. But give me the diversity any day (just hold the *Glossifungities*, please).

Lynn Soreghan,
SEPM President

IN MEMORY

SEPM maintains a webpage about our members that have recently passed on - https://www.sepm.org/In-Memory at www.sepm.org. When we are notified about a recent member's death we offer the opportunity to write a memorial piece and/or link to an existing obituary. Over the last few years we have lost both well-known and perhaps less well known SEPM long time members and we encourage everyone to visit or contribute to their memory. Contact Hayley Cooney (hcooney@sepm.org).

Recent Losses

2019

Harold Garnar Reading
Barbara Lidz
Philip W. Choquette
Lynn Watney
John L. Wray

2018

John A. Minch
S. George Pemberton
Robert H. Dott
Robert L. Folk
Chris Edwards
Joanne Kluessendorf

#SEPM- Sedimentary Geology in the Twitterverse

Authors:
Rowan C. Martindale (@RowanMartindale), Kathleen Benison (@KathyBenison), Christopher Jackson (@seis_matters), & Brian Romans (@clasticdetritus)

Connection with the geoscience community is a cornerstone of our work as sedimentary geoscientists; it is key to our collaboration, networking, and problem-solving. This can take many forms, such as writing letters or emails, physically visiting colleagues, participating in conferences and workshops, or discussing issues in informal social settings. Methods of communication have changed rapidly over the last century, and with them, how we communicate our science to our colleagues, students, and the general public (Schäfer 2012). In the last two decades, there has been an expansion of communication via Social Media – interactive websites and applications (apps) that facilitate communication via virtual communities and networks (Peters et al., 2014). Social Media spans a wide variety of platforms – from more traditional websites or blogs, to Facebook, Instagram, and Twitter – each with its own unique content format and audience. For example, many of us view Facebook as being geared towards interacting with family and friends rather than colleagues.

In this article, we discuss the benefits and drawbacks of combining social media with sedimentary geosciences, predominantly via Twitter as a professional networking platform. Twitter is a microblogging and networking service on which users post and interact with "tweets", which are short (<280 characters) messages with links, photographs (<4), animated gifs (i.e. typically <5 seconds, looped videos), or videos. Britton et al (2019) liken spending time on Twitter to visiting a cafe with colleagues, but the Twitter cafe is open 24/7 and is not constrained by geography, languages, or institutional boundaries, real or perceived. Online discussions provide a forum for people to ask for advice, share frustrations about a broad array of topics (e.g., fieldwork problems, issues with publications or job searches, imposter syndrome, being overwhelmed with work), but most importantly, these platforms help people feel connected with their community. Realizing that you are not alone can be a critical factor in confidence and retention of geoscientists, especially for people who do not feel like they have a support network at their institution.

Engaging with social media also has numerous benefits for sedimentological research and collaboration. One of the most obvious perks is the sharing and amplification of new or ongoing research; this is a particularly good way to catch the eye of journal editors, the media, or new colleagues. For example, you could post about a new paper in Palaios or the Journal of Sedimentary Research, or tweet about an article preprint, new methodologies, or new software or computer code that you would like to share with and/or have tested by the community. Moreover, sites like Twitter allow people to ask for help, advice, or feedback in real-time, providing all geoscientists with a new (and often more rapid) venue for support with their research. Twitter can also be effectively used to build a more multidisciplinary scientific community. Because many scientific agencies and organizations have Twitter accounts, tagging them (using the "@" plus their twitter identifier) and using popular science "hashtags" (i.e., keywords) can engage a wide audience. For example, a tweet or retweet about sedimentary rocks on Mars that tags NASA (@NASA) and SEPM (@SEPMGEO) and uses hashtags such as #Mars2020 and #FieldWorkFriday can connect people who are interested in both planetary and sedimentary geology. Platforms like Twitter can also be used to build enthusiasm around new conferences or meetings by soliciting abstracts, sessions, and conference attendance. For example, SEPM started a Twitter handle for the 2020 International Sedimentary Geosciences Congress, @SEPM2020; this was used to advertise and promote sessions, to solicit abstracts and reviewers, and to remind people about upcoming deadlines. It is also becoming more common for audience members at scientific conferences to "live tweet" talks or seminars (assuming the speaker has given permission for the talk and their image to be shared). Such a tweet (or series of related tweets, known as a "thread") commonly includes a photo of the speaker and/or title slide with a concise summary of the findings of the talk. "Live Tweeting" can allow those not in attendance to follow the conference remotely, and thereby enhance the broader reputation and reach of the speaker, as well as the hosting professional society.

Social media networks can also be an important tool for career development and recruitment. Twitter is an excellent platform for career advice and networking, particularly for underrepresented minorities and/or people who feel marginalized at their institution (Britton et al., 2019). Webinars, re-tweeted advice posts, and discussion threads about graduate school or geoscience jobs within academia, industry, and government provide career advice and mentoring to the broader geoscience community and/or can be targeted at specific demographics. This can also 'level the playing field' for students or researchers who may not have access to this information, either due to the lack of mentorship or because they do not have the opportunity to attend workshops at their home institution. In this way, social media is an important tool in mentoring new geoscientists, demystifying career paths (especially for students and Early Career Researchers), as well as connecting us all with the global community of researchers (Britton et al., 2019). Twitter is also a forum for job announcements and recruiting; undergraduate and graduate students often look to Twitter and similar sites for new scientific discoveries, exciting research, and opportunities, thus being active on social media can improve the visibility of a research group or individual. Whether the goal is to recruit graduate students or postdoctoral researchers, undergraduate researchers for the summer, or a new hire in the department, social media may have a wider (or at least complementary) distribution within the community as compared to traditional tools such as emails, web postings, or printed ads. Furthermore, job seekers can use social media to preview their advisors or institution to determine whether the mentor, lab group, or department holds the same values they do.

There are also benefits of using Twitter for teaching sedimentary geoscience and communicating with the public. Sedimentary geoscience is a dynamic and highly visual field and thus social media provides an ideal venue for science communication. Our studied systems are dynamic, beautiful, international, as well as historically relevant, and with the new advances in virtual field trips, social media brings these amazing sedimentary systems direct to your device. Many geoscientists have also started "live tweeting" class, department, or conference trips. By sharing exciting visuals, often with a specific hashtag (e.g., #ThinSectionThursday and #FossilFriday), Twitter greatly expands the reach of science communication with the public. Social Media can also be used for real-time hazards communication (complete with videos), which can lead to improved outreach, discussion, and collaboration (Hicks, 2019). Twitter can also be a great source for teaching collaborations or sharing of new educational techniques, syllabi, videos, or activities. It also provides a forum for sharing "Best Practices" for inclusion and equity, fieldwork safety, codes of conduct, and mentoring. A great example of this was the recent thread about 'bathroom issues' in the field, which touched on best practices for health during fieldwork as well as ways to enhance inclusion in field research teams.

In addition to the above benefits of social media, having geoscientists on Twitter has a number of more general positive outcomes. The most direct benefit is the visibility of sedimentary geoscientists and our research; by visualizing who is a geoscientist (e.g., #ScientistsWhoSelfie) and what kinds of geoscience are done, we become more trustworthy and human while retaining our credibility (Jarreau et al., 2019). Moreover, this kind of science communication expands the definition of geoscientists to the general public, providing role models for those who may not identify with the traditional portrait of a sedimentologist (e.g., underrepresented ethnic or racial minorities, women, members of the LGBTQ+ community, people with disabilities). Social media users can also be anonymous (or pseudo-anonymous), which allows them to openly discuss systemic issues (e.g., harassment or discrimination) without fear of retribution. Another major benefit of having geoscientists actively engaged in social media is that they can bring their expertise to bear directly on important and/or contentious scientific issues or events. For example, Katherine Hayhoe routinely uses Twitter to engage communities in discussions about climate change and many institutions use this platform to discuss local events, such as hurricanes, floods, or fires. While these activities are, on the whole, extremely positive, Twitter users must also strive to ensure clarity and accuracy in their postings (Hicks, 2019), which can be challenging given the short format of this particular platform.

Like all modes of communication, Twitter has several drawbacks. Many people see it as a time sink: "why should our students/colleagues be on Twitter when they could be writing papers or raising grant money?". Here we propose that the time spent is not lost, in the same way that time spent doing outreach, or going for coffee with a colleague to discuss teaching methods or a research problem, is not a waste of time. Furthermore, many scientists use Twitter during non-work time, such as during their bus commute, while waiting for equipment to calibrate, or while relaxing at home, so (providing it is not all-consuming) a social media presence is often not "lost research time". This can, however, lead to different problems, such as when academics feel as though even their social media time is "work" (i.e. building and maintaining a professional profile). In these instances, we suggest that Twitter users find the balance that is right for them, which may be using the social media platform more or less than other colleagues. For example, when first joining Twitter, many find it useful to follow others and 'listen' for some time before posting their own content, using that time to consider what content they find most valuable. In fact, many use Twitter as a customized information feed and rarely post at all. Another concern is that, if an account is not anonymous, professional geoscientists must ensure that all posts are 'forum-appropriate' and strike the right tone for something that could live forever online. In the same vein, there is also the risk of misrepresentation or misquotation; for example, a tweet about having a glass of wine while grading papers on a Saturday evening could be viewed as inappropriate or seen as promoting a poor work-life balance. A more serious concern is that there is the possibility of retaliation if one chooses to speak out about contentious issues via social media, which is especially concerning for people of color, ethnic minorities, women, and members of the LGBTQ+ community, where threats of physical harm or job loss may occur.

So, how do you get connected with the SEPM Twitterverse (i.e., the connected network of Sedimentary Geologists on Twitter)? The first step is to sign up at https://twitter.com/ (either on the app or web browser). Choose your "handle" (i.e., identification), which can be anything from a fun, nerdy name like @seis_matters or @clasticdetritus to a more formal/professional handle like @RowanMartindale or @KathyBenison; you can also include an avatar, picture, and short biography about yourself. Once you are on Twitter, search for and "follow" your favorite sedimentologists (like us!), geoscience societies (e.g., SEPM is @SEPMGEO, GSA is @geosociety, and AAPG is @AAPG), and groups (e.g., @GeoLatinas, @ESWNtweets, @AccessibleGEO, @NABGSocial, @SACNAS). Find your favorite hashtag, here are some to get you started: #SEPM, #MolluskMonday, #TectonicTuesday, #ThinSectionThursday, #FieldworkFriday, #FossilFriday, #FluvialFriday, #FoldFriday, #SaltSaturday, #SedimentologySunday, #AcademicChatter, #PhDChat. Finally, have fun exploring, learning, tweeting (and retweeting) about sedimentary geoscience and paleobiology! We look forward to seeing your best photos or videos from the field or lab, learning about your experiences as a sedimentary geoscientist, and expanding our #SEPM network in the Twitterverse!

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SEPM on Social Media

Since you all know all about the Twitterverse from the page 10 article, do not forget about SEPM's full range of social media: there is a Blog on the website, https://www.sepm.org/blog; SEPM Student Councilor (Kristina Butler and her Student Committee also run an Instagram account – https://www.instagram.com/sepmstudents/; and we are also building content for an SEPM YouTube Channel – https://www.youtube.com/channel/UC9iDj3Jg49rJaQKEDhnGeNg, if you have some content let me know – Howard Harper (hharper@sepm.org)

SEPM URL Locations	https://www.facebook.com/societyforsedimentarygeology/ and https://www.facebook.com/SEPM2020/	@SEPMGeo And @SEPM2020	https://www.linkedin.com/groups/2741198/
Posting			
Timing	Whenever you have something about sedimentary geology	Whenever you have something about sedimentary geology	Whenever you have something about sedimentary geology
SEPM HQ Postings	Whenever new Society news happens	Whenever new Society news happens	Whenever new Society news happens
Frequency Goal for SEPM Leadership Postings	Weekly	Weekly	Weekly
SEPM Membership Postings[1]	Whenever you have some interesting sedimentary geology items	Whenever you have some interesting sedimentary geology items	Whenever you have some interesting sedimentary geology items
Hash Tags[2]	Try to include 1 or 2 hashtags per post – use #sepm or #sepm2020 as appropriate	Try to include 1 or 2 hashtags per post – use #sepm or #sepm2020 as appropriate	Try to include 1 or 2 hashtags per post – use #sepm or #sepm2020 as appropriate
Hashtag Purpose	Tie to other posts on a similar or relevant topic or emphasize a point	Tie to other posts on a similar or relevant topic or emphasize a point.	Tie to other posts or relevant topics
Use of Visuals	Use lots of pictures – rocks and people	Use lots of pictures – rocks and people	Use lots of pictures – rocks and people

1. Please use the SEPM social media of your choice or post in multiple places. If you post on your own site then please '#sepm' to share your sedimentary geology post with the community.
2. Some hash tags, like #sepm do have other non-sedimentary geology items – while current #sepm items about sedimentary geology seem to dominate, there are other items – (Symatec Endpoint Protection Manager (SEPM)). "#sepmgeo" is more specific to the Society and can also be used and of course anything more specific to your posting like '#turbidites', etc.

SEPM International Sedimentary Geoscience Congress – Field Trips

Field Trip 1: Contrasting Mesozoic Fluvial Systems of Utah

Dates: Wednesday April 22 – Saturday, April 25 (4 Days)
Leaders: Mike Blum and Amanda Owen
Location: Departs from Salt Lake City and ends in Flagstaff, AZ

This field trip will examine Mesozoic fluvial deposits across Eastern and Central Utah to illustrate differences in fluvial architecture from the bar to basin scale.

Field Trip 2: Chinle Formation (Upper Triassic) Paleosols and Paleoenvironments in Petrified Forest National Park, Arizona

Dates: Thursday April 23 – Friday April 24 (2 Days)
Leader: Steve Driese
Location: Departs and returns to Flagstaff, AZ

This is a two-day field trip to examine spectacular outcrops of Upper Triassic paleosols and associated floodplain and channel deposits of the Chinle Formation.

Field Trip 3: Red rocks of Sedona: Day tour of late Paleozoic strata of the Mogollon Rim

Date: Friday April 24 (One Day)
Leaders: Ryan Leary and Mike Smith
Location: Departs and returns to Flagstaff, AZ

This one day field trip will explore spectacular exposures of Pennsylvanian and Permian strata exposed in and around the community of Sedona, Arizona.

Field Trip 4: Aeolian Sedimentary Structures, from wind ripples to compound dunes

Date: Saturday April 25 (One Day)
Leader: Dave Rubin
Location: Departs and returns to Flagstaff, AZ

This 1-day field trips takes participants to two stops that illustrate outstanding examples of Aeolian sedimentary structures, from the smallest fine structures (wind ripples, grainfall, and grainflow stratification) to larger assemblages of compound cross-bedding deposited by small dunes migrating over larger dunes.

Field Trip 5: The Mural Limestone of Arizona: Depositional Facies and Cyclicity in a Peak Greenhouse Ramp Interior Setting and Implications for Reservoir Characterization

Dates: Thursday April 30 – Friday May 1 (2 Days)
Leaders: Rachel Aisner Williams and Kelly Hattori
Location: Departs from Flagstaff, AZ and ends in Bisbee, AZ

This two-day field trip will feature a number of spectacular mid-Cretaceous carbonate ramp interior outcrops from the Mural Limestone near Bisbee, AZ, sure to keep any paleontologist or carbonate stratigrapher happy!

Field Trip 6: Southern California Turbidite Depositional Environments

Dates: Thursday April 30 - Sunday May 3 (4 Days)
Leader: Zane Jobe
Location: Departs and returns to San Diego, CA

This 4 day trip will visit classic, must-see locales as well as newly described locales along the southern California coast, including: Black's Beach (Scripps and Ardath formations);
San Clemente (Capistrano Formation) and submarine lobe strata along the Point Loma peninsula (Point Loma Formation).

SEPM International Sedimentary Geosciences Congress – Workshops and Courses

Workshop 1: Distinguishing Storms and Tsunamis

Date: Sunday April 26 (One Day)

Leaders: Alexander R. Simms (UC Santa Barbara) and Bruce Jaffe (USGS, Santa Cruz)

A 1-Day workshop investigating the similarities and differences between the sedimentary records of storms and tsunamis.

Workshop 3: Paleoceanography and Cyclostratigraphy

Date: Sunday April 26 (One Day)

Leaders: Ken MacLeod (University of Missouri, USA), Sietske Batenburg, and Stuart Robinson (Oxford University, UK)

This workshop will explore novel perspectives on depositional systems at the intersection of cyclostratigraphy and paleoceanography.

Short Course 4: Ocean Chemistry and Carbonate Sediment Production

Date: Sunday April 26 (One Day)

Leaders: Marcello Minzoni (University of Alabama) and Dr. Kimberly Lau (University of Wyoming)

Carbonate sediment and rocks are natural archives that store vital records of the Earth's recent and deep-time ocean, climate, and biological evolution; these long records provide critical boundary conditions with which we can predict ecological response of modern bioclacifiers to changing climate scenarios.

Short Course 5: Big data, machine learning, and digitization forum

Date: Tuesday Evening April 28 (One Evening)

Leaders: Thomas Martin (Colorado School of Mines, USA) and Liz Hajek (Penn State University, USA)

Big data, machine learning, and digitization have been buzzwords in the past few years, but how can our community leverage these tools and workflows?

Short Course 6: Systematics of Diagenetic and Geochemical Techniques in Carbonates

Dates: Thursday - Friday, April 30 - May 1 (Two Days)

Leaders: Robert Goldstein (University of Kansas, USA) and others

This two day short course is focused on a survey of and instruction into the systematics of the techniques that are currently used in studies of carbonate diagenesis.

Short Course 7: Fluvial Paleohydraulics

Dates: Thursday - Friday, April 30 - May 1 (Two Days)

Leaders: Brandon McElroy and Robert Mahon, (University of Wyoming, USA) and Sheila Trampush (University of Delaware, USA)

Strata left by ancient rivers contain a rich record of Earth's past conditions so how can we decipher them.

Short Course 9: Mudstone Diagenesis-Development of Mudstone (Shale) Hydrocarbon Reservoirs

Dates: Thursday - Friday, April 30 - May 1 (Two Days)

Leaders: Sven Egenhoff (Colorado State Univ), Neil Fishman (PetroLogic Solutions, LLC), Joe Macquaker (ExxonMobil Corp), Juergen Schieber (Indiana Univ), Wayne Camp (Anadarko Petroleum Corp)

This one-day workshop is intended for a broad range of geologists specializing in sedimentology, petrography, diagenesis, geochemistry, and petroleum geology who are interested in the study of the impact of diagenesis on mudstone (shale) hydrocarbon reservoirs.

Short Course 10: Applied Machine Learning: Fundamentals and Geostatistics

Dates: Thursday - Friday, April 30 – May 1 (Two Days)

Leaders: Michael Pyrcz (University of Texas-Austin, USA) and Didi Ooi (Anadarko, USA)

This two-part course will provide a short yet dense introduction to machine learning (ML) in a geoscientist context leading up to geostatistics.

SEPM ISGC Registration Process

For any questions or help in registration please contact please contact SEPM HQ (+1 918-994-6216) – Theresa Scott (tscott@sepm.org) or Cassie Turley (cturley@sepm.org).

1. The online registration is located here <2020 ISGC Registration Page.>
2. If you are an SEPM member you can sign in with your user name (member number + 0) and your current password. There are helps in case you have forgotten your user name or password.
3. If you are not an SEPM Member you can go here to join SEPM and pay the member rates for the meeting OR if you are a member of IAS or SGD of GSA you may use the JOIN NOW for the ISGC option and receive the member rate for this meeting.
4. If you are not a member of SEPM, IAS, or SGD of GSA you will need to create a new account just for this meeting.
5. To sign in for non-SEPM members, use the email and password from your new account.
6. Once you have signed in or if you have created a new account you will be on the registration page.
7. The main registration fee is assigned based on your account information (society membership)
8. You can then also chose additional meeting options under the PROGRAM for field trips, workshops or short courses. Make sure that you answer the additional questions about diets or medical issues. If you are signing up for a field trip, short course or workshop please do not make your final travel arrangements until after March 13th when any cancellations will be posted.
9. Proceed to Checkout and review your selections. Use the left carrot to see the details of your selections and click on the 2020 International Sedimentary Geoscience Congress link to make any changes (add or remove items)
10. By registering you are agreeing to follow SEPM's Code of Conduct
11. Enter your credit card information and submit your registration. Please make sure your "card address" matches the billing address for the card or choose "another address" to make sure they match.

Detailed FAQs for the meeting are location on the SEPM website but here are a few of them:

What is the registration cancellation policy?

- Cancellations received before January 31, 2020 will be refunded in full.
- Cancellations between January 31, 2020 and March 1, 2020 will be refunded, minus a $300 cancellation fee. Students will be refunded half of the paid registration fee. If a trip, course, or workshop has been registered but later cancelled it will be fully refunded.
- Cancellations made after April 11, 2019 (2 weeks prior to the conference start date). We are not able to provide any refunds.
- To cancel your registration, please contact SEPM HQ – Theresa or Cassie
- To transfer your registration to a colleague (up to one (1) week prior to the meeting) please contact SEPM HQ – Theresa or Cassie

Are kids allowed at the ISGC 2020 SEPM Conference?

Due to insurance and conference center rules, all SEPM attendees must be at least 16 years of age and officially registered for the conference. For child care during the meeting, please check out Kingdom Kids if you need child care assistance while in Flagstaff. SEPM is not affiliated with Kingdom Kids.

Where is the conference being held, and what are the hotel options?

ISGC SEPM 2020 is being held at High Country Conference Center in Flagstaff, AZ USA. We are pleased to offer discounted rates at these hotels. Room quantities are limited.
Drury Inn & Suites – (group code 2367656)
Courtyard Marriott - (group code SEPM ISGC 2020)

- ✔ Call for topics/trips/courses – Done
- ✔ Call for Abstracts/Submissions --- Done
- ✔ Abstracts Reviewed --- Done (thanks to all those that helped with reviews)
- ✔ Acceptances out --- Done
- ✔ Sessions Created ---- Done (thanks to all the session chairs and their work)

Time to Register (2020 ISGC Registration Page.)

Be sure to review the registration Process

Overview of Program Schedule- Details at https:/www.sepm.org/SEPM2020-Sessions

- Tuesday – Saturday: Field Trips
- Sunday: Workshops/Ice Breaker/ Plenary Talk – Dr. Sara K. Yeo "The Science of Communication"
- Monday
  - Morning – Oral and Poster Sessions and
  - Plenary Talk Dr. John Grotzinger "Earth, Mars and Comparative Planetary Evolution"
  - Afternoon – Oral and Poster* Sessions
  - Evening – Student Reception Event
- Tuesday
  - Morning – Oral and Poster* Sessions and
  - Plenary Talk – Dr. Barbara Carrapa "Multi-proxy Data to Resolve S2S Dynamics"
  - Afternoon – Oral, Poster* and PICO Sessions
- Wednesday
  - Morning – Oral and Poster* Sessions
  - Big Data Unsession
  - Afternoon – Oral and Poster* Sessions
  - Evening – Plenary Talk – Dr. Sean Gulick "Life and Death by Impact"/ISGC Dinner and SEPM Awards
- Thursday – Short Courses/Field Trips
- Friday – Short Courses/Field Trips

*All Poster Sessions are in dedicated daily time slots – no orals sessions are concurrent with poster sessions

Registration Fees

	Early Bird*	Post-Early Bird	Onsite
Professional - Member[1]	$550	$600	$650
Professional Non-Member	$615	$665	$715
Early Career Member (<= 5 years of degree)	$440	$490	$540
Early Career Non-Member	$500	$550	$600
Student Member	$275	$325	$375
Student Non-Member	$325	$375	$425

*Early Bird until February 29, 2020 – 24:00 CT. [1] Member means SEPM, IAS or SGD in good standing in 2020