



# 2020 ANNUAL REPORT



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# REPORTS OF SEG BOARD MEMBERS

## REPORTS OF SEG BOARD MEMBERS

### President Rick Miller



Without question, 2020 waylaid humanity with unprecedented challenges. Lockdowns, isolation, quarantining, travel restrictions, and tragic loss of life due to the pandemic were collectively instrumental in the staggering reduction in global energy demand. The pandemic dramatically impacted almost every industry served by applied geophysicists. On the bright side, our profession has endured and overcome challenges from fluctuating demand before and will again. Geophysicists understand what it takes to appraise, retool, and science their way out of downturns, emerging even stronger. Engulfed in the pandemic, geophysicists continue to transform and reinvent themselves en route to a sustainable profession for the future.

Applied geophysics has an incredibly bright future. Our science will continue to be instrumental in solving problems for decades to

come. Geophysicists have a storied history of unraveling problems in engineering, groundwater, environment, data management, medicine, military, forensics, archeology, and more. Demand for our technologies will continue to span well beyond our traditional bread-and-butter exploration ventures. Applied geophysics will remain integral to powering the world's economy and supporting decision makers as they plot a course deep into the 21<sup>st</sup> century.

My year as the 89<sup>th</sup> president began at the 2019 Annual Meeting in San Antonio. Our list of goals and opportunities would have challenged even the most aggressive professional society. SEG was energized and looking forward to growing our offerings and advancing our relevance to the energy sector while building on years of foundational work by past Boards as we looked to diversify into underserved applied-geophysics communities. SEG was perfectly positioned to begin investing in strategic-growth opportunities, including transitioning potential stakeholders (outside oil and gas) that had been a target since the start of the 21<sup>st</sup> century into well-served and engaged current stakeholders. Central to that growth was the need to shore up and refresh products and services

that SEG historically has delivered at the highest standards of our industry.

As the second decade of the century began, a vision of metered growth and optimism was prevalent. Additionally, at the start of 2020, several major SEG programs were undergoing rebuilds to update and diversify delivery to better meet the needs of our evolving membership. SEG was investigating new product-delivery platforms and collaboration space for geoscientists. Enhancing relevance to the profession and promoting the application of geophysics were squarely in the crosshairs as we crossed into 2020.

Then, the coronavirus pandemic transgressed the globe and, in its wake, in-person events began canceling, rescheduling, and flipping to virtual in the first quarter of 2020. SEG began preparing aggressively for whatever the “new normal” might look like. Revenue streams that had powered many of the products and services valued by our profession but were not self-sustaining dried up quickly. Several task forces immediately were established to ensure that business continuity was maintained through these challenging times. Of critical importance was monitoring the delivery of an Annual Meeting with minimal fiscal and health risk but with opportunities for members

and exhibitors to connect and unveil new technical content and capabilities.

Groups intensified brainstorming and plotting a path forward for the digital transformation of the business, a process already under way but expedited by the pandemic. As these task forces progressed and offered glimpses into the future, the emerging view was clearly fresh, innovative, and visionary. Revitalizing product delivery and core stakeholder engagement to meet the expectations and capture the interest of emerging professionals and new stakeholders is in the works.

Along with SEG's progress in retooling and reshaping itself for the new normal has come a wide range of extremely important changes in the business. SEG's management structure is more compressed and better aligned with the portfolio business model established a couple of years ago. This focusing has cultivated much better cross-platform communication and program integration. Some changes to the business were being contemplated but the pandemic catalyzed and expedited their development and implementation. By reshaping, SEG has reduced indirect cost by more than 30% in 2020 and therefore more efficiently operates with more of our revenue streams available for direct program costs.

Delivery and impact of many SEG programs and products has been unscathed by the pandemic. SEG is the unchallenged leader in the publication of scholarly articles on applied geophysics. This position has been reinforced with the trends observed in 2020. Overall, submissions in 2020 are in record territory. Impact factors are some of the highest in the history of our journals.

Even with the difficult times we have all endured with the pandemic, SEG continues to focus strategically on our profession's needs now and well into the future. Membership has struggled with the impact the pandemic has had on employment in our profession, but we are within about 10% of 2019 membership. SEG opened a new office in Kuala Lumpur, Malaysia, in late 2019. It is already a highly successful regional office joining Beijing, Houston, and Dubai. A great deal of work has been done by volunteer and staff leaders to investigate advantages and opportunities in moving key staff leadership positions to Houston, where a wide range of our traditional and potential stakeholder communities are present.

During 2020, SEG began a deep dive to actively search for any occurrences or even hints of potential or actual inherent bias, inequality, or systemic

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racism within published, practiced, or inferred guidelines, policies, and procedures, especially targeting those involving evaluations, reviews, nominations, judging, or other selection-based processes. Our goal is to go beyond simply looking for occurrences of inequality and eliminating those to actually identifying areas where additions/enhancements can be made that enable us to create a truly diverse and inclusive community of applied geophysicists rather than just strive for one.

As we grapple with the pandemic and its associated challenges, it is important to stay focused on being relevant to all industries that utilize geophysics to explore, characterize, or image. Innovative, dynamic, and visionary planning is going into new platforms and delivery systems that will be instrumental in the Society's future. The key will be maintaining strategic alignment well after current restrictions and market depression rebound. These challenges have made and will continue to make 2020 the most challenging year in decades.

Relevance and the vital role of SEG have never been greater to the energy industry and practitioners engaging in engineering, environmental, groundwater (fresh and contaminated), mining, military, public safety

(geohazards), and any application where taking a peek into what lies below our feet dictates what happens next. Our new normal will be dominated by innovative ways to deliver content, promote networking, and improve business efficiency among our geoprofessionals and the businesses they support.

Stepping back and looking at the future of SEG and applied geophysics provides a different perspective than the view out the side window we have been seeing in 2020. Our essential role in exploration (petroleum, mineral, water, hazards, etc.) and characterization will continue as the core of our profession. SEG will continue to serve the profession and professionals even more effectively and efficiently in this new normal by bringing an expanding field of view and engagement.

### President-elect

Maurice M. Nessim



I was honored to serve as president-elect during one of the most challenging periods — the intersection of plunging oil prices due to oversupply and the collapse of demand due to the coronavirus outbreak.

Exploration and production activities reached record-low levels, and investments in geophysics were impacted directly. This led to a massive reduction in geoscience personnel within companies and capital cuts in research, development, engagement with societies, and training.

The energy and applied-geophysics industries are at a crossroads defined not only by the current pandemic and low oil prices but also by the inevitable fundamental structural changes facing a global economy increasingly focused on decarbonization and renewable resources.

President Rick Miller asked me to lead two new task forces in response to the dramatic changes that are having a direct negative impact on SEG's financial ability to achieve its mission.

### BUSINESS CONTINUITY TASK FORCE

The mission of the Business Continuity Task Force (BCTF) was to recommend to the SEG Board of Directors which measures should be taken to mitigate the impact of the challenging situation on the Society's revenues.

After tens of meetings and analysis in which all members participated actively, it was clear that we had to mitigate the negative impact on revenues resulting from our inability to hold the Annual Meeting in person. The task force, therefore, recommended a reduction in staff-related expenses of US\$1.44 million and funding SEG's remaining anticipated deficit with reserves up to \$2 million.

The recommendation from the BCTF was presented to the Board, approved unanimously, and implemented almost immediately. I want to take this opportunity to thank all of the task-force members for their tireless efforts, with special thanks to Lee Bell and Ken Tubman. A full report on the BCTF activities is in the Annual Report as part of the Task Forces section.

### ANNUAL MEETING TASK FORCE

The mission of the Annual Meeting Task Force (AMTF) was to advise the Board on the viability of holding the 2020 Annual Meeting in person in Houston as scheduled and to explore alternatives. The alternatives included holding the Annual Meeting virtually or in a hybrid manner, i.e., both in person and virtually. The goal was to minimize net losses resulting from a diminished or eliminated in-person meeting while identifying opportunities to meet SEG's strategic direction to diversify globally, demographically, and beyond oil and gas.

After a remarkable effort from all of the team members in meetings and discussions, a recommendation on converting the Annual Meeting to be 100% virtual was presented to the SEG Board, got unanimous support, and was implemented with good success. A new and exciting plan for future SEG Annual Meetings will be discussed and implemented in 2021. I thank all of the task-force members for their participation and extend special mention to Baishali Roy and Wafik Beydoun. A full report on the AMTF activities is in the Annual Report as part of the Task Forces section.

I also chaired the Strategy and Planning Committee (SPC), working

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with a group of talented individuals from the geophysical industry and academia to fine tune SEG's strategic plan. The team came up with SEG's Strategic Pillars as a guide to all of our future activities. Also, following SPC input, the SEG Board unanimously endorsed the strategic move of SEG headquarters to Houston, the global energy capital, so SEG executive leadership can operate more closely with major stakeholders as the Society diversifies its activities and implements the strategic pillars. A full report on the SPC activities is in the Annual Report in the Committees section.

During my year as president-elect, I served as SEG Board liaison to the SEG Foundation Board. I enjoyed that, as it gave me great honor to interact with such a passionate and professional team dedicated to serving the membership and direction of SEG and inspiring donors to fund Society programs, even in financially difficult times.

In closing, I want to thank President Miller for navigating SEG through all of the challenges and leading us to an excellent virtual Annual Meeting. I also would like to thank all of the Board members for their passionate efforts and their collaboration with and advice to me as together we made difficult decisions that have positioned

the Society to move forward. I also would like to applaud the SEG staff for their knowledge and flexibility to adapt to Board decisions and the major changes that required fast implementation. Also, I would like to thank our members for their support and for sticking with SEG through difficult times for them and the Society.

I see the future as bright for applied geophysics and for SEG, but we have to change and we have to do it fast to adapt to 2021 with its challenges and opportunities.

### Past president Robert R. Stewart



SEG was founded in Houston some 90 years ago, with an aspiration to assemble those with a like-minded pursuit of finding something valuable in the subsurface. While much has changed since 1930, our fundamental purpose remains similar. We continue as a group of geophysicists to develop our membership, enhance our fellowship, and advance and apply our science to economic opportunities (and challenges) in the underground. How we assemble and who is participating is rather different in 2020, and what we seek has broadened. Indeed, what is economic (and socially licensed) in the resource sector is transforming. To remain relevant and loyal to our founding principles, we need to adapt.

Our organization, like a healthy garden, needs attention via planting new seeds appropriate to environmental conditions and promoting vibrancy

through pruning, regular watering, and fertilizing. Continuing with the analogy, the SEG Board of Directors has been especially attentive to our "garden" over the last year due to the lack of rain and infestation of pests.

How are we tending and adapting? On the organizational front, we have restructured the functioning of the Society into activity portfolios, which have associated teams and budgets. This makes operations and issues more understandable and better informs decisions. We sold our Tulsa campus, effectively exiting the real-estate business, which while painful, substantially improved our budget and reserve situation. This augmented our future viability. We have had reductions in our workforce. Again, while this was not remotely what we dreamed of doing, it was the unfortunate reality. As we all know, the price of oil (as a proxy for geophysical activity) up to a previous US\$145 per barrel versus current \$45 per barrel ultimately only supports a proportioned level of professional undertakings.

Like most professional organizations, we have relied heavily on in-person meetings to deliver our educational and industrial products and services. After much discussion and analysis throughout early 2020, the Board made the decision to have a purely

virtual Annual Meeting in October. This turned out to be the correct decision and resulted in a very successful meeting. Major kudos to the Annual Meeting leadership team, which includes Wafik Beydoun, Olga Nedorub, Cengiz Esmersoy, Kristi Casey, Trisha DeLozier, Jenny Cole, Rick Miller, and Maurice Nessim. The bright side of virtual meetings is the opportunity to reach everyone in the world who has Internet access and a solid geophysical interest.

We continue to develop our global constellation of physical offices. We believe that having a presence in the world's major resource and population centers is the best way to understand local needs and deliver geophysics of the highest impact. Commendations to our SEG staff including Tom Agnew, Flora Wu, Yogaani Bhatia, and Annabella Betancourt. Office developments in Houston and Kuala Lumpur are testimonials, and I hope that there will more to come in Latin America, Europe, and Africa.

As conditions in the resource industry oscillate while companies consolidate, there is periodic discussion of SEG merging with a related society. Some of the thinking is that this could reduce expenses for SEG and minimize perceived duplication in meetings, courses, and back-office effort.

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Several task forces have thoroughly investigated merger possibilities. So far, the task forces and Board have overwhelmingly chosen to maintain close contact with our sister organizations but retain our independence and special character. The general feeling is that we are in relatively good financial shape, run the organization and its budgets effectively, could be lost in another society, and have a bright future with our wide array of techniques and host of applications. However, we continue to monitor relationships and stay open to possibilities that could substantially benefit our membership.

Much of our strength comes from the diversity of our members. I believe that most geophysicists are distinctly inclined to appreciate different geographies, cultures, countries, applications, methods, and a wide variety of people. We know that discovery and contribution can come from different locales and backgrounds. So, while we clearly can't guarantee success for any group, we are certainly trying to provide opportunities and encouragement while addressing barriers.

Very pleasant parts of the past president's duties are involvement with nominations for Board positions as well as evaluations for SEG honors and

awards. I am constantly inspired by the remarkable histories of achievement and breadth of contributions of our members, especially as nominated for our leadership positions and recognition. While a golden generation of geophysicists is now moving into its senior years, there is a capable cadre ready to continue exploring and organizing.

Due to the volume of SEG leadership work, the longer-term timelines of realizing goals, as well as the widely variant issues that arise, the current, past, and upcoming presidents met weekly throughout the year. Regular additional participation in 2019–2020 by SEG Foundation Chair Mike Loudin, Finance Committee Chair Lee Bell, Treasurer Dan Ebrom, and 2020–2021 President-elect Anna Shaughnessy was particularly helpful. This provided more continuity and diversity of opinion to help guide decision-making. The Board itself was very active in 2020, partially because meetings were mediated via Zoom and online voting. Thank you to our organizational angel, Mandi Duckworth, and human-resources sage, Angela Paulsen. There were many issues to consider, ranging from financial, to logistical, to existential.

As we bid adieu to 2020, we are mindful of the difficulties and

challenges faced by many of our colleagues and friends. Looking forward, may the ancient Irish blessing apply, "... with the sun shining warm upon your face and the wind at your back." There is a compelling need for applied geophysics to better understand the subsurface and conscientiously produce its bounty. We need to adapt our techniques to new targets, the monitoring of infrastructure, and mitigation of natural disasters. Our energy and resource work over the past 90 years has been invaluable for the world's prosperity. The year 2020 distorted our vision, but we have applied corrections as possible. It has been a year of adaptation, but as Charles Darwin taught us, that's the basis of success. On to 2021!

### First vice president Manika Prasad



In my last term as SEG vice president, I focused on evaluating and promoting equity in SEG and in our various outreach activities. I continued as a member of the Women's Network Committee (WNC) as well as several technical committees. I was Board liaison for the Committee on University and Student Programs (CUSP) and the Scholarship, Travel Grants, and Field Camp committees. I was a member of the newly developed Equity in Process (EIP) Task Force, where we evaluated SEG Policies and Procedures and Bylaws for language that communicates bias or inequality (racism, bigotry, or discrimination) in any form.

The EIP Task Force report is included in the Annual Report as part of the Task Forces section. I must say that it was a sober learning experience to see how many language changes were needed, because on closer reading,

we realized how much implicit bias and discrimination was still present. Sometimes, the bias was not so much in the language but in the process. We hope to maintain and continue along this path in 2021.

Applications for grants to attend the SEG Annual Meeting are handled by the Travel Grants Committee with Tyler Schwenk as chair. The committee is responsible for handling travel grants in three categories including the Student Education Program (SEP), Student Leadership Symposium (SLS), and Technical Program. The Travel Grants Committee also grants the Near-Surface Research Award (NSRA) toward partial support of near-surface geophysics projects. The committee evaluated a total of 239 applications and awarded 104 grants and awards.

- The committee implemented a new three-person review system with success. The NSRA, SEP, and SLS grant evaluations were completed by the end of May.
- SEP 2020 was canceled due to pandemic concerns.
- The NSRA was awarded to Daniel Locci of Louisiana State University.

SLS 2020 was held virtually. It included 54 students using Basecamp as a

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forum, several Zoom presentation sessions, a panel webinar, and presentations from guest speakers. As always, the committee continues its search for new members.

Since its inception in 1956, the SEG Scholarship program has helped advance the field of applied geophysics by encouraging students who excel in geoscience. Gifts from SEG members, their employers, corporate sponsors, SEG Sections and Associated Societies, and memorial funds given in honor of colleagues, friends, and family members provide substantial merit-based financial awards for deserving students. Approximately US\$11 million in scholarship money has been awarded to date to the top geoscience students in the world. From freshmen just beginning their education to graduate students doing research to advance the field, SEG scholarship awardees are recipients of the most prestigious geoscience scholarships in the world.

During 2020, the Scholarships Committee managed the application process for the 2020–2021 academic year. The committee evaluated 494 applications and granted 124 student scholarships, totaling \$322,332. During the evaluation process, each committee member ranked applicants for merit based on information

provided in their applications. Individual rankings were compiled, and a composite forced ranking was created to determine the highest-qualified applicants in each of six categories (freshman, undergraduate, and graduate, each divided into North American and non-North American).

The committee considered the specific selection criteria for each of the individual scholarships and carefully matched qualified applicants, in some cases with the assistance of advisory boards who provided feedback and recommendations on applicants. All scholarships are merit based, ensuring that the top geoscience students in the world are honored and awarded.

Committee members also are serving as advisors to each of the recipients for the 2020–2021 academic year, helping them learn more about career opportunities in geophysics and connecting them with valuable resources to enhance their education and prepare for their careers.

The 2020 Scholarships Committee included Karl Schleicher (chair), Esther Babcock, Lorie Bear, Loralee Dickson, Yong Ma, Kai Zhang, Adam Mangel, and Ahmed Ismail. For addition information, visit <https://seg.org/scholarships> and

<https://seg.org/education/student/financial-assistance/scholarships/list-of-scholarship-recipient>.

In 1993, the Field Camp Grant program was established by the SEG Foundation to provide seed money for geophysics faculty and SEG student chapters to create and support field courses that provide students with hands-on experience in data collection and analysis using geophysical instruments and software applications. The 2020 Field Camps Committee provided continued leadership in evaluating applications and awarding grants to eligible applicants, ensuring that geophysics students around the world receive valuable field training in contexts that emphasize safety and high-quality learning.

In 2020, SEG received 36 applications for funding (a 20% increase from 2019). The total funding requested was \$445,375. From the submitted applications, the committee selected 16 to receive awards, totaling \$124,443, with values ranging from \$3300 to \$16,000. In 2019, we selected 17 awardees.

Francesca Fazzari began two years of service as chair during the 2020 Annual Meeting. Dylan Mikesell completed two years as chair during the event. The committee and SEG

staff continued to work with 2020 awardees over the summer to ensure that health, safety, security, and environment (HSSE) plans and modifications to field plans due to the pandemic were carried out. Many field camps still occurred this year after modifications to the original HSSE plans, but some field camps had to reduce the number of participants in order to follow guidelines for physical distancing.

The 2020 Field Camps Committee included Mikesell, Fazzari, Hendratta Ali, Alex Fick, Joe Estep, and Payson Todd.

CUSP held its last meeting of the year at the end of October. The committee continues to maintain contact with our student chapters, most recently alerting them to a competition sponsored by the Switch Energy Alliance and the petroleum and geosystems engineering department at the University of Texas at Austin. The competition encourages teams of students to find solutions to the challenges of energy poverty.

Additionally, the committee is working on two new programs to encourage students and student chapters to develop their skills in innovation and coding, as well as provide hands-on work with data and educational opportunities in fields such as mining,

water exploration, and machine learning. The programs are being scaled to work on a more regional level in an effort to encourage regional collaboration between chapters.

In 2021, the committee will continue to focus on strengthening communication with student chapters, specifically to focus on assisting them in growing their chapters and connecting them to SEG programs. The committee also plans to continue developing programs that provide more offerings to student chapters on a regional level.

Serving as vice president during the past two years was an amazing experience. However, serving on the EIP Task Force showed me the attention we still need to devote to our processes to reach equity. I trust that SEG will emerge as a stronger society — but one that will be accessible to all SEG members.

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### Second vice president Scott Singleton



In 2020, as second vice president, I was Board liaison for the Gravity and Magnetics Committee and the newly formed Machine Learning Committee. I participated as a member of the Annual Meeting Steering Committee, the Annual Meeting Task Force, and the Digital Transformation Task Force. In addition, I represented SEG as one of the technical cochairs for the Unconventional Resources Technology Conference (URTeC).

The Gravity and Magnetics Committee is one of the larger and more active SEG committees. The chair, Irina Filina of the University of Nebraska, has done a wonderful job keeping the committee focused and active. One of the committee's main efforts each year is contributing to the Annual Meeting. This year, the committee had one oral and two poster sessions. Its luncheon morphed into a popular and highly

attended keynote presentation by Kirsten Siebach of Rice University who talked about Mars exploration. The committee's postconvention workshop, jointly hosted with the Mining Committee, was on machine learning. In addition, the committee put together a special section for *Interpretation* (November 2020). The committee is heavily involved in AGU-SEG collaboration and has coordinated the Meter Reader section in *The Leading Edge* for many years.

A task force on machine learning led by Chris Liner and Bill Abriel has been active all year. They assembled a great group of data scientists led by Robert Clapp and Mauricio Araya. I am the Board liaison, and Ted Bakamjian is the staff liaison. We worked with the task force to determine how it wanted to organize within SEG. The members agreed to become an SEG committee, and we assisted them in writing a procedures document, which was presented to the Board at the 2020 Annual Meeting. It was approved, thus formalizing the Machine Learning Committee as an official SEG entity.

I participated as a member of the Annual Meeting Steering Committee. As the intersociety engagement chair, I was responsible for working with other societies to encourage participation in the Annual Meeting. I worked with the

Geophysical Society of Houston (GSH), which is where we were to have the physical Annual Meeting. I also worked with URTeC, which is a collaborative conference jointly run by the Society of Petroleum Engineers (SPE), American Association of Petroleum Geologists (AAPG), and SEG. Due to the pandemic, we had to cancel several GSH events but did have a Best of 2019 URTeC session during the Annual Meeting.

Associated with this topic, I participated in the Annual Meeting Task Force, which investigated the changing dynamics of conference participation domestically and internationally. Of course, this was massively impacted by the pandemic. The task force came up with proposals for revitalizing how we hold conferences in the future and will continue its activities in 2021.

The Digital Transformation Task Force is led by Bill Abriel. I joined the task force due to my association with other digital initiatives, many of which were driven by the pandemic. This is a long-term initiative, as the effort and committee size are progressively growing. The task force will continue to develop in 2021.

Finally, I have represented SEG for the past two years as one of the technical cochairs of URTeC. Each of the sponsoring societies (SPE,

AAPG, and SEG) is represented by one of the cochairs of the technical program. In 2020, the conference had to move online at a relatively late date in the planning cycle due to the pandemic. This caused a lot of angst. We succeeded in reorganizing the event, although attendance was down considerably from what we had been accustomed to in the past (about 2700 versus 4000-5000). I will continue as the SEG technical cochair in 2021, when we hope to have a hybrid event (both in person and online) in Denver.

### Treasurer and Finance Committee

Dan Ebrum, treasurer  
Lee Bell, Finance Committee chair



The year 2020 will be remembered as a year of seismic shifts in the energy industry, especially for SEG. The market shifts have had a profound effect on the finances of SEG. On the oil-demand side,

the pandemic reduced energy needs across the globe. On the oil-production side, competing national agendas of Saudi Arabia and Russia resulted in overproduction relative to demand, resulting in historically record-breaking low oil prices. The low oil price impacted travel budgets for oil companies and geophysical contractors, while the pandemic directly influenced decisions by companies to restrict travel to scientific conferences and expositions.

SEG is especially vulnerable to disruptions in scientific and tradeshow attendance because much of the Society's revenues derive either from its own Annual Meeting or from partner meetings — the Unconventional Resources Technology Conference (URTeC), the North American Prospect Expo (NAPE), and the Offshore Technology Conference (OTC). Low oil price is bad, but low oil price coupled with travel restrictions is disastrous. The virtual Annual Meeting lost approximately US\$800,000 and was even so lucky to do so, as the cancellation fees for the George R. Brown Convention Center and the downtown hotels were waived due to pandemic force majeure. In-person meetings have been the key revenue generator for SEG, but there are

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clearly risks that must be abated either by insurance or diversification.

Fortunately, the SEG staff and Board of Directors were alert to the special needs of the Society in these difficult times. Expenses were reduced (in part through reorganization and staff reductions), while revenue-producing activities were trimmed to be leaner in cost structure. The budget iterations that the staff, Finance Committee, and Board went through are chronicled in the Business Continuity Task Force report.

The projected net income for the year, not including investment gains, is a negative \$2.7 million (Table 1). This

exceeds the authorized budget deficit by about \$700,000. The excess budget deficit is due to the Annual Meeting revenues being even lower than worst-case expectations.

Some initiatives in cost reduction, such as selling the two SEG office buildings, were, by good fortune, just in time (late 2019/early 2020) to provide SEG with enhanced liquidity. Given that office rents have sagged as more Americans work from home, we are lucky to no longer be in the office-rental business.

One of the key strategic questions going forward is how to meet the needs of current stakeholders (primarily geophysicists in energy-

extraction industries, geophysical contractors, and energy companies) while broadening SEG's stakeholder base into hydrogeology, civil engineering, mining geophysics, carbon storage, and other applied-geophysics endeavors.

### Vice President, Publications Baishali Roy



It has been my honor to serve as the vice president, publications for SEG during 2019–2020 and to be returning in that role for 2020–2021. SEG Bylaws charge the vice president, publications with oversight of SEG publication and technical dissemination activities, ensuring that all such activities are aligned with SEG's mission, goals, and policies and that the publications achieve the highest standards for technical and scientific integrity. SEG publications staff continue to play a very strong role in the efficient management of all publications matters.

In this position, I served as Board liaison for all of the Society's publications boards and committees. These include the editorial boards for *GEOPHYSICS*, *The Leading Edge*, *Interpretation*, the Books Editorial Board, and the Translations, Reviews, and Community Content committees.

These boards and committees plus the Technical Program Committee are represented on the Publications Committee. The reports of all of these boards and committees describe in detail how each advanced SEG publications during 2020 in the middle of a pandemic. Journal publications remain strong. Our three main journals — *GEOPHYSICS*, *Interpretation*, and *The Leading Edge* — continue to grow in submissions, and the CiteScore ratings of all three and the Journal Impact Factor ratings of the first two continue to be strong. The SEG Wiki pages continue to get more views around the world.

President Rick Miller created a Wiki Task Force that I chaired. The task force reviewed current content and opportunities to expand. Based on task-force recommendations, the Wiki Committee was renamed as the Community Content Committee to better reflect having expanded its remit to additional areas of interest such as blogs, YouTube presence, wikithons, and the Repro Zoo. The SEG Wiki's discoverability has improved significantly, leading to much-increased page views across the world. A Spanish translation of Robert Sheriff's *Encyclopedic Dictionary of Applied Geophysics* has been added to the wiki through crowdsourcing.

**Table 1.**

Estimated 2020 revenue and expenses as of November. IDC is basically overhead and reflected in the support services row. The revenue for support services is the interest and dividend gained from the SEG investment of the reserves. Investment gain/loss is not included.

Portfolio	Revenues	Expenses	Net	IDC	Grand total
Regional offices	486,449	662,298	(175,849)	367,239	(543,089)
Professional development	436,741	843,660	(406,920)	300,522	(704,441)
Community engagement	962,077	372,060	590,017	201,077	388,941
Publications	2,514,371	2,341,702	172,669	914,682	(742,013)
Meetings	1,525,579	1,525,059	519	666,544	(666,024)
Students	491,574	610,749	(119,174)	125,766	(244,940)
Business development	781,935	1,089,473	(307,538)	605,594	(913,131)
Support services	702,637	3,180,078	(2,477,440)	(3,181,423)	703,982
<b>Grand total</b>	<b>7,901,363</b>	<b>10,625,079</b>	<b>(2,723,716)</b>	<b>0</b>	<b>(2,723,716)</b>

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The SEG Library is a resource that members long have counted among their most highly treasured, and it has become even more appreciated and will continue to grow in value. The development path includes additional content and technology integrations and discovery improvements that will further serve the Society's mission of advancing applied geophysics.

As vice president, publications, I dealt with resolving conflicting issues between authors and editors according to the Ethical Guidelines for SEG Publications. As a result, we reviewed the need and approved updates to publications ethics punitive-action procedures. The changes will bring more clarity to the process of punishing individuals who flagrantly violate ethical standards in the publication process. Risks associated with publications ethics transgressions and related punitive action can be lowered with these strengthened procedures. More clarity was brought to the process that enables editors who bring cases to the attention of the vice president, publications to appeal the vice president's decisions to the full Publications Committee. As stated in the revision, "The goal of punitive action shall be to preserve the integrity of SEG publications and prevent further unethical behavior through example as well as through prohibition."

The SEG Publications Committee also gained Board approval for an update to the Society's preprint policy, thereby enabling SEG to accelerate the pace of innovation in applied geophysics and other sciences. By ceasing to regard preprint posting as prior publication that would eliminate work from publication consideration, the Society removed a publication barrier for authors who find it essential to disseminate their initial research reports on preprint servers. While relaxing rules for preprint posting, SEG has declared no endorsement of any preprint, protecting its reputation for high-quality knowledge transfer advanced through peer review. Intellectual property rights concerns associated with SEG publication of work originating as openly licensed preprints have been evaluated, and the policy mitigates those by requiring that authors retain copyright and the ability to transfer it with any preprint posting of material submitted for SEG publication.

Highlights from 2020 activities and improvements to Policies and Procedures include the following.

- A senior assistant editor position was created for GEOPHYSICS. John Etgen was approved as senior assistant editor of GEOPHYSICS

for issues published in 2020 and 2021 and will assume the role of GEOPHYSICS editor-in-chief for issues published in 2022 and 2023.

- Author-fee adjustments were approved and made effective for submissions on 1 February 2020 and later.
  - The open-access article processing fee (APC) for authors publishing on an open-access basis increased from US\$2500 to \$3500 for GEOPHYSICS, *Interpretation*, and *The Leading Edge*.
  - The APC for authors publishing expanded abstracts on an open-access basis decreased from \$2500 to \$1000. Authors who publish their expanded abstracts on an open-access basis and later further develop their papers into SEG journal articles will have the APC for each journal article reduced by \$1000 to \$2500.
  - Author fees for GEOPHYSICS and *Interpretation* became identical, with *Interpretation* mandatory fees starting with each page after the 10<sup>th</sup> page rather than the 12<sup>th</sup> page and nonmembers assessed mandatory charges for all pages. AAPG authors

qualify for SEG member rates for *Interpretation*. *The Leading Edge* authors and authors of expanded abstracts continue as not subject to page charges.

- Mandatory page charges for member authors publishing more than 10 pages in an article increased from \$225 to \$275 per page after the 10<sup>th</sup> published page.
- Mandatory page charges for nonmember authors increased from \$275 to \$325 per page for all pages in an article.
- Voluntary rates (also called agreed rates) did not change. The suggested voluntary rate for pages 1–10 of a journal article authored by a member continues to be \$175 per page. The suggested member and nonmember voluntary rate for each color page continues to be \$450.
- Authors unable to pay page charges continue to be able to appeal for hardship relief on the same basis as previously.
- SEG became a signatory to the San Francisco Declaration on Research Assessment (DORA) and adopted

the proposed Procedures Manual entry summarizing its aligned activity in its publishing operations. Supporting justification is as follows.

- Becoming a DORA signatory and adopting the related policy will position SEG firmly behind a fairer approach to research assessment applied to funding, appointment, and promotion.
- By encouraging authors and their institutions to regard Journal Impact Factors as just one of many indicators of research value and not the primary one, authors are less likely to indulge in questionable publication practices.
- By becoming a DORA signatory, adopting the proposed policy, and adjusting some publication practices, SEG will strengthen its reputation as a provider of high-quality channels for knowledge exchange.
- Recognizing that Journal Impact Factors are of high importance to many researchers, SEG should remain a steward of its ratings in order to help attract as many good papers as it can, while encouraging the research community to adopt

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fairer standards for research assessment.

- Policies and Procedures for Corrections, Additions, Expressions of Concern, and Retractions following Committee on Publication Ethics (COPE) guidelines were formally adopted and added to the Procedures Manual. Supporting justifications include the following.
  - These policies and procedures strengthen SEG's commitment to maintaining the integrity of the scientific record.
  - These policies and procedures provide guidance to all parties involved with publications regarding how corrections, retractions, and other record adjustments should be handled.
  - These policies and procedures mitigate risk to SEG related to corrective action it may take on published work postpublication.
  - These policies and procedures comport with SEG's commitment to full transparency in dealing with postpublication corrective action.
- Publications Ethics Procedures were updated, with Board support, to give

editorial leaders power to impose probations for ethical transgressions. Supporting justifications include the following.

- This provides publications leaders a probation option that will help them manage ethics cases more effectively.
- Some publications ethics transgressions can be addressed more fairly with probation rather than suspension of privileges.

### Chair of the Council Gustavo Jose Carstens



The SEG Council is where SEG demonstrates that it is truly a global society. Through SEG's 53 Sections and Associated Societies and 24 representatives from 12 districts, we have representation from all of the countries in the world in which we have members.

This large gathering of global scientists met twice in 2020, and both meetings were held virtually. We first met in June to approve the 2019 Annual Report, including the audited financial statements and a Foundation financial summary. For the first time, the second meeting, the Annual Meeting of the Council, was held virtually after the SEG Annual Meeting was moved from Houston to a virtual format.

As chair, I resolved to review and analyze the specific goals and concerns of the 2020 Council and instituted two separate task forces to accomplish this undertaking. The District Representatives

Task Force reviewed the current structure of SEG districts to determine if the structure correctly represents the SEG membership population, as summarized in the annual membership Diversity Report, to determine if district representatives are working well in tandem with section representatives, and to determine better methods of communication between SEG and global members. Improvements have been made in enabling SEG members to communicate with their Council representatives. The Council has a new page on the SEG website that enables constituents to send questions to Council members directly. In addition, Council representatives are now able to send e-mails to all members of their SEG district through the SEG Marketing Department.

The Procedures Task Force aimed to review and update the Policies and Procedures of the Council, which have not been updated since 2012. The task force is working on the three governing documents of the Council and ensuring that all are aligned. Once completed, the task force will have clearly defined the rights and obligations of the individual Council members on voting, representation on the Council, and how the Council will run.

In early 2021, the Council will review a proposal from the Board

of Directors to formally recognize Houston as the headquarters of SEG. This wording change to the Bylaws will assist in moving the SEG executive director and other key staff to Houston while most staff members will continue to operate from Tulsa.

### Director at large Bob Brook



My term as director at large came to an end at the conclusion of the 2020 Annual Meeting. It proved to be a memorable three years, with some landmark achievements interspersed among unprecedented surprises.

It started at the 2017 Annual Meeting in Houston, the first convention to be held at the George R. Brown Convention Center after the devastating floods caused by Hurricane Harvey. From that point on, the Board had some significant accomplishments, the most significant being the sale of SEG real estate in 2019. This decision

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was driven by the Board's desire to sharpen the Society's focus on serving the geophysical industry. This proved to be a fortuitous choice, given the events of 2020, which have rocked the commercial real-estate business.

As a result of the real-estate sale, SEG entered 2020 with no debt and a strong balance sheet. It has been a challenging year, but it could have been much harder if we had been focused on finding tenants in a tight market. Instead, we are in a position to meet the demands of a rapidly changing industry.

At the January 2020 Board meeting in Tulsa, then-President-Elect Maurice Nessim warned us that the coronavirus was a very real threat. How right he was. That proved to be the only in-person Board meeting of 2020. Like everybody, the SEG Board and staff had to adapt day by day to the rapidly changing circumstances. This started with a rework of the just-completed budget, followed by changes to almost every program SEG offers.

I was a part of Nessim's Annual Meeting Task Force. We met weekly to analyze the financial and operational impacts on the Society's keystone event. Plans evolved from a hybrid format to the all-virtual event that we all experienced. Importantly, members

of the task force brainstormed future improvements to Annual Meeting formats, and there were some exciting ideas that will be integrated into subsequent formats and locations. I applaud the effort from volunteers and staff to pull off such a successful event in a very short time.

As chair of the Audit Committee, I had the opportunity to take a close look at the 2019 SEG financials and work with the accounting group. The audit had to be moved off site, and again the staff involved should be applauded for adapting to the changing circumstances. Maria Angela Capello took on this role in October 2020.

I had the privilege of working with chair Sergio Chávez-Pérez as Board liaison to the Research Committee. The committee is very active and did a tremendous job organizing 15 virtual workshops at the Annual Meeting. While everyone enjoys the benefits of face-to-face meetings, the lessons learned from the all-virtual experience will serve us well in the future.

I think we are all glad to see 2020 in our rearview mirror. The experience only reinforced my respect for the dedication of the SEG staff, management, and volunteers who make the Society function. With their hard work, the Society is well

positioned to improve and expand our services to meet the challenges of a changing industry. Finally, I want to acknowledge the wisdom, companionship, and commitment of my fellow Board members over the past three years. With their dedication, SEG will continue to evolve to meet future demands, we hope with a fewer surprises along the way.

### Director at large Maria Angela Capello



This was my second year as director at large. Throughout the year, I had the opportunity to support SEG in navigating the challenges of the pandemic and its effects on our Society and members. The consecutive lockdowns and numerous layoffs experienced by our members at global scale triggered in me several reflections that reinforced my willingness to serve in expanding SEG's support to the membership on several fronts. These fronts include

our value proposition as a professional society, upskilling our members to face the new reality, and renewal of SEG to cope with the new challenges.

In relation to value proposition as a professional society, I led the preparation of a mapping exercise of geophysics to each of the 17 United Nations Sustainable Development Goals (SDGs), creating the Geophysical Sustainability Atlas. This mapping included consultation with experts in all areas of application of our profession and flourished as an article coauthored with two awesome colleagues who share with me a passion for sustainability in geosciences. The atlas was published in the January issue of *The Leading Edge*, and I could not think of a more motivational way to start 2021, highlighting the pivotal and protagonist roles geophysicists have in all fronts of society. I am convinced that this initiative will be further enhanced by collaboration with other geoscience professional societies as we seek to frame and explain our professional value proposition with respect to the economy, society, and protection of the environment, in other words, our sustainability as geophysicists framed by the UN SDGs.

Another goal I pursued this year was the upskilling of our members who are immersed in new and known difficulties caused by the pandemic,

digital transformation, and energy transition. For this, the new SEG Members in Transition program was launched. Members in transition include individuals with evolving and changing work conditions, encompassing students, fresh graduates, employees, entrepreneurs, and retirees. In short, a member in transition is all of us, because our careers always evolve, following market trends and our progress in life and work. SEG Members in Transition was launched in January 2021. It is inspired by a similar program operated by the Society of Petroleum Engineers' Gulf Coast Section in Houston. The program will offer our members support in their shifting strategies with help from renowned experts in different areas including soft skills, digitalization, resume and social-media professional branding, and much more.

My third main focus in 2020 as director at large was to support the renewal of SEG. I endorsed actions to optimize administrative loops and reduce costs. Some measures were hard, but I am confident that the integrated efforts of the Board pursued the betterment of the Society.

My summary of this rich year needs to highlight activities of the SEG committees for which I act as Board

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liaison. I am proud of each one of them and look forward to their accomplishments in 2021.

The Oil and Gas Reserves Committee (OGRC) found in their 2020 chair, Richard Xu, a path of renewal. The committee actively engaged in many activities to revamp its presence, outreach, and accomplishments. Most importantly, the committee is actively advocating to expand, enhance, and ensure the insertion of geophysical technologies and techniques to be utilized effectively and reliably in the process of oil and gas reserves and resources assessment for entities at all levels and fundamentally in the standards to be adopted internationally. SEG is one of the sponsoring societies of the Petroleum Resources Management System (PRMS), the main document that establishes best practices and guidelines for assessing reserves. OGRC is currently working closely with PRMS to ensure that a geophysical chapter will be included in new editions of PRMS standards to be released in 2021. During the 2020 Annual Meeting, the committee launched a Reserves Workshop, which had great success and key findings about possible future collaboration paths in reserves assessment loops.

The number of geophysicists involved in reserves and resources assessments is not large, and OGRC is looking for more SEG members who are reserves experts and who have the aptitude and interest to become more engaged in this process. Please contact Xu or myself to get involved.

The Women’s Network Committee (WNC), led in 2020 by Blair Schneider, has traditionally been one of the most effective committees of SEG in terms of step changes and mindset-provoking initiatives. This year, so special to all of us as one of the most challenging years ever, was no exception, and WNC launched 10 free webinars on technical and soft-skills topics. In addition, the committee launched a quarterly newsletter, offered free resume reviews with great success, and partnered with Science-A-Thon to raise funds for social good. The committee created a proposal for a new award, the SEG IDEAL award, to recognize individuals who are role models in advancing inclusion, equity, and diversity in geophysics.

Honoring their tradition of shaking the ground of the Society, they also challenged the Board to issue a statement on diversity, following the Black Lives Matter issues in the United States. They prepared a grounded document on efforts that SEG should

take to address diversity, inclusion, and equity within our professional society, creating ripples of reflection and resulting in the appointment of the Equity in Process Task Force.

The Membership Committee, led in 2020 by Jing Ba, supported members in these difficult times and established loops to reduce or alleviate fees for those individuals affected in their work status by the pandemic. In addition, they submitted a carefully designed and updated document about emeritus status including a proposal to reduce the number of years of membership to qualify from 30 to 20. These updates and changes involve Bylaws additions, which are laborious and involve many layers of approval. The labor done by the Membership Committee this year was on many fronts a labor of support and love for our Society, and I commend each committee member.

The Board is a vibrant corps of highly active volunteers with different experiences, perspectives, and personalities, all unified in their will to work for the betterment of the Society. I affirm without hesitation that it has been very interesting to advance SEG with them. Who could anticipate 2020 would be a year in which we would have to conduct our first fully virtual Annual Meeting? And not only that, but also hire a new executive director, initiate the

process to establish our headquarters in Houston, and reorganize our staff, with some very painful decisions that were not easy to approve but were aimed to fine tune our efficiency and costs.

I feel proud to belong to an evolving society, as change is difficult but motivates me to give the best I have. Do not hesitate to contact me with your feedback, ideas, and questions. As 2021 unfolds, I am positive and thrilled to see what it will bring. Are you?

Thank you for your trusting support.

### Director at large David E. Lumley



During 2020, I completed my second year as director at large on the SEG Board of Directors; 2021 will be my third and final year on the Board. Prior to this term, I served as first vice president on the 2009–2010 SEG Executive Committee. We created the current Board format of governance at

that time. In my first term, we had to manage the global financial crisis that hit us hard in September 2008. I was hoping that my second term on the Board would be smoother sailing, but in March 2020, we were hit with the global pandemic and economic crisis. Timing, as they say, is everything.

It is my honor to contribute my business and financial experience (earned as a senior project manager in a US\$200 billion corporation and as a founder and CEO of a geophysical technology company) to help stabilize and manage SEG’s finances in order to navigate through both crises. In 2020, while working with then-President Rick Miller, my fellow colleagues on the Board, various task-force members, the Finance Committee, the SEG executive director and senior staff, and others, we managed to avert a major financial disaster by quickly converting the 2020 SEG Annual Meeting to a completely virtual event. Although there were many lessons learned and much room for future improvement, I think everyone involved did an amazing job to pull this off successfully. I am a firm believer in the 80-20 rule, and by this measure, our collective efforts were a huge success. We are never going back to the way things were before. Unfortunately, as part of the financial actions required to survive, SEG had to implement a 15% reduction in payroll, which led to the

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loss of several long-term and loyal SEG staff members who will be sadly missed going forward. We thank them for their service. But, we are by no means out of the rapids — 2021 may be shaping up to be an even more challenging financial year than 2020. With 2021 President Maurice Nessim, we are working hard and fast to reposition SEG with a more stable business model, especially to reduce our financial dependence on the net revenues of a single large Annual Meeting that can be at risk of sudden cancellation at any time.

Many of us see an additional challenge and major threat looming over the Society. SEG is arguably the world's premier nonprofit scientific organization representing applied geophysics. SEG has always drawn the majority of its membership and funding sources from the energy industry, with additional smaller but equally important representation from environmental, mineral, groundwater, and other applied-geophysics sectors. Many of us are concerned that the energy industry is undergoing fundamental structural changes and may have entered an irreversible decline curve. Although the energy industry will always be at the forefront of cutting-edge applied geophysics, the opportunities for future employment and funding may continue to decrease in the sector.

The challenge for SEG will be whether to meet this change by (1) reducing its programs and activities in proportion to declining energy-industry membership, (2) merging with other professional societies to maintain critical mass, or (3) growing its membership by expanding in more diverse areas of applied geophysics such as environment, water, agriculture, climate-change mitigation, etc. It is in this context that I decided to run for the Board to see if I could help pivot SEG in new directions, while simultaneously preserving our core expertise in applied geophysics for natural resources. Learn more about my views on this in the February 2019 and March 2020 issues of *The Leading Edge* and in [episode 75 of Seismic Soundoff](#).

In addition to my strategic objectives as director at large, I also serve as the Board liaison for several SEG entities including the Geoscientists *Without Borders*® (GWB) Committee; the AGU–SEG Collaboration Committee, which I helped found with John Bradford a decade ago; the Distinguished Lecturer Committee; the Honorary Lecturer Committee; the Distinguished Instructor Committee (DISC); the Continuing Education Committee; the EVOLVE exploration training program; and the Emerging Professionals International Committee (EPIC). As you

can see, these entities represent some of the best ongoing and new flagship programs for SEG.

GWB is SEG's highest-profile and most successful outreach program. Started more than a decade ago with major leadership support from Schlumberger and then-President Craig Beasley after the deadly 2004 Indian Ocean earthquake and tsunami, it is focused on humanitarian geophysics. GWB annually funds numerous projects around the world that focus on humanitarian applications of geophysics such as assessing geohazards and helping people find water. The program also donates geophysical equipment to communities and trains community members in equipment use. Cengiz Esmersoy is currently leading a strategic task force to plan the next five-plus years for GWB, and I am working with Esmersoy in an advisory capacity.

The AGU–SEG Collaboration Committee was formed over a decade ago via a formal Memorandum of Understanding between the American Geophysical Union (AGU) (fundamental geophysics) and SEG (applied geophysics) to cooperate more closely. This committee has been very productive and typically hosts a major integrated workshop each year, along with several other

initiatives. The next major AGU–SEG research workshops will be on the topics of near-surface full-waveform inversion (2021) and geophysics in convergent margins (2022). They combine the best in SEG imaging and inversion methods with the best in AGU near-surface critical-zone, plate-tectonics, and earthquake seismology.

The Distinguished Lecturer Committee, chaired by Jerry Schuster, and the DISC Committee, chaired by Adel El-Emam, are two of our brightest flagship programs. Because of their similar but different objectives, I recommended and they agreed to meet regularly to more closely coordinate processes and lessons learned regarding nominations, travel, programs, funding, etc. Both programs have experienced significant decreases in funding provided by the energy sector. These committees are working well to adapt to their new conditions, especially by converting to fully virtual lecturer and instructor tours with larger attendee numbers than ever before. I look forward to helping them develop new delivery methods and funding opportunities.

The Continuing Education Committee, chaired by Malcolm Lansley, continues to provide an essential role to our membership. Geophysicists young and old often state that SEG's professional

educational courses and workshops are among the highest-value benefits of membership. As a university professor, I am aware that there are dramatic changes going on today in the way people want educational courses to be marketed and delivered, and this is no different for SEG members. I look forward to helping with the updating of SEG's educational courses, programs, and online delivery methods.

Mike Forrest enthusiastically chaired the EVOLVE Technical Committee. It would take a full paragraph to expand the EVOLVE acronym. Instead, I can simply say that its main purpose is to provide emerging professionals and students with a hands-on boot camp to learn oil and gas exploration techniques using real seismic, log, core, production, and other data. This program originally started a few years ago and grew with Forrest's vision to improve the practical training of exploration-geophysics students so they could better hit the ground running when hired by oil and gas companies. A new spinoff version, EVOLVE Pro, aspires to replace the in-house training programs that most companies once provided to new hires but no longer can afford to do alone. I am happy to offer advice to Forrest and program leader Allen Bertagne (although they certainly don't need it) on how to turn this new idea into a self-

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funded revenue-generating business, which in turn will help fund the more charitable student-program aspects of EVOLVE.

Last but not least, EPIC, representing SEG's emerging professionals, has been chaired recently by Johannes Douma, Kelsey Kidd, and now Aurelian Roeser. EPIC is doing a great job of attracting and retaining SEG's emerging professionals (those with fewer than 10 years in the applied-geophysics profession). This includes growing a professional network of contacts, programs, and activities customized for SEG's emerging professionals. I have been working closely with EPIC and others to help emerging professionals establish greater presence and opportunities for contribution at the SEG committee and Board levels. Emerging professionals are the future of SEG, and with EPIC's energy, the future looks bright.

### Director at large Kurt J. Marfurt



In 2020, I served as the Board liaison for the SEG Mining Committee. Jean Legault served as chair, Glenn Chubak as vice chair, and Sarah Devriese as technical chair.

The Mining Committee holds a Biannual Mining Summit during the SEG Annual Meeting. Like all previous meetings, the 2020 Annual Meeting was scheduled as an in-person event. However, due to the pandemic and limits on international travel, fewer abstracts were submitted than for previous meetings. Nevertheless, the Mining Committee was able to organize one oral session and one poster section for what turned out to be a fully virtual conference. The Mining Committee also organized two quality workshops, including a joint machine learning workshop with the Gravity and Magnetism Committee and another on the SimPEG geophysical simulation and inversion framework.

Although the keynote speaker, Michael Thorpe from NASA, did not receive a meal for delivering his address on Mars at what was originally scheduled as the Mining Committee luncheon, his presentation was high quality and well received. Committee members were also happy to see many participants who joined the virtual Summit who are not regulars at the in-person meetings. It is unknown whether their previous absence was due to difficulties in travel or to finite budgets, but their presence was most welcome, and the committee would like the opportunity for such virtual participation to continue in the future. Pandemic disappointments included canceling the field trip to NASA's Johnson Space Center and Student Night organized with the Gravity and Magnetism Committee.

In addition to the Biannual Mining Summit, the committee held two other meetings during 2020: one at the Association for Mineral Exploration Roundup Conference in January in Vancouver and the other at the Prospectors and Developers Association of Canada International Convention in March in Toronto.

The committee is discussing moving the Summit from even to odd years, to coincide with non-oil-and-gas-specific centers, such as Denver in 2021 and

New Orleans in 2023 (versus Houston in 2022 and Dallas in 2024), to attract a greater number of mining delegates.

The year 2020 saw several intercommittee initiatives. The Mining Committee, Gravity and Magnetism Committee, and Near-Surface Geophysics Technical Section agreed to welcome members of each other's committee meetings to act as informal liaisons and ensure better communication between each group. In November 2020, members of the groups formed a cooperative intersociety committee on unmanned aerial vehicle/drone geophysical guidelines and standards, with the hope to reach out to other societies to establish best practices for the industry.

In 2021, the Mining Committee will be led by Chubak as chair, Devriese as vice chair, and Jiajia Sun as technical chair.

### Director at large Tad Smith



As I write this, it is December 2020, and the world is a vastly different place than when I joined the SEG Board of Directors a little over a year ago. The coronavirus continues to spread, various forms of lockdowns are occurring, and the oil and gas industry is struggling amid reduced demand and geopolitical headwinds. It is an understatement to say that my first year on the Board has been one of rapid change and a deep lesson in organizational response and flexibility. I have been busy this first year with Board and various committee meetings, but much of my time also has been spent listening and learning as the Board and executive management team grappled with unprecedented challenges and worked tirelessly to ensure the continued success of SEG. We have reorganized, reduced costs, reevaluated our offerings, and tightened up the balance sheet as we prepare for an

## REPORTS OF SEG BOARD MEMBERS

uncertain future. I am impressed with the dedication and commitment of our SEG staff members, the Board of Directors, and volunteers.

As we seek to expand SEG's offerings beyond oil and gas, the SEG Board of Directors is looking to the Near-Surface Technical Section (NSTS) as a potential source of new offerings and growth. As the Board liaison for NSTS, I have been impressed with the members' passion, enthusiasm, and global reach, all of which are reflected in the strong growth of the technical section's membership. NSTS has gone from a low of 186 members in 2013 to an all-time high membership of 935 as of November 2020. NSTS now represents approximately 8% of the SEG membership and certainly will continue to be an engine for future growth. One of my goals as the Board liaison is to make sure they are represented at the Board level and have the support and resources they need to continue growth. I look forward to an even more exciting 2021 with NSTS. If you would like more information on NSTS, I invite you to contact Near Surface Programs Manager Laurie Whitesell. A full report on NSTS activities is in the Annual Report as part of the Committees section.

In October 2020, I assumed responsibility as chair of the Committee on Nominations. This committee is responsible for selecting the future leaders of SEG, so it is something every member of the committee takes very seriously. At the time of this writing, we are currently meeting on a regular basis to find a top-tier slate of candidates for the upcoming 2021 Board elections. I can assure you that we are working diligently to make sure all demographics and voices are heard and represented at the highest levels of SEG. Every person on the committee recognizes that we are a broad and diverse community and that we need leadership that reflects that diversity.

More recently, in December 2020, I assumed the role of Board liaison for the Distinguished Lecturer Committee and the SEAM Board of Directors. I look forward to working with these entities and representing them on the SEG Board of Directors.

As 2020 draws to a close and we plunge headfirst into 2021, I look forward to helping advance the goals and strategies of SEG through my current Board and committee activities. I am humbled and impressed with what can be accomplished by a dedicated staff and army of volunteers, even during times of great challenges.

I am confident that, working together, we can not only continue to serve the oil and gas industry but also can develop new products and offerings that will help SEG keep growing and thriving, even in a world of decreasing demand for fossil fuels. I am optimistic we will weather these storms and come out stronger and more focused as a result. I look forward to hearing from you and discussing possibilities.

### Director at large Kenneth M. Tubman



The third and final year of my term on the Board was extremely eventful and busy. SEG was challenged by a severe downturn in the oil and gas industry. Pandemic restrictions added to the challenges. I participated in a number of task forces and committees that helped SEG navigate through these difficult times. They included the Strategy and Planning Committee, Annual Meeting Task Force, and

Business Continuity Task Force. These were in addition to my regular assignments as chair of the Committee on Nominations, member of the Digital Transformation Task Force, and Board liaison to SEAM, SEG China, and SEG Middle East. Each of these committees and task forces have their own report, so I will not repeat details here.

It has truly been enjoyable and educational to work with some of SEG's regional offices. Seeing the growth in the number and variety of programs, membership, and financial position has given me hope for the future of SEG as a truly global society. It was, in part, seeing the work of these regions that influenced my desire to help achieve improved Board representation for our global membership.

SEAM continued to make good progress, delivering high-quality modeling results for the geophysical community and managing the financial side well.

I was glad to be involved with adjusting SEG to the difficult challenges presented by the oil and gas industry conditions and the global pandemic. Working through decisions on the Annual Meeting and SEG finances presented difficult choices. I was extremely impressed with the work of SEG staff

and fellow Board members to meet the challenges. The quality of the people on the staff and Board makes me comfortable that SEG is in good hands moving forward. It is a strong group that approach problems differently but together can identify options, make decisions, and take action.

I am honored to have been able to serve SEG as a director at large for the past three years. The best part has been working alongside my amazing fellow Board members, SEG staff, and volunteers.

# REPORTS OF COMMITTEES

## REPORTS OF COMMITTEES

### Advisory

Nancy House, chair  
Rick Miller, president

The official mission of the Advisory Committee is:

- Initiate reports and/or recommendations to the Board on any matter deemed appropriate and provide a similar response to matters submitted to it by the Board
- Annually review the progress of the immediately retiring Board and make recommendations to the incoming Board
- Act as an ombudsman for members who are unsatisfied with the actions or decisions of the Board

The Advisory Committee is comprised of the prior five past presidents of SEG. It is generally called upon to lend experience and historical insight to crises that may arise during a presidential term. The beginning of the 2019–2020 presidential term of Rick Miller began like most until early March when the pandemic began to seriously impact global communities. On 13 March 2020, Miller convened the first of a weekly series of Advisory Committee meetings. The goal of the meetings was to brainstorm how to pivot SEG activities in the short

and long term in order to deal with what ended up to be an entire year of drastically curtailed activities and seriously reduced revenue.

The Advisory Committee met weekly from mid-March to late April. It advised on proposals formed by the Business Continuity Task Force to ensure SEG survived the catastrophic revenue decreases associated with the elimination of in-person meetings and workshops. Other task forces were created in response to COVID-19 that helped pivot most SEG meetings and professional-development offerings to be delivered virtually.

With luck, hard work, and the advice and support provided by the Advisory Committee, SEG should persist through the pandemic and beyond. Fortunately, one of the virtual meeting options, Zoom, had been in use by SEG for several years prior to 2020 when it became critical for the long-term survival of the Society. The SEG staff and Board should be congratulated on the rapid and creative response to a global pandemic that profoundly affected the traditional ways of doing business.

### AGU–SEG Collaboration

Chi Zhang, cochair

The AGU-SEG Collaboration Committee (ASCC) was established as part of the SEG-AGU Alliance MOU signed in 2010. In the MOU, ASCC was “charged with considering and making recommendations to the respective organizations regarding areas of cooperation, such as joint workshops or programs and continuing education courses.”

AGU and SEG provide complementary support for geophysical sciences, with SEG focusing on methodology development in applied geophysics and AGU primarily supporting geophysics as applied to broader scientific questions. ASCC identified the following areas of overlap between the two communities: active and passive seismology, gravity and magnetics, electrical and electromagnetic methods, near-surface geophysics, geothermal exploration, and basin analysis.

ASCC meets four times per year, of which two meetings usually are in person at the major annual meetings of each organization.

### COMMITTEE MEMBERS

- Chi Zhang  
University of Kansas  
SEG cochair
- Xavier Comas  
Florida Atlantic University  
AGU cochair
- Steven Wilson  
Seismogenic
- Sarah Kruse  
University of South Florida
- Louise Pellerin  
Green Geophysics
- José Arce  
Arce Geofisicos
- John Bradford  
Colorado School of Mines
- John Louie  
University of Nevada at Las Vegas
- John Lane Jr.  
USGS
- John Goff  
University of Texas at Austin
- James Irving  
University of Lausanne
- George Tsoflias  
University of Kansas
- Frederick Day-Lewis  
USGS
- Esben Auken  
Aarhus University
- Dimitrios Ntarlagiannis  
Rutgers University-Newark
- Anne Becel  
Lamont-Doherty Earth Observatory

- Anja Klatzsche  
Forschungszentrum Jülich
- Andrew Lamb  
University of Arkansas at Fayetteville
- Dale Bird  
Bird Geophysical and University of Houston
- Nathan Bangs  
University of Texas at Austin
- Christopher Sherman  
Lawrence Livermore National Laboratory
- Jonathan Ajo-Franklin  
Lawrence Berkley National Laboratory
- Dylan Mikesell  
Boise State University
- Alex Martinez  
ExxonMobil

SEG support was provided by Staff Liaison Laurie Whitesell and Board Liaison David Lumley. AGU support is provided by Victoria Forlini.

In 2011, SEG and AGU executives approved an MOU that provides a framework for joint meetings and other collaboration to be held by the two organizations. The events to date include:

- 2012 — Hydrogeophysics was held 8–11 July 2012 at Boise State University.

## REPORTS OF COMMITTEES

- 2013 — Cryosphere Geophysics: Understanding a Changing Climate with Subsurface Imaging was held 6–8 January 2013 at Boise State University.
- 2014 — Advances in Active + Passive Full-wavefield Seismic Imaging: From Reservoirs to Plate Tectonics was held 22–24 July 2014 in Vancouver.
- 2015 — Potential Field and Electromagnetic Methods Applied to Basin Studies was held 25–27 August 2015 in Colorado.
- 2016 — Upper Crust Physics of Rocks was held 11–13 July 2016 in Hawaii.
- 2017 — Hydrogeophysics was held 24–27 July 2017 in California.
- 2018 — Induced Seismicity was cancelled prior to initiation of planning due to saturation of the market with respect to the topic.
- 2019 — Airborne Geophysics was held 11–13 June 2019 in Florida.
- 2020 — Advances in Distributed Acoustic Arrays was originally planned for 12–16 July 2020. It was postponed and moved to a virtual format due to the pandemic. It will occur virtually 8–10 February 2021.

- 2021 — Near-surface Imaging with Full-waveform Inversion: Theory and Applications will occur virtually every other Tuesday 21 September through 19 October with a live component 2 November 2021.
- 2022 — Geophysics in Convergent Margins is being planned.

A goal of ASCC is to hold joint sessions at the major annual meeting of each organization. The standing special session on hydrogeophysics at the SEG Annual Meeting has been held since 2012. Kristina Keating served as lead convener since inception until John Lane took over in 2016. At AGU, a joint technical session on exploration geophysics has been held over the last five years. It was pioneered and convened by Darcy McPhee and Louise Pellerin. Recently, Kennedy Doro and Lu Anja Stefan have taken the lead in convening the topic.

This year saw a new project, a joint special section in GEOPHYSICS on hydrogeophysics that will be published in 2021. Both organizations promoted a call for papers. All members of AGU and SEG will get access to the papers. The special-section editors are all members of both societies. The editors for this special section are: Adam Mangel, Andrew Parsekian, Kristina

Keating, James Irving, and Philippe Leroy.

In addition, a survey was developed by the committee on potential collaborative topics that can be used for joint workshops or other joint activities. Numerous individuals who were surveyed were interested in joining the committee. Others requested additional information about the committee prior to indicating whether or not they would like to join.

Work on committee governance has been undertaken this year and will be voted on and finalized soon.

### Annual Meeting Steering Wafik Beydoun, chair

SEG celebrated its 90<sup>th</sup> year with a revolutionary change in the format of its Annual Meeting. This year, our long history of innovation and industry leadership moved into new territory with the first all-virtual SEG Annual Meeting and International Exhibition.

#### THE MAKING OF SEG20

The Annual Meeting theme for 2020, “Shifting Gears in the Digital Speedway,” could not have better captured the transformational process that all stakeholders experienced due to the pandemic. Six months before the event, the committee was asked by SEG leadership to transition the Annual Meeting from an in-person event to a hybrid in-person/online event. Then, three months before the event, the decision was made to convert the hybrid event into a 100% virtual experience. We had to rethink and redesign the program from top to bottom. We had to imagine, for example, what a technical session, a panel, and an exhibition would look like in a virtual world. The change also necessitated the evaluation, selection, and testing of a digital event platform and coordination with production providers.

Sixty days prior to the Annual Meeting, things started to accelerate. The committee began meeting weekly instead of monthly. We reviewed the progress of all the planning components of the digital Annual Meeting on a dashboard (Figure 1) monitored by Liza Yellott, a contractor hired to be the SEG20 digital project coordinator.

SEG20 would ultimately look like no other Annual Meeting. The core of the program, of course, was maintained. A strong technical program, Business of Applied Geophysics sessions, and postconvention workshops attracted geoscience professionals from all over the globe to discuss the latest topics in geophysics, such as artificial intelligence; machine learning; seismic data acquisition; processing; inversion; interpretation; carbon capture, utilization, storage; and more.

We also added new events to the program to experiment with broadening SEG’s footprint. The new events covered areas such as the geophysics workforce of the future, sustainability issues, unconventional resources technology, and planetary geophysics. Should such initiatives be pursued for future Annual Meetings, it is important to dedicate a targeted marketing campaign to ensure we are reaching out to a new audience, as

## REPORTS OF COMMITTEES

many may be unaware that SEG is venturing into these areas.

Shifting the in-person exhibition hall (and exhibitors) into a virtual environment was, in my opinion, the biggest challenge. Although SEG20 provided a digital platform to exhibitors, the virtual exhibition has gaps to be analyzed to bring it on par with an in-person experience. A better experience with a virtual-reality feel could have been produced with more time and resources.

Among the new, purely digital, features of the program were:

- the ability to revisit all SEG20 content on-demand up to one month after the meeting (through 13 November 2020), which allowed more time to absorb content and discussion
- chat rooms, in which technical program speakers participated in Q&A during and immediately following their presentations
- topical group chat rooms to facilitate ongoing discussions occurring outside of presentation times (available until 13 November 2020)

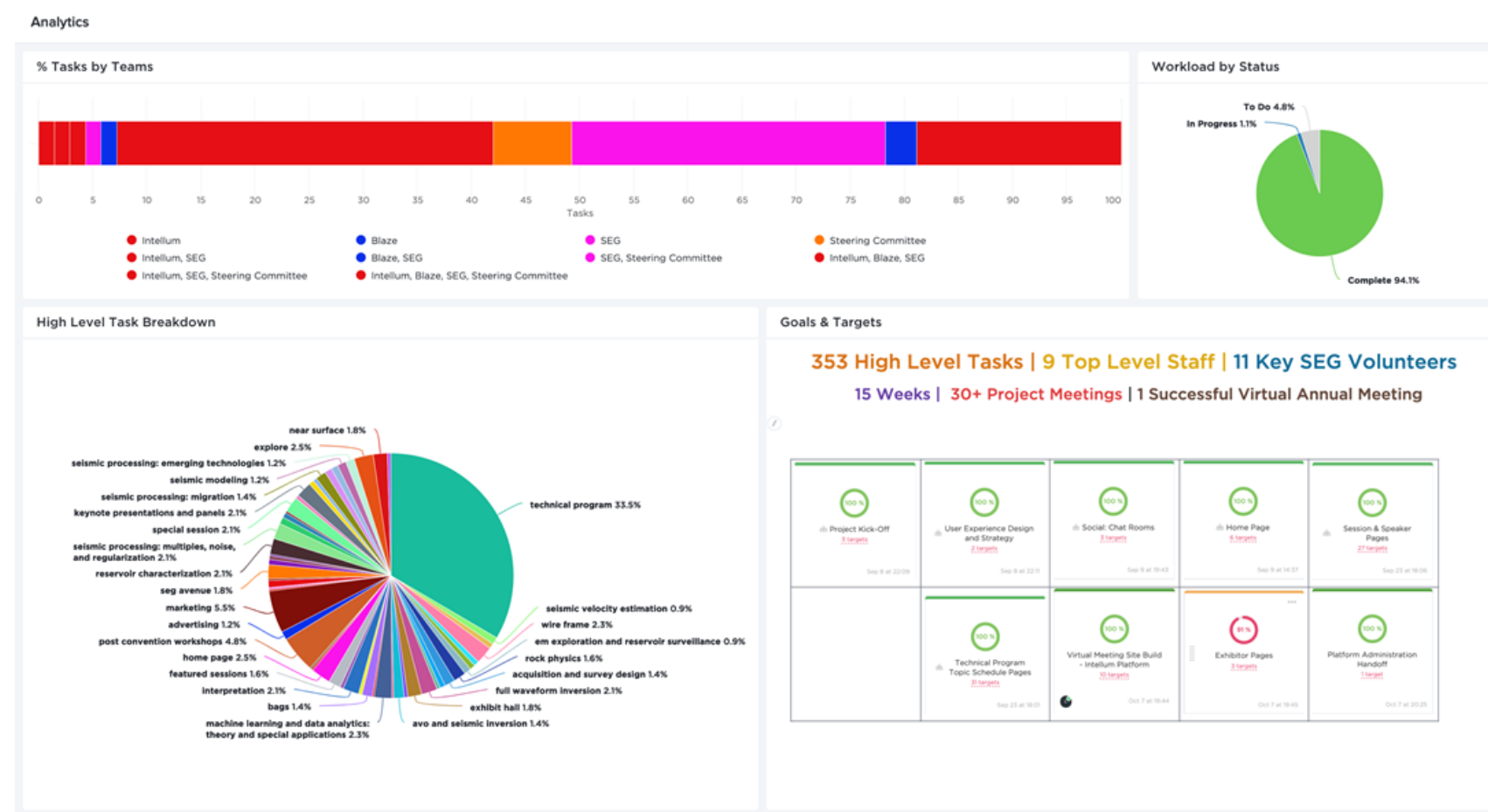


Figure 1. The Annual Meeting planning dashboard.

**Table 2.**  
Preliminary 2020 Annual Meeting metrics.

Topic	Stat	Information
Attendees	3948	
Attendee job titles	%	Top three: exploration geophysicist: 42%, research and development: 24%, student: 15%
Countries	71	Top 10: United States, United Kingdom, China, Saudi Arabia, Canada, France, Norway, Brazil, the Netherlands, and Japan
Exhibitors	82	Including all service majors
Sponsors	9	Aramco, BHP, Chevron, ConocoPhillips, DUG, OXY, Schlumberger, Shell, and Total
Abstracts	764	115 technical sessions (50 oral and 65 poster); average attendance per session: 345
<a href="#">Postconvention workshops</a>	20	Average attendance per workshop: 295
Regional focus	1	Africa keynote: Michael Nii Aryeetey, Ghana National Petroleum Corporation
Lunch keynote presentations	3	Africa, mining, and gravity and magnetics
<a href="#">Business of Applied Geophysics sessions</a>	4	"Value of near surface," "The business climate of O&G service sector," "Geophysics business for CCS," and "Geophysical business climate in Africa"
<a href="#">Applied Science Education program speakers</a>	2	"Life seasons and storms: Being a meteorologist and forecasting in Houston," by Erika Lopez "Path to becoming a geophysicist" by Johannes Douma
<a href="#">SEG 90<sup>th</sup> opening keynote address</a>	New	1 "SEG @90 +/- 100" by Michael Oristaglio, Yale University
Opening keynote industry panels	New	1 <a href="#">"Geophysicists of the future: An industry and government perspective."</a> with four panelists
	New	1 <a href="#">"Geophysicists of the future: An academic perspective."</a> with five panelists
<a href="#">Sustainability panel</a>	New	1 "Mobilizing the geosciences on today's sustainability challenges," with five panelists
<a href="#">Best of URTeC special session</a>	New	1 Eight award-winning papers from the 2019 URTeC Conference
<a href="#">Planetary Geophysics panel</a>	New	1 "Geophysically explore the Solar System beyond the Earth," with five panelists



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- a “Race to the Top” component that allowed attendees to earn points and win prizes
- the entertainment zone where attendees could enjoy performances by the Royal Dukes Band from Houston, Texas

### SEG20 METRICS (PRELIMINARY/HIGH LEVEL)

Overall, SEG20 was a success in the sense that this fully virtual prototype meeting was conducted without any major glitches, and we have received valuable feedback from various stakeholders that should be

capitalized upon. Table 2 summarizes the preliminary SEG20 postevent metrics that SEG staff have compiled. These are intended to serve as a baseline for future digital Annual Meetings. There are tangible lessons to be learned from SEG20, including the granular survey feedback from attendees, assessments from exhibitors and sponsors, and, finally, observations of the Annual Meeting Steering Committee (all of which are pending). If the exercise is done appropriately, it will provide future Annual Meeting Steering Committee members with information that can be used to effectively and efficiently build better experiences for

attendees, speakers, sponsors, and exhibitors.

### SEG20 STEERING COMMITTEE

Finally, I would like to thank each and every member of the 2020 Annual Meeting Steering Committee (Figure 2). They performed with high professionalism and dedication, despite the turbulent context. I am grateful for having worked with them as the general chair of SEG20. This experience has taught me to look at the word “compromise” in a more positive way. It is better for all to bend a little, searching for a robust and collective solution, than to break.

implement the technical program along with other numerous components of a traditional Annual Meeting. While there were many challenges along the way, introducing a virtual component in response to the unprecedented environment elevated the program’s content, resulted in numerous improvements to the process, and offered many new benefits to SEG members. The total number of attendees was 3948, of which 536 were students. Attendees logged in from a wide range of locations. The top 10 countries included the United States, United Kingdom, China, Saudi Arabia, Canada, France, Norway, Brazil, Netherlands, and Japan.

The professional committee consisted of key contacts for 26 general sessions and nine special sessions, more than 500 volunteer reviewers, organizers for 20 postconvention workshops (led by Sergio Chávez-Pérez), Board Liaison Rob Stewart, 230 session chairs, and Staff Liaison Jenny Cole. All worked tirelessly to bring the program together.

General Session topics included:

- “Acquisition and survey design” led by Mike Yates
- “Anisotropy” led by Heloise Lynn
- “AVO and seismic inversion” led by Norbert van de Coevering
- “Borehole geophysics” led by Tom Bratton
- “Distributed acoustic sensing” led by Brian Fuller
- “EM exploration and reservoir surveillance” led by Kris MacLennan
- “Full-waveform inversion” led by Yi Shen
- “Gravity and magnetics” led by Chuck Campbell
- “Induced seismicity” led by Jeff Nunn

This was the second year of a new tradition. The previous year’s technical cochair became the technical chair to enable better continuity. We believe this practice was beneficial to the efficiency that was needed in such a challenging year. We recommend that this practice continues.

High-quality technical content is at the core of SEG and signifies the strength of SEG’s reputation in the industry. It starts with authors who graciously share their message with SEG members. This year, we received 1238 qualified papers, which were reviewed by our highly competent professional committee.

### Annual Meeting Technical Program

Olga Nedorub, chair  
Bryce Swinford, cochair

The SEG 2020 Annual Meeting was the first in SEG’s 90-year history that was successfully held entirely in a virtual format due to the pandemic restrictions that affected everyone across the globe. The meeting was supposed to be held in Houston, Texas, 11–16 October. SEG volunteers and staff did a tremendous amount of work between March and October 2020 to generate the entirely new set of procedures and effectively



**Figure 2.** Many volunteers and staff were involved in the successful execution of the 2020 Annual Meeting.

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- “Interpretation” led by Evgeny Chesnokov and Bo Zhang
- “Machine learning and data analytics: Theory and special applications” led by Sudipta Sarkar
- “Mining” led by Sarah Devriese
- “Multicomponent seismic” led by Chip Story
- “Multiphysics data integration” led by Aria Abubakar
- “Near surface” led by Chester Weiss
- “Passive seismic” led by Mirko van der Baan
- “Reservoir characterization” led by Laurie Weston Bellman
- “Rock physics” led by Ronny Hofmann
- “Seismic modeling” led by Anusha Sekar
- “Seismic processing: Multiples, noise, and regularization” led by Ramesh Neelamani
- “Seismic processing: Migration” led by Bin Wang

- “Seismic processing: Emerging technologies” led by Mike Varner
- “Seismic theory” led by Gokay Bozkurt
- “Seismic velocity estimation” led by Ettore Biondi
- “Time lapse” led by Kurang Mehta
- “Vertical seismic profile” led by YingPing Li

A total of 764 abstracts formed 50 oral sessions and 65 poster sessions (115 total). The average rejection rate this year was 34% but was over 50% for a number of hot topics, such as full-waveform inversion, machine learning, and data analytics. Average technical session attendee enrollment was 345. The total number of abstracts presented was 696 due to 68 total withdrawals for various reasons. Out of 696, 36 authors were not available for question and answer, but prerecorded presentations were made available to attendees.

The Technical Program Committee's goal was a highly technical, quality program, with fewer parallel sessions. We thank all reviewers for their hard work and the difficult decisions that had to be made during the short abstract review period. We also thank authors of all papers for understanding

the difficulty of the process. We built a diverse program that included all aspects of geophysical research and demonstrated applicability of geophysics to a wide range of earth-science challenges.

This was the third year that we used the ScholarOne abstract-management system. The system continues to work well, and Jenny Cole deserves special acknowledgment for maintaining and running the system.

One of the main focus points for 2020 was experimenting with new initiatives to beacon the future of our profession. Along with the traditional Recent Advances and the Road Ahead and Special Global sessions (this year's focus was on Africa), we invited new topics to promote multiple disciplines that utilize geophysics, focus on sustainability, and collaborate with cross-disciplinary stakeholders. This year, SEG also reached out to the leader in planetary geoscience, NASA, to showcase cutting-edge technology and applications to exploration of the Solar System.

Special Session topics included:

- “Geophysical exploration onshore and offshore Africa: Challenges and opportunities” led by Elive Menyoli

- “Geophysical exploration of the Solar System by NASA” led by Nick Schmerr
- “Geophysics in medicine” led by Julie Aitken
- “Geoscientists *Without* Borders and humanitarian geophysics” led by Ted Asch
- “Geothermal exploration” led by Laurie Whitesell
- “Machine learning in the near surface” led by Chester Weiss
- “Recent advances and the road ahead” led by Kurt Strack
- “SEG/AGU hydrogeophysics” led by Niels Grobbe
- “Urban geophysics” led by Catherine Truffert

Probably the best format to showcase new research and debate not-yet-widely-accepted ideas is during the postconvention workshops that were proposed and organized this year by members of the Research Committee, Development and Production Committee, Near-Surface Geophysics Technical Section, and Mining Committee jointly with the Gravity and Magnetics Committee. A

total of 20 (out of 23 originally planned) workshops were carried out, with a high average number of attendees (295).

Postconvention workshop topics included:

- “4D under complex overburden: Are we there yet?”
- “Anisotropic imaging velocity modeling — Preserving accurate structure and multiazimuth signal at the target — Current state and remaining challenges”
- “Applied geophysics addressing top challenges facing humanity”
- “CO<sub>2</sub> geophysical monitoring: Achievements, challenges, and the road ahead”
- “DAS: Advances in fiber-optic sensing over the last decade”
- “Full-wavefield imaging”
- “Geophysical solutions for oilfield engineering applications”
- “Low-frequency FWI: How low do we need to go?”
- “Machine learning/artificial intelligence in mineral exploration”

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- “Promises and challenges with sparse node ultra-long offset OBN acquisition in imaging and earth model building”
- “What are the latest in machine learning and data analytics for geoscience applications?”
- “Advancement in land seismic processing technologies”
- “Booking P1-3 oil and gas reserves using geophysical data”
- “Least-squares migration in complex overburden”
- “Machine learning blind-test challenge”
- “Microseismic monitoring: Proven versus nonproven”
- “Next-generation geoscience using machine learning”
- “Professor Azra Tutuncu’s Workshop — Integrated geophysical and geomechanical evaluation of induced seismicity”
- “SimPEG for mineral explorationists”
- “Values in elastic imaging and elastic full-waveform inversion”

Based on feedback from our key contacts, members of our committees, reviewers, and authors, improvements were implemented every step of the way. We thank everyone for the comments and support. Some of the key improvements included:

- A new tool was created to reach out to the geoscience community and recruit reviewers. We saw great response and involvement from all subdisciplines, which is crucial for providing knowledgeable evaluation of abstracts.
- Improvements were made in communications with all of the committee members.
- Improvements to the Policies and Procedures were made regarding plagiarism guidelines, formatting, and no-show policy.
- We introduced extended (50-minute) sessions.
- Improvements were made to review categories for abstracts and best paper awards.
- We updated the license agreement, speaker kit, and question-and-answer sessions.
- We introduced the virtual component to the technical program.

The virtual program could not have been possible without partners and software providers who are experts in

the digital meeting arena. Intellum was our virtual platform provider. Freeman’s Orchestrate platform was used to upload and review recordings. Blaze was our production company. We thank these companies for their support and outstanding service that enabled SEG to implement the technical program with a variety of options to improve navigation and engagement.

To reflect on the 2020 Annual Meeting, it is important to list both positive feedback and suggestions for future improvement

Key areas for improvement:

- A shorter submission timeline resulted in stress for many authors.
- Time-zone differences posed challenges.
- Some presentations were withdrawn due to data sensitivity.
- There was a lack of in-person networking.

What worked well:

- Participants could log in from their homes and avoid expensive travel and accommodation and possible exposure to COVID-19.

- The registration rates were discounted.
- Presentation quality was high due to prerecording.
- There were various ways to interact, including chat rooms for technical presentations and Zoom for postconvention workshops. This enabled more engagement, although some improvements were recommended.
- Extended access to the Annual Meeting content (until 13 November) enabled attendees to watch presentations that they may have missed.

The SEG20 theme was “Shifting Gears in the Digital Speedway.” It was a truly remarkable year that showed that significant changes are possible, inevitable, and, best of all, beneficial to the future of the geoscience community. We recommend that a virtual component is considered for future meetings.

### Audit Bob Brook, chair

The Audit Committee is a standing committee of the Board of Directors. Its primary function is to assist the Board

in fulfilling its oversight responsibilities, specifically in the Society’s finance and accounting procedures. The committee is tasked with reviewing the independence and performance of the Society’s auditors.

The committee is made up of three nonexecutive SEG Board members. In 2019–2020, the committee members were Maria Angela Capello, Dan Ebrom, and myself. This was my second and final year as chair of the committee. The incoming chair is Capello.

In January 2020, I met with the audit firm HoganTaylor LLP and our CFO to discuss their process and expectations for the 2019 audit. This was their second year as our auditors, so there was an established relationship with the SEG staff. This proved to be valuable when the onset of the pandemic forced the audit work to be executed off-site.

I am pleased to say the staff did an excellent job of managing these challenges. The Audit Committee interviewed the independent auditors and thoroughly reviewed the 2019 financials in May 2020. The financial reporting of the sale of the Tulsa real estate was a particular focus. The 2019 audited financials were approved by the Board of Directors in June 2020.

## REPORTS OF COMMITTEES

The sale of the real estate in 2019 left SEG with no debt and a strong balance sheet entering 2020. This proved to be a blessing, given the challenges that we faced as a result of the pandemic. Considerable effort went in to managing the budget during the year. The financials in this Annual Report have been reviewed by the upcoming Audit Committee.

### Books Editorial Board

Lianjie Huang, chair

The SEG Books program is a crucial part of the Society's goal of being the go-to source for quality information on applied geophysics. This year, Philip Armstrong, Ed Biegert, William Harbert, Umair bin Waheed, and Yingcai Zheng joined Ian Jones, Wei Liu, Liam O'Suilleabhain, and Tijmen Jan Moser as members of the Board. Board members solicit and consider proposals and manuscripts from authors and editors and serve as managing editors for accepted proposals.

The following books were published in calendar year 2020:

- *Anisotropy and Microseismics: Theory and Practice* by Vladimir Grechka

- *Basic Wave Analysis* by Enders Robinson and Tijmen Jan Moser
- *Blizzards and Broken Grouzers: A Year of Antarctic Glaciology* by Les Denham
- *Survey Design and Seismic Acquisition for Land, Marine, and In-between in Light of New Technology and Techniques* by Dave Monk
- *Simultaneous Source Seismic Acquisition* by Ray Abma and Mark Foster
- *Illustrated Seismic Processing, Volume 2: Preimaging* by Steve Hill and Andreas Rüger

In 2021, SEG will be publishing books on seismic attributes and computer-assisted interpretation, machine learning, near-surface geophysics, and forensic data processing. The books SEG publishes are essential resources for students, researchers, and practitioners.

### Bylaws

Joseph Reilly, chair

During 2020, the Bylaws Committee received one request from the Board regarding an application for a new

Associated Society. An opinion was generated that there were several significant concerns regarding the submission. Legal opinion was strongly encouraged prior to proceeding. For 2021, Joseph Reilly is stepping down as chair. He will be replaced by Edith Miller who has served on the committee for several years.

### Community Content

Karl Schleicher, chair

In 2020, the Wiki Committee was renamed the Community Content Committee to reflect the committee's expanded oversight responsibility to include other SEG member-generated content, including the Seismic Soundoff podcast, envisioned SEG blogs, and social-media activities. Most committee work continues to center around the wiki.

The Geophysical Society of Houston's Geoscience Center added many historical documents to the SEG Wiki. The documents include images of old instruments, selected company newsletters, and multimedia files (video and audio). Published items are searchable and linked by multiple categories, including location, donor, manufacturer, and description. They highlight the history and future of applied geophysics to the public. Les Denham,

Bill Gafford, Ed Lengel, Andrew Geary, and Karl Schleicher made most of the Geoscience Center contributions.

Translations of Robert Sheriff's *Encyclopedic Dictionary of Applied Geophysics* and other works were among active SEG Wiki-related activities as well. Please see the Translations Committee report for further details about the translations.

There have been more than 160,000 edits to the wiki since it was launched in 2012. In 2020, the wiki drew 1,353,176 page views — an increase of nearly 20% compared with total page views in 2019.

Andrew Geary, instrumental in coordinating volunteer engagement and technical support for the wiki since 2014, left SEG's staff in August 2020 yet continues to produce three episodes of the Seismic Soundoff podcast each month. SEG members and other listeners are invited to submit suggestions for future podcast episodes.

Susan Stamm, SEG's books manager, has taken on staff support for the wiki and is working closely with the translations teams.

A champion and a group of dedicated volunteers will be needed to get a

blog off the ground. That had not occurred by the end of my term. Those interested in working on a blog are invited to contact Stamm.

### Compensation

Rick Miller, SEG president

The Compensation Committee is tasked with reviewing the performance of the executive director and recommending salary adjustments based on that review. The committee also reviews the executive director's goals for the coming year.

The committee met several times during 2020 and completed the tasks as defined in the SEG Bylaws and Policies and Procedures.

## REPORTS OF COMMITTEES

### Continuing Education

Malcolm Lansley, chair

The Continuing Education (CE) Committee provides a curriculum of quality professional courses to the exploration-geophysics community. To ensure that the current and emerging needs and standards of the community are met, the committee is dedicated to developing a high-value, needs-based curriculum while adopting delivery approaches consistent with best practices.

#### CE EVENTS

Due to pandemic restrictions, all 2020 face-to-face public courses were canceled. In response, the committee and the SEG business office quickly retooled and successfully sponsored nine virtual events (Table 3) and added six video recordings to SEG on Demand.

The following 2020 goals were achieved:

- Contacted instructors concerning asynchronous virtual versus live in-person courses. A January 2020 survey reflected strong support and willingness to convert from face-to-face to virtual platforms.

- Acquired data on needs-based training and preferred delivery platforms using polls and surveys.
- Introduced a new workflow-based course, “Interpretation workflows for a solid seismic interpretation,” by Rainer Tonn.
- Decreased the course review cycle from five to three years to improve the relevancy of content. A subcommittee continues to review and make recommendations on the course catalog.
- Reduced course reviewer costs and improved flexibility via the use of Zoom and other video-communication applications. Courses in 2020 were all presented via Zoom.

Expanded the promotion and visibility of the Competency Management System (CMS) and International Human Resources Development Corporation (IHRDC) revenue-share courses. Monthly advertisements, e-mail blasts, social media, Doodlebugger updates, and *The Leading Edge* spots were utilized when available.

- Offered four soft-skills courses. Two were on writing, and two were on business.

### NEW COURSES IN 2020

The following courses were added to the course catalog.

- “Passive surface wave methods using ambient noise: From basic 1D soundings to high-resolution 3D imaging” by Koichi Hayashi
- “The new seismic interpretation: Integrating relative geologic time, structural geology, and 3D seismic for more effective stratigraphic exploration and development” by Steve Tobias
- “Deep learning with application to seismic data” by Vladimir Kazei and Xiangliang Zhang
- “Practical machine learning methods in the geosciences” by Jerry Schuster
- “Interpretation workflows for a solid seismic interpretation” by Rainer Tonn
- “Practical applications of time-lapse seismic data” by David Johnston
- “Synthetic seismograms — Construction and use” by Dhananjay Kumar

- “How engineers make money using geophysics” by John Duhault
- “The geology of unconventional reservoirs” by Bruce Hart
- “Understanding signals: Basic waveform analysis from a geophysical perspective” by Michael Burianyk

### SEG ANNUAL MEETING 2020

In June, the CE Committee convened to identify virtual courses in support of the SEG Annual Meeting. Nine courses were initially offered, and four met registration thresholds. For the first time, recorded options were made available to participants preferring not to attend the live virtual presentations.

### SEG ON DEMAND

Five Honorary Lecture and Distinguished Lecture recordings were added to SEG on Demand. A total of 50 Flash-supported lectures were converted to MP4 format. Siddharth Misra’s popular course “Intro to machine learning techniques for engineering and characterization” was added in June. In addition, four courses were captured during live presentations.

### IACET REACCREDITATION

In August, SEG successfully hosted a five-year International Association for Continuing Education/Training (IACET) reaccreditation visit, retaining its Approved Provider of Continuing Education Units (CEUs) status.

**Table 3.**  
CE courses held in 2020.

Event	Dates	Number of courses	Number of participants
Asia and Pacific courses	June–August	3	41
Summer URTeC	18–19 July	2	22
Annual Meeting	September–October	4	33
<b>Total</b>		<b>9</b>	<b>96</b>

## REPORTS OF COMMITTEES

IACET's ANSI/IACET Standard supports best practices and provides a framework for continuous improvement. More than 60% of those attending SEG CE events continue to find value in the award of CEU credits.

### COMPETENCY MANAGEMENT SYSTEM

Through partnership with IHRDC, CMS is provided free of charge to SEG members. CMS enables members to assess their current capabilities against specific competency models for key geoscience careers. The software is designed to easily identify competency gaps based on assessment results. It then recommends a learning plan that helps close those gaps.

Members are referred to an ever-growing list of SEG training resources including SEG CE courses, e-learning

courses, generic third-party course titles, SEG technical papers, books, and on-job work assignments. Per the user progress data report in Table 4, we are seeing an increase in the usage of this resource.

### Development and Production Andrew Royle, chair

The Development and Production Committee continued to promote discussion and interaction on the latest technologies to improve reservoir characterization, primarily through involvement in workshops during SEG Annual Meetings.

The 2019 Annual Meeting included a workshop titled, "Interpretation and derisking to support decision making in development and production," which

was well attended and spurred good technical discussion.

At the 2020 Annual Meeting, the committee collaborated with the Oil and Gas Reserves Committee to cohost a workshop titled, "Booking P1-3 oil and gas reserves using geophysical data," which involved six speakers.

The committee also acted as host for the "4D under complex overburden: Are we there yet?" workshop at the 2020 Annual Meeting. This workshop included eight presentations from industry and academia.

### Distinguished Instructor Short Course

Adel El-Emam, chair

It has been a challenging year for the entire world. The Distinguished Instructor Short Course (DISC) Committee struggled with how to achieve the planned program, deal with changes, and provide useful services to the geophysical community.

The 2020 DISC instructor was Dave Monk. His course was titled, "Survey design and seismic acquisition for land, marine, and in-between in light of new technology and techniques." Due to the pandemic, all of the tour dates had to be canceled or postponed.

As the pandemic progressed, it was decided to hold a virtual version of the course 15 and 16 October 2020. There were a total of 59 attendees, and each received a copy of the book before the course began. SEG's Melissa Presson facilitated the course, and there was excellent enthusiasm and engagement from the attendees.

In 2021, we hope to host more virtual DISC events. We also plan to have Monk present his course in a few locations. Joe Dellinger will serve as the 2021 DISC instructor. His course is titled "Forensic data processing." He will begin his tour following the Annual Meeting.

During a virtual committee meeting, Mark Willis was selected as the 2022 DISC instructor. The committee believes that his course "Distributed acoustic sensing for seismic measurements — What geophysicists and engineers need to know" is relevant to today's developments in seismic acquisition and processing technologies.

The committee also introduced a new position: the DISC cochair. Adriana Ramirez was nominated for the position and was unanimously supported by the committee members. I am confident that Ramirez will bring new ideas and ensure continual improvements and success

for the program. In addition, the committee decided that term years will begin and end with the SEG Annual Meetings.

I want to thank the committee members for their great contribution, SEG staff for their endless support, and the instructors for their professional work and tireless efforts to ensure the successful continuation of the DISC program.

### Distinguished Lecturer

Gerard T. Schuster, chair

The SEG Lecture program, including the Distinguished Lecture (DL), Honorary Lecture (HL), and Virtual Near-Surface Global Lecture, is considered to be one of the most effective outreach programs of SEG. This is evidenced by the reported 13,105 virtual registrants and 8094 unique attendees for the 2020 tours (Table 5).

The Q1 and Q2 tours of Lisa Gavin, Johan Robertsson, and Sergey Fomel were interrupted by the pandemic, and the rest of the 2020 tours were strictly virtual. Attendance of a DL/HL talk is the only opportunity for many young people to directly interact with distinguished SEG speakers. We

**Table 4.**  
Usage of the CMS.

	Total accounts created	In progress	Assessments completed
2016	172	114	49
2017	312	216	73
2018	440	195	83
2019	528	234	105
2020	587	265	108

## REPORTS OF COMMITTEES

applaud SEG for continued support of the outstanding program.

### 2020 DISTINGUISHED LECTURERS

- Sergey Fomel, Q1/Q2 SEG DL, 21 live lectures and two virtual lectures, 2313 unique attendees

Title: “Automating seismic data analysis and interpretation”

Countries reached: 61

Quote: “The presentation was cutting edge and accessible. We highly recommend it.”

- Aria Abubakar, Q3/Q4 SEG-AAPG DL, two virtual lectures, 873 unique attendees

Title: “Potential and challenges of applying artificial intelligence and machine learning methods for geoscience”

Countries reached: 55

Quote: “It was a useful talk about a topic of high importance to geoscientists right now.”

### 2020 HONORARY LECTURERS

- Pacific South Q1/Q2: Lisa Gavin, seven live lectures and two virtual lectures, 258 unique attendees

Title: “Regional to reservoir stress-induced seismic azimuthal anisotropy”

Countries reached: 16

Quote: “Very good, informative, balanced, and well-structured lecture. Provided education to those not familiar with the topic and depth and ideas to those who are.”

- Europe Q1/Q2: Johan Robertsson, eight live lectures and three virtual lectures, 881 unique attendees

Title: “Generalized sampling and gradiometry: Changing the rules of the information game”

Countries reached: 52

Quote: “The content was a hugely entertaining mix: exciting (and amazingly up-to-the-moment) science along with the oft-overlooked, but very important, history of known and little-known pioneering individuals who laid foundations for us.”

**Table 5.**

Statistics from the 2020 lecture tours.

Lecturer	Region	Virtual registrations	Live attendance	Virtual attendance	Total attendance
Sergey Fomel	Q1/Q2 DL	2037	1300	1013	2313
Lisa Gavin	Pacific South HL	326	115	143	258
Johan Robertsson	Europe HL	1098	304	577	881
Xinming Wu	South and East Asia HL	4562	0	2475	2475
Estella Atekwana	Near-Surface Global	1049	0	417	417
Aria Abubakar	Q3/Q4 DL	1813	0	873	873
Patricia de Lugão	Latin America HL	748	0	356	356
Saleh Al-Dossary	Middle East and Africa HL	631	0	169	169
Anna Shaughnessy	North America HL	841	0	352	352
		<b>13105</b>	<b>1719</b>	<b>6375</b>	<b>8094</b>

- South and East Asia Q1/Q2: Xinming Wu, five virtual lectures, 2475 unique attendees

Title: “Deep learning for seismic processing and interpretation”

Countries reached: 69

Quote: “Fantastic view of how machine learning can be applied to practical interpretation problems. Xinming has advanced the science tremendously in a short period of time.”

- Latin America Q3/Q4: Patricia de Lugão, two virtual lectures and one postlecture workshop, 356 unique attendees

Title: “Environment-friendly exploration using magnetotellurics”

Countries reached: 52

Quote: “Truly interesting talk! A must for students and practitioners!”

- North America Q3/Q4: Anna Shaughnessy, two virtual lectures, 352 unique attendees

Title: “Developing a successful career in geophysics today”

## REPORTS OF COMMITTEES

Countries reached: 54

Quote: “I wish I had the opportunity to hear something like this when I was starting my journey in geophysics.”

- Middle East and Africa Q3/Q4: Saleh Al-Dossary, two virtual lectures, 169 unique attendees

Title: “Improving reservoir characterization using four innovative seismic technologies”

Countries reached: 43

Quote: “Very good lecture! It was clear and easy to understand.”

### 2020 VIRTUAL NEAR-SURFACE GLOBAL LECTURER

- Estella A. Atekwana, two virtual lectures, 417 unique attendees

Title: “Biogeophysics: Exploring earth’s subsurface biosphere using geophysical approaches”

Countries reached: 61

Quote: “A great presentation at the forefront of our scientific knowledge.”

### 2021 DISTINGUISHED, NEAR-SURFACE, AND HONORARY LECTURERS

- Q1/Q2 DL: Lucy MacGregor
- HL Pacific South: Xiaogui Miao
- HL Europe: Adriana Citlali Ramirez
- HL South and East Asia: Nimisha Vedanti
- Q3/Q4 DL: Ali Tura
- HL Latin America: Miguel Bosch
- HL Middle East and Africa: Jack Dvorkin
- HL North America: Mark Zoback
- Near Surface: John Bradford

In 2020, some DL Committee members expressed concern about the reduced effectiveness of virtual HL tours and recommended efforts to restore funding to ensure that all HL tours are live traveling tours. However, attendance at the virtual talks exceeded the attendance at many of the live tours in the past. For example, the total number of attendees for the tours in 2020 was 8094, compared to 5359 in 2019, 7281 in 2018, 9692 in 2017, and 8635 in 2016. Moreover, the DL Committee provided breakout sessions at the end of several virtual lectures so small groups of interested professionals and students could talk with the speaker. These sessions lasted for more than an hour and were well received. During many of the live virtual talks, an expert monitor

was online to answer real-time questions from the audience. This was particularly effective in clarifying undefined terms or unclear concepts so the audience members could keep up with the talk.

The virtual Zoom lectures have many benefits. The following have been accomplished to enhance the virtual experience:

- A teaching assistant is assigned to answer real-time questions during the presentation. In addition, a DL Committee member hosts each talk and is on the discussion panel in order to transmit questions from the audience to the speaker.
- A subcommittee was formed, chaired by Manika Prasad, in order to enhance the Zoom breakout sessions that follow each talk.
- A document on best practices was created for distribution to each HL/DL speaker. The document offers guidelines for optimizing a presentation, including an opportunity for a practice session in front of the committee.
- The online format provides educational opportunities beyond the main talk that have been implemented. For example, John

Ceron organized a workshop on electromagnetic methods after Lugão’s talk.

The DL Committee now performs online voting for candidates using SurveyMonkey. SEG members are welcome to submit nominations for DLs and HLs, as well as the Virtual Near-Surface Global Lecturers at any time. To submit a nomination, visit <https://seg.org/education/lectures/nominate-a-lecturer>.

To view SEG lectures online, visit <https://seg.org/education/seg-on-demand>. Encourage your friends, colleagues, and students to explore this valuable resource.

### Emerging Professionals International

Aurelian Roeser, chair  
Kelsey Kidd, past chair

The 2019–2020 time period was the sixth year for the SEG Emerging Professionals International Committee (EPIC). EPIC is dedicated to positively increasing SEG’s professional, technical, and social impact on the lives of early-career geophysicists around the world. An “emerging professional” is defined as someone who has worked in the industry for eight years or less and may be gaining

seniority and increasing responsibility. The main goals of the committee for 2020 were outreach and networking in the SEG community.

We have continued our endeavor to establish an emerging professional development chair position in local geophysical chapters and associated societies. The goals of the position are to improve communication with SEG and to coordinate local events that contribute to the technical and leadership development of emerging professionals in the corresponding region.

The committee has strengthened its collaboration with and involvement in various bodies of SEG governance. Members of EPIC also serve as volunteers on the Committee on University and Student Programs; Health, Safety, Security, and Environment Committee; Membership Committee; Research Committee; Reviews Committee; and Travel Grants Committee. In addition, long-time EPIC member Brandy Hawkins has been elected to serve as director at large on the SEG Board of Directors.

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### EVOLVE

Jenny Thompson,  
2020–2021 chair  
Michael C. Forrest,  
2019–2020 chair

SEG EVOLVE offers students direct experience in conducting integrated subsurface analyses using real-world seismic, wireline, production, and other data. The teams use a range of software platforms including the iEnergy Halliburton Landmark DecisionSpace Cloud platform or locally installed Petrel, Kingdom, or DecisionSpace software. They utilize modern technology, gain an understanding of the exploration technical and business workflows used by oil companies, and ultimately recommend the best investment opportunities in their assigned data sets. The teams gain experience in soft skills such as communication, teamwork, and project management. To date, more than 300 students from 55 universities in 44 countries have completed the EVOLVE program.

Each team of four to six students, with backgrounds in geology, geophysics, petrophysics, and reservoir engineering, work together reviewing a technical data set. In 2020, nine varied data sets from around the world were used. The program is technically coordinated by Allen Bertagne.

Additional support is provided by Jesus Ortiz Nevarez and Mario Ballinas, recent University of Houston graduates. EVOLVE also benefits from volunteer support from advisors Mike Forrest and Jenny Thompson, as well as many other experienced mentors.

The program expanded to 28 international teams in 2020, from 20 international teams in 2019 and 10 international teams in 2018. A total of 24 teams, including 114 students, completed the EVOLVE program in 2020. Continuing its support from 2018, several tutorials were donated by the International Human Resources Development Corporation. Due to challenges related to global time zones, Arthur Cheng was enlisted as a technical advisor for EVOLVE 2020 Southeast Asia teams, holding meetings and engaging mentors to support students in the region.

The program kicked off in January 2020 and culminated in May with presentations of each team's best investment opportunity to the executive committee, a group consisting of members of the technical committee, mentors, and select leaders from a variety of exploration and production companies. This committee provides helpful but real-world feedback to all of the teams. For many, it is the first taste they get

of presentations in a business setting. Aligning the EVOLVE program with the school year enabled Heather Bedle (University of Oklahoma) and John Castagna (University of Houston) to offer EVOLVE for credit. Students in the class consisted of the EVOLVE team as well as additional students working on the data sets and providing information to the team.

Collaboration as compared to competition is a key differentiator for EVOLVE. This year, that was exemplified by several collaborations. Participants from Perugia, Italy, and Leoben, Austria, worked together as a single team with one presentation. Two teams working the southern North Sea collaborated on a depth conversion model. Several teams working the Gulf of Mexico digitized logs to provide a common data set.

Early-career professionals have been asking for a program like EVOLVE to support their training needs because many companies are reducing their training programs and experienced mentors are retiring. In early 2020, a pilot program for EVOLVE Professional was launched to provide the same EVOLVE program to an early-career team at a leading major oil company. The plan is to expand the EVOLVE Professional program to meet the needs of the early-career demographic

as well as assist with funding to sustain EVOLVE in the long term.

The pandemic provided challenges in 2020. However, the program was well prepared to make the adjustments required. This enabled 24 of the 28 teams to complete the program. Zoom meetings have been a critical part of EVOLVE since its inception. They enabled the work to continue in a remarkably similar manner to prepandemic times. In mid-March, as the pandemic was impacting the United States, students were giving their mid-project presentations. By 24 March, Bertagne communicated with the students that we would be continuing to support them in their efforts. He encouraged everyone to follow protocol as required by their school, region, and country. Zoom meetings continued with the students weekly and as needed to support their needs for information and software access. The mentors were extremely impressed how the students continued to move forward with their projects and adapt to the changes that were required due to the pandemic.

In past years, some of the teams have followed their 45-minute final presentation with a 12-minute presentation and poster session at the Annual Meeting. When the

Annual Meeting was shifted to a virtual program, the students were encouraged to continue their work to put together a presentation, which was recorded and presented at an EVOLVE session during the event. The students were available via chat, and a concurrent Zoom meeting was held to allow for questions to the students. An EVOLVE follow-up session and celebration was held the following Friday via Zoom to celebrate the students' accomplishments and review the program.

The 2019 year was highlighted in a January 2020 *The Leading Edge* report written by Andrew Geary, EVOLVE program manager. EVOLVE also has a presence on social media via Facebook, LinkedIn, and YouTube.

### Field Camps

Dylan Mikesell, chair

In 1993, the Field Camp Grant program was established by the SEG Foundation to provide seed money for geophysics faculty and SEG student chapters to create and support field courses that provide students with hands-on experience in data collection and analysis using geophysical instruments and software applications. In 2020, the Field Camps Committee provided continued leadership in

## REPORTS OF COMMITTEES

evaluating applications and awarding grants to eligible applicants, ensuring that geophysics students around the world receive valuable field training in contexts that emphasize safety and high-quality learning. During the unprecedented time of the pandemic, committee members and SEG staff worked with awardees to ensure that health, safety, security, and environment (HSSE) plans and modifications were carried out. Many field camps were still held this year after modifications to their original HSSE plans. However, a number of field camps had to reduce the number of participants in order to follow guidelines for physical distancing.

In 2020, SEG received 36 applications for funding (a 20% increase from 2019). The total funding requested was US\$445,375. From the submitted applications, the committee selected 16 awardees, totaling \$124,443, with individual award values ranging from \$3300 to \$16,000. This year awards were provided to field camps across Africa, Asia, Europe, and North America. However, due to pandemic restrictions, some awarded proposals had to cancel their project. Nine of the awarded camps were conducted throughout 2020 using all precautions necessary. They were sponsored in whole or in part

through funding provided by donors to the program.

In regard to applications, the committee continues to identify shortcomings and provide feedback to unsuccessful applicants. This is in the hope that their next applications will be improved and awards can be made. The committee also encourages applicants to take advantage of the volunteer application readers who provide feedback prior to the submission deadline. This is a complimentary service provided by SEG member volunteers.

The Field Camps Committee continues to partner with the HSSE Committee, chaired by Luke Decker, to keep HSSE guidelines current and to assess applicant HSSE plans. The HSSE plans in applications over the past years of this partnership have improved dramatically, and this coordination among committees has been fruitful.

In addition, there is a new chair of the Field Camp Committee. Francesca Fazzari began the two-year position during the 2020 Annual Meeting. Members of the committee in 2020 included Dylan Mikesell (chair), Francesca Fazzari, Hendratta Ali, Alex Fick, Joe Estep, and Payson Todd.

## GEOPHYSICS

Jeffrey Shragge, editor

In 2020, GEOPHYSICS proved to be an extremely successful journal, with 920 submissions, which represents the largest number of submissions

in the history of the journal. Handling this volume of submissions is possible thanks to the commitment of the GEOPHYSICS Editorial Board that includes assistant, associate, and department editors; guest editors associated with special sections; and a large number of

knowledgeable reviewers. I thank them for their dedication and volunteer time. The whole process from submission to publication would not be possible without the professionalism and commitment of SEG staff.

**Table 6.**

Submissions by country 1 January 2020 to 31 December 2020.

Country	Submitted	Country	Submitted
Argentina	3	Netherlands	19
Australia	10	New Zealand	1
Austria	3	Nigeria	2
Bolivia, Plurinational State of	1	Norway	29
Brazil	29	Pakistan	1
Canada	34	Poland	1
China	445	Russian Federation	2
Czech Republic	2	Saudi Arabia	23
Denmark	3	Singapore	2
Egypt	4	Slovakia	1
France	14	South Africa	1
Germany	12	Spain	3
Greece	2	Sweden	6
India	26	Switzerland	4
Iran, The Islamic Republic of	13	Taiwan	3
Iraq	1	Thailand	4
Israel	2	Turkey	2
Italy	8	United Arab Emirates	4
Japan	8	United Kingdom of Great Britain and Northern Ireland	12
Korea, The Republic of	7	United States	167
Kuwait	1	Venezuela	2
Mexico	3	<b>Total</b>	<b>920</b>

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One major change instituted in 2020 was a restructuring of the senior editorial team by formalizing the senior assistant editor position, a role designed to share some of the growing overall editorial responsibilities. This position is currently held by John Etgen, who will take over as GEOPHYSICS editor on 1 August 2021.

I invited 24 new associate editors to serve at the start of my term, largely in response to the doubling of GEOPHYSICS submissions in the previous five years. The subjects that

attract large numbers of manuscripts are seismic inversion, seismic migration, electric and electromagnetic methods, and signal processing.

In response to research trends and increased applications in exploration geophysics, the journal started a new section on multiphysics and joint inversion. A total of 24 case histories and

four papers accompanied by code in the geophysical software and algorithms category were published in 2020.

The average time required for first review is 65 days, down from 78 days in 2019. The average time between acceptance and publication is slightly reduced at 69 days, down from 70 days in 2019 (although the just-accepted

version of papers now appears online within a few days of acceptance). The 2019 impact factor according to the Science Citation Index Expanded of Clarivate Analytics' Journal Citation Reports is 2.609, which is the second highest behind 2018.

In January 2018, GEOPHYSICS adopted a double-blind review process. In double-blind review, the reviewers are anonymous, and the authors are unknown to the reviewers. The decision of moving to double blind was made after long discussions within the GEOPHYSICS Editorial Board and a thorough pros-and-cons analysis

**Table 7.**

Origin of papers submitted for publication in GEOPHYSICS by employer 1 January 2020 to 31 December 2020.

Universities	685
Research institutes	110
Oil companies	58
Governments	24
Service companies and manufacturers	20
Consultants	12
Mining companies	5
Retired	3
Instrument companies	3
<b>Total</b>	<b>920</b>

**Table 8.**

Manuscript-handling statistics.

Year published 1 July–30 June	Average number of days required for first review	Year published 1 July–30 June	Average number of days required for first review
1991–92	172	2008–09	55
1992–93	157	2009–10	66
1993–94	184	2010–11	61
1994–95	182	2011–12	66
1995–96	211	2012–13	61
1996–97	186	2013–14	72
1997–98	205	2014–15	70
1998–99	214	2015–16	66
1999–00	212	<b>Year</b>	<b>Average number</b>
2000–01	211	<b>published</b>	<b>of days between</b>
2001–02	178	<b>1 January–31</b>	<b>acceptance and</b>
2002–03	133	<b>December</b>	<b>online publication</b>
2003–04	141	2016	66
2004–05	105	2017	71
2005–06	66	2018	80
2006–07	53	2019	78
2007–08	57	2020*	65

\*First reviews have not been returned for all papers.

**Table 9.**

Manuscript-handling statistics.

Year published 1 July–30 June	Average number of days between acceptance and online publication	Year published 1 July–30 June	Average number of days between acceptance and online publication
1991–92	176	2008–09	111
1992–93	181	2009–10	122
1993–94	178	2010–11	135
1994–95	.210	2011–12	126
1995–96	N/A	2012–13	78
1996–97	N/A	2013–14	72
1997–98	180	2014–15	65
1998–99	177	2015–16	69
1999–00	202	<b>Year</b>	<b>Average number</b>
2000–01	208	<b>published</b>	<b>of days between</b>
2001–02	213	<b>1 January–31</b>	<b>acceptance and</b>
2002–03	195	<b>December</b>	<b>online publication</b>
2003–04	161	2016	66
2004–05	158	2017	53
2005–06	181	2018	65
2006–07	143	2019	70
2007–08	82	2020	69

## REPORTS OF COMMITTEES

carried out by SEG staff. The reason was mitigating possible bias due to fame, nationality, and gender in the review process. It was decided to

carefully monitor the possible negative effects of double blind, and after two years, no reduction in submissions or

anomalous changes in the acceptance rate have occurred.

### SPECIAL SECTIONS

In 2020, GEOPHYSICS published one special section titled “Machine learning and data analytics for geoscience applications.” This special section contains 22 papers and covers five broad topic areas: seismic data processing, seismic imaging and inversion, seismic interpretation, well-log analysis and reservoir characterization, and nonseismic and joint inversion methods. Four other special sections on crucial topics have been launched in 2020. “Hydrogeophysics” and “Shallow void, tunnel, and other anomaly detection” will be published in May–June 2021. “Advances in seismic multiple reflection processing” is expected in September–October 2021. “Applications of humanitarian geoscience” is scheduled for January–February 2022.

### REVIEWER OF THE YEAR

Erik Koene has been awarded 2020 Reviewer of the Year. He has been serving as a reviewer for GEOPHYSICS for several years. He contributed a high number of reviews, gave highly relevant feedback, and had the fastest response time of any GEOPHYSICS reviewer who handled more than

10 manuscripts. His scientific and technical knowledge has been an important resource for the journal and for the authors.

### Geoscientists Without Borders®

Robert Merrill, interim chair

The Geoscientists *Without Borders*® (GWB) Committee reviews grant applications twice per year. Each application period has two phases. In 2020, the committee reviewed 65 grant applications. Selection of Phase I first-quarter proposals occurred in January. In March, the pandemic caused the committee to postpone screening of Phase II proposals until the Phase II round of the third quarter following the second period for submittals. Funding uncertainty also influenced this decision. Committee members felt that they would have a better understanding of funds available for grants by the third quarter.

Following an initial screening, selected applicants expanded their application and submitted Phase II proposals for final selection. Committee screening of 20 first- and third-quarter Phase II proposals took place in November. The committee recommended the following proposals for funding:

“Development of sustainable groundwater resources in Saint Catherine area, Egypt” is led by Mohamed Ahmed from Texas A&M University-Corpus Christi. Other supporters include Suez Canal University and the Desert Research Center. The project will identify the best locations for drilling groundwater wells. It also will educate the local Bedouin community on proper groundwater management and well care.

“Geophysics applied to geotechnical study in Ouro Preto, MG-Brasil” is led by Pedro Lourenço dos Reis from the Federal University of Ouro Preto. This project was initiated by the Sociedade de Geofísica Aplicada de Ouro Preto, the local SEG student chapter at the Federal University of Ouro Preto. Ouro Preto’s Civil Defense Department is a partner. Seventeen students are involved. The project aims to establish and implement a methodology to assess and classify areas of geotechnical risk in urban centers using noninvasive and low-cost technology. The city of Ouro Preto is the project location. The city has potential geotechnical hazards that would affect its inhabitants and historical and cultural heritage.

An additional project is pending approval in December 2020.

**Table 10.**  
Impact factor.

Year	Impact factor	Year	Impact factor
1975	0.629	1998	0.687
1976	1.095	1999	0.818
1977	0.773	2000	0.861
1978	0.591	2001	0.649
1979	0.918	2002	0.834
1980	0.895	*2003	0.589
1981	1.087	2004	1.087
1982	1.100	2005	1.030
1983	1.461	2006	1.228
1984	1.193	2007	1.167
1985	1.206	2008	1.349
1986	0.968	2009	1.662
1987	1.084	2010	1.404
1988	0.931	2011	1.418
1989	1.017	2012	1.723
1990	0.905	2013	1.759
1991	1.166	2014	1.612
1992	0.697	2015	2.017
1993	0.919	2016	2.391
1994	0.824	2017	2.368
1995	0.877	2018	2.793
1996	0.867	2019	2.609
1997	0.824		

\*The impact factor for 2003 is based on a single issue. A recalculation based on all issues in 2003 gives 0.862.

## REPORTS OF COMMITTEES

### 2021 FUNDING COMMITMENT

“Capacity building of Acholi people in Uganda to develop and manage village water supplies” is led by Paul Bauman from Advisian. Partners include IsraAID, University of Victoria, Aarhus University, Gulu University, and Community WASH Partners Africa. A total of 34 students are expected to participate. The project, beginning in early 2022, will create safe water sources in approximately 20 villages, directly benefiting 6500 people. An estimated 33 Acholi people are joining the effort to address their need for further training.

### FINAL REPORTS

In 2020, GWB received eight project-completion reports.

“Groundwater resources for small rural and Aboriginal communities in Chaco province, Argentina” was supported by the Universidad Nacional de La Plata, Buenos Aires Province Scientific Research Council, National Scientific and Technical Research Council, CEQUINOR, Multipurpose Pilot Plant, Institute of Mineral Resources, and Universidad Nacional De La Plata Geophysical Society. Ten students participated.

“Geophysical mapping of aquifers in Bolivia” was supported by Lund University and the Universidad Mayor de San Simon. A total of 22 students from Lund University, Universidad Mayor de San Simon, University of Lausanne, Universidad Técnica de Oruro, Aarhus University, and Colorado School of Mines participated in the project.

“Improving the sustainability and productivity of poor smallholder farmers in northern Ghana using electromagnetic induction-guided precision irrigation” was supported by the State University of New York at Buffalo, University for Development Studies, United States Geological Survey, Ghana Geological Survey Authority, and West African Science Service Center on Climate Change and Adapted Land Use. Five students participated in the project.

“Geophysics to enhance agricultural productivity and livelihoods of smallholder farmers through improved groundwater management of the Vientiane Plain, Lao PDR” was supported by the National Center for Groundwater Research and Training, College of Science and Engineering, Flinders University; International Water Management Institute, South East Asia Regional Office; Physics Department, Faculty of Science, National University of Laos; Department of Water Resources, Ministry of Natural

Resources and Environment, Lao PDR 5; and School of Physical Sciences, University of Adelaide. More than 10 students participated in the project.

“Geophysical investigations at Holocaust sites in Lithuania and Warsaw” was supported by the University of Hartford, University of Wisconsin, Duquesne University, Advisian, Quest University, and University of Calgary. Nine students participated in the project.

“Improving water security in Mon State, Myanmar, via geophysical capacity building” was supported by the University of British Columbia, Golder Associates, Stanford University, University of California at Berkley, Mawlamyine University, and National Department of Irrigation and Water Utilization Management. A total of 20 students participated.

“Seismic site effects study in Nepal” was supported by Thammasat University, University of Chieti-Pescara, and National Research Council of Italy. A total of 20 students from Tribhuvan University participated in the project.

“Bonanza en Los Andes: Sustainable water management in Zurite, Peru” was supported by Humboldt State University, Rutgers University, Engineers Without Borders,

Universidad Nacional de San Antonio Abad del Cusco, and University of San Marcos. More than 20 students from Temple University, University of Texas at Austin, University of San Marcos, and Universidad Nacional de San Antonio Abad del Cusco participated.

### WRITTEN PROGRESS REPORTS

The committee received six progress reports in 2020, some of which are nearing completion.

**Table 11.**

Statistics of the 2020 GWB projects applications.

Submittal subject	Submittals	Accepted
<b>WASH (water, sanitation, and hygiene)</b>		
Groundwater resource exploration	20	2
Water resource management	9	
Water quality	9	
<b>Disaster risk reduction</b>		
Earthquake preparedness	6	
Tsunami preparedness	1	
Terrain stability	7	1
Volcano preparedness	1	
Flood mitigation		
Natural hazard education	3	
Food security		
Soils and agriculture		
<b>Environmental and cultural conservation</b>		
Habitat conservation	1	
Pollution mitigation	1	
Archaeology	3	
<b>Other</b>		
Geothermal exploration	2	
Mineral exploration	2	

## REPORTS OF COMMITTEES

“Low-cost geophysical instrumentation for groundwater management in West Africa” is supported by Colorado School of Mines and the University of Abomey-Calavi.

“Geophysical investigation of fault zone aquifers and water-quality assessment, Nkoteng, Cameroon” is supported by the University of Bamenda, Fort Hays State University, Colorado School of Mines, and University of Yaoundé. Thirty-one students are involved in the project.

“An international partnership to develop volcano monitoring capacities in Guatemala” is supported by the University of Liverpool, Karlsruhe Institute of Technology, and Universidad San Carlos. Graduate and undergraduate students are involved.

“Geophysical investigation to improve the landslide susceptibility analysis in Kerala, India” is supported by the University of Kerala, Jamsetji Tata School of Disaster Studies, and Tata Institute of Social Sciences.

“Toward improved earthquake hazard assessment in Myanmar: Tools, knowledge, and infrastructure” is supported by the Myanmar Earthquake Committee, Monywa University, University of Yangon, Myanmar Geosciences Society, Dagon University, East Yangon University, and West

Yangon University. More than 30 students are participating.

“Understanding high mountain aquifers to source drinking water in the Sagarmatha National Park, Nepal” is supported by the University of Kansas, Tribhuvan University, and Nepal Department of Mines and Geology.

### ORAL PROGRESS REPORTS

By year-end 2020, the committee heard nine oral progress reports.

- 1) “Low-cost geophysical instrumentation for groundwater management in West Africa”
- 2) “Geophysical investigation of fault zone aquifers and water-quality assessment, Nkoteng, Cameroon”
- 3) “An international partnership to develop volcano monitoring capacities in Guatemala”
- 4) “Geophysical investigation to improve the landslide susceptibility analysis in Kerala, India”
- 5) “Toward improved earthquake hazard assessment in Myanmar: Tools, knowledge, and infrastructure”

- 6) “Understanding high mountain aquifers to source drinking water in the Sagarmatha National Park”
- 7) “Geophysics to enhance agricultural productivity and livelihoods of smallholder farmers through improved groundwater management of the Vientiane Plain, Lao PDR”
- 8) “Building resilience to seismic hazard in Indonesia: Training in multichannel analysis of surface waves and implementing seismic disaster mitigation strategies”
- 9) “Hydrometeorologic and geologic hazards at Pico de Orizaba Volcano, Mexico”

### Gravity and Magnetism Irina Filina, chair

In 2020, the Gravity and Magnetism Committee was involved in the organization of Annual Meeting technical sessions, a gravity and magnetism keynote, and a postconvention workshop, which was held jointly with the Mining Committee. In addition, the committee organized a special section in *Interpretation* focused on integrated geophysical imaging that was published in the November issue. Other activities included reviewing technical publications, teaching a continuing education course on potential fields, coordinating publications in the committee’s Meter Reader column in *The Leading Edge*, establishing collaboration with the Near-Surface Geophysics Technical Section, and assisting in the organization of a joint workshop with the American Geophysical Union (AGU).

The chair of the Gravity and Magnetism Committee for 2019–2021 is Irina Filina. Marianne Rauch served as vice chair in 2020 and will assume the role of chair 26 September 2021 for a two-year term. The vice chair for 2021–2023 will be elected during a committee meeting in the second quarter of 2021.

In 2020, there were three gravity and magnetism-focused technical sessions at the virtual SEG Annual Meeting: one oral and two poster sessions. Chuck Campbell has organized the technical oral and poster sessions for many years, with abstract-reviewing assistance from committee members. He continued this task in 2020 and volunteered to do so in 2021.

The committee sponsored a keynote session during the 2020 Annual Meeting. Kirsten Siebach from Rice University served as the keynote speaker. Her presentation about the geology of Mars gathered 237 attendees and triggered a vigorous and dynamic live question-and-answer session that was moderated by Filina.

The 2020 postconvention workshop on machine learning was organized jointly with the Mining Committee. The organizers were Jiajia Sun, Sarah Devriese, Aline Melo, and Ed Biegert. The workshop consisted of four mini sessions and featured 11 technical presentations in real time from all over the world. The workshop attracted 53 participants. Organizers plan to submit an article about this workshop to the Meter Reader column in *The Leading Edge*.

Committee member Michal Ruder taught the SEG gravity and magnetism

## REPORTS OF COMMITTEES

continuing education course twice in 2020 before the onset of the pandemic. The two-day course consisted of four segments (four hours each) that focused on the basics of each potential field followed by hands-on exercises. The coursework will be converted to a format deliverable by an online platform.

The Meter Reader column in *The Leading Edge* focuses on different issues related to potential fields. Alan Morgan coordinates the publication of the column. In 2020, there were two articles published in the column and another is in review for 2021. The committee's special section in *Interpretation* focused on integrated geophysical imaging. Filina served as assistant editor for the special section, which consisted of nine illustrative case studies of integration with nonseismic geophysical methods. The committee members served as associate editors and reviewers. This special section is aligned with the committee's effort to promote nonseismic geophysical methods.

Dale Bird is the committee's representative for the AGU-SEG Collaboration Committee. The joint AGU-SEG workshop on distributed arrays was postponed from the third quarter of 2020 to February 2021 due to the pandemic. Another joint

workshop on full-waveform inversion for near-surface applications is planned for the third quarter of 2021.

The committee's goal for 2020 was to increase its presence on social media (LinkedIn, Facebook, Twitter, and Instagram). Jiajia Sun, Andrea Balza, Simon Gozzard, and Rauch are the committee's social media team responsible for this initiative. The committee's goal for 2021 is to attract more student members by organizing activities that target early-career participants in cooperation with the Near-Surface Geophysics Technical Section and Mining Committee. Particularly, organizing a career panel, holding a joint student night at the 2021 Annual Meeting, and offering mentoring opportunities for students are planned.

The committee will continue to support SEG-related activities that promote knowledge and applications of gravity and magnetics methods at the Annual Meeting and throughout the year.

### Health, Safety, Security, and Environment

Luke Decker, chair

#### 2019–2020 ACCOMPLISHMENTS

Luke Decker continued his third year as chair of the Health, Safety, Security, and Environment (HSSE) Committee. The following was accomplished:

- The committee collaborated with the Field Camps Committee to strengthen and improve HSSE plans. This included the development of a threat-assessment matrix and example HSSE plan.
- The committee reviewed and evaluated field camp proposal HSSE plans. We provided constructive feedback to applicants. This feedback enables them to resubmit their plans and receive travel grant funding.
- The committee assisted the Annual Meeting Steering Committee to determine the viability of a face-to-face event during the pandemic. An assessment that the event could not be safely held contributed to the decision to revert to a virtual model.
- The committee drafted guidance documents for international travel by SEG members for both U.S. and non-U.S. citizens.

- A vice chair was selected for the committee.

#### 2020–2021 OBJECTIVES

- The committee will work with SEG sections to develop HSSE guidelines for managing pandemic risks for in-person events as they begin to resume.
- The committee will continue to support the Field Camp Committee by providing feedback on HSSE plan components of proposals.
- The committee will liaise with the Near-Surface Geophysics Technical Section to determine how we can best support the environmental portion of our mandate.
- The committee will complete documents on international travel guidelines for SEG members and staff.
- The committee will attempt to bring Kevin Bohacs' course on field safety to SEG in collaboration with the American Association of Petroleum Geologists. We will scope the possible cost structure for the course and make it available for planners of field camps.

- Additional committee members will be added.

The committee's mission is "to help ensure that HSSE is taken into consideration for any activities that the SEG manages or sponsors. The committee will not duplicate the work that the International Association of Geophysical Contractors and International Association of Oil and Gas Producers do with HSSE for geophysical operations, but rather complement it and utilize wherever possible industry guidance already developed."

### Honors and Awards

Christopher L. Liner, chair

The Honors and Awards Committee consists of the five most recent past presidents of SEG. The 2020 members were Chris Liner (chair), John Bradford, Bill Abriel, Nancy House, and Rob Stewart.

Nominations were solicited from the membership at large following the 2019 Annual Meeting in San Antonio. Nominations for certain Best Paper or Best Presentation awards were provided by the Technical Program Committee for the 2019 Annual Meeting, the editor of *GEOPHYSICS*, the Editorial Board of *Interpretation*, and the Editorial Board of *The Leading Edge*.

## REPORTS OF COMMITTEES

The Honors and Awards Committee met several times during 2020 to review candidates put forward by the SEG membership. Selections were summarized for approval by the SEG Board of Directors. Due to the pandemic, the 2020 Honors and Awards Ceremony at the SEG Annual Meeting was converted from a live event to a prerecorded online presentation. With the committee work complete, my service on the committee ends. I would like to express my appreciation for the thoughtful diligent work by all committee members and expert support by Staff Liaison Mandi Duckworth.

The following awards were conferred in 2020. Full citations for these awards were published in the December 2020 issue of *The Leading Edge*.

### MAURICE EWING MEDAL

Leon Thomsen

### VIRGIL KAUFFMAN GOLD MEDAL

Carlos Torres-Verdín

### REGINALD FESSENDEN AWARD

Felix Herrmann, Charles Mosher, Faqi Liu, Laura J. Pyrak-Nolte, and Evert Slob

### HONORARY MEMBERSHIP

James Rector

### J. CLARENCE KARCHER AWARD

Fangyu Li, Siddharth Misra, and Xinming Wu

### DISTINGUISHED ACHIEVEMENT

Smart Exploration

### LIFE MEMBERSHIP

Jie Zhang

### CECIL GREEN ENTERPRISE AWARD

Gary Tubridy (Avalon Sciences Ltd.)

### SPECIAL COMMENDATION

Marianne Rauch

### OUTSTANDING EDUCATOR

Shalivahan and Ilya Tsvankin

### CRAIG J. BEASLEY AWARD FOR SOCIAL CONTRIBUTION

James Clark

### BEST PAPER IN GEOPHYSICS

“On the physical principles underlying electromagnetic induction” by Mark E. Everett and Alan D. Chave

### HONORABLE MENTIONS, GEOPHYSICS

“Adaptive waveform inversion: Practice” by Lluís Guasch, Michael Warner, and Céline Ravaut

“Convolutional neural network for seismic impedance inversion” by Vishal Das, Ahinoam Pollack, Uri Wollner, and Tapan Mukerji

“Data-driven internal multiple elimination and its consequences for imaging: A comparison of strategies” by Lele Zhang, Jan Thorbecke, Kees Wapenaar, and Evert Slob

“Simulation of wave propagation in linear thermoelastic media” by José M. Carcione, Zhi-Wei Wang, Wenchang Ling, Ettore Salusti, Jing Ba, and Li-Yun Fu

### BEST PAPER IN THE LEADING EDGE

“Salt/sediment proximity to delineate salt boundaries using seismic while drilling in the Gulf of Mexico” by Jacob Bayer, Bryce Jensen, Yingping Li, Tianrun Chen, and Ken Matson

### HONORABLE MENTIONS, THE LEADING EDGE

“The nimble node — Million-channel land recording systems have arrived” by Ted Manning, Dinara Ablyazina, and John Quigley

“Full-waveform inversion for salt: A coming of age” by Ping Wang, Zhigang Zhang, Jiawei Mei, Feng Lin, and Rongxin Huang

### BEST PAPER IN INTERPRETATION

“Control of Precambrian-to-Paleozoic orogenic trends on along-strike variations in Early Cretaceous continental rifts of the South Atlantic Ocean” by Kyle Reuber and Paul Mann

### TECHNICAL PROGRAM AWARDS FOR THE 2019 ANNUAL MEETING

### BEST PAPER

“Angle-dependent and angle-independent lease-squares reverse-time migration (LSRTM) — Case studies” by Thomas Kühnel, Michael Kiehn, Eric Duvencek, Bruce Strawn, Dung Nguyen, Anu Chandran, Farhad Bazargani, Richard Palmer, Thomas Rayburn, Mandy Wong, and Siyang Yang

### HONORABLE MENTION, BEST PAPER

“DAS observation of guided waves in a shale reservoir generated by perforation shots” by Ariel Lellouch, Biondo Biondi, Steve Horne, Mark A. Meadows, and Tamas Nemeth

### BEST POSTER PAPER

“Controlled-order multiple waveform inversion” by Yike Liu, Bin He, and Yingcai Zheng

### HONORABLE MENTION, BEST POSTER PAPER

“Extending the AVO toolbox with rock physics driven inversion for seismic interpretation with little or no well control — Example from the Norwegian Sea” by Erling Hugo Jensen, Åsmund Drottning, and Mark Littman

### BEST PAPER PRESENTED BY A STUDENT

“Waveform inversion by model reduction using spline interpolation” by Guillaume Barnier

### AWARD OF MERIT, BEST PAPER PRESENTED BY A STUDENT

“Data weighted full-waveform inversion with adaptive moment estimation for

## REPORTS OF COMMITTEES

near-surface seismic refraction data” by Ao Cai

### BEST POSTER PAPER PRESENTED BY A STUDENT

“Seismic impedance inversion based on cycle-consistent generative adversarial network” by Yuqing Wang

### AWARD OF MERIT, BEST STUDENT POSTER PAPER

“An efficient wavefield inversion for isotropic elastic media” by Chao Song

### Interpretation Editorial Board Balazs Nemeth, editor-in-chief

This is the eighth *Interpretation* annual report since its launch in October 2012. The Editorial Board members for 2020 included Balazs Nemeth (editor-in-chief), Kurt Marfurt (deputy editor-in-chief), William L. Abriel, Saleh Ammar Al-Dossary, Sunday Amoyedo, Huyen Thi Thanh Bui, Oswaldo Davogustto, Dallas B. Dunlap, Vsevolod Egorov, Shu Jiang, Robert K. Merrill, Lisa Stright, Oskar Vidal Royo, Bradley Wallet, Chicheng Xu, Hongliu H. Zeng, Bo Zhang, and Hongtao Zhu.

*Interpretation* is built on special sections, with standing sections on “Tools, Techniques, and Tutorials” and “Pitfalls,” as well as a general technical section. There are three motivations for the special sections. First, the readers of *Interpretation* can find multiple articles addressing a given technical topic or geologic basin, thereby identifying unifying themes and alternative perspectives. Second, the special sections are organized by guest editors, thereby broadening not only the intellectual scope but also the geographic and demographic diversity of the journal. Third, in addition to the published call for papers requesting submissions from the geotechnical community at large, the special-section editors directly

enlist contributions from potential authors who are either authorities on a specific technical topic or seasoned interpreters in a specific basin. Such invitations from the special-section editors on behalf of the American Association of Petroleum Geologists (AAPG) and SEG to publish in *Interpretation* greatly facilitate the release of proprietary data, workflows, and best practices from company management. Indeed, such requests are correctly viewed as outside

recognition of company expertise and therefore aligned with business goals of being a preferred partner, operator, or technology provider.

The expectation is that each board member will initiate at least two special sections each year. Not all special sections receive the minimum of three papers. In this case, accepted papers appear in the general technical section. Papers that miss the special section due to

delays in data release or

additional revisions also appear in the next technical section. Papers accepted for publication prior to the target special-section publication date are placed online as accelerated articles immediately after they have gone through the galley proof and have had corrections approved.

Table 12 summarizes the origin of papers by country for 2020. The origin roughly represents the membership of SEG and AAPG. As in 2019, the focus of the special sections can influence the origin of the papers. In 2020, the main countries of origin were China and

**Table 12.**  
Origin of papers submitted for publication in *Interpretation* by country 1 January 20 to 31 December 2020.

China	97	United Kingdom of Great Britain and Northern Ireland	2
United States	73	Bangladesh	1
Egypt	7	Chile	1
Columbia	6	France	1
India	6	Iran, the Islamic Republic of	1
Canada	4	Iraq	1
Norway	4	Netherlands	1
Australia	3	New Zealand	1
Austria	3	Russian Federation	1
Brazil	3	Saudi Arabia	1
Germany	2	South Africa	1
Nigeria	2	Spain	1
		Sweden	1
		Switzerland	1
		Taiwan	1
		<b>Total</b>	<b>227</b>

**Table 13.**  
Origin of papers submitted for publication in *Interpretation* by employer 1 January 2020 to 31 December 2020.

Universities	137
Oil companies	41
Research institutes	15
Governments	11
Consultants	11
Service companies and manufacturers	8
Mining company	2
Retired	2
<b>Total</b>	<b>227</b>

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**Table 14.**

Special section and paper count.

		Planned special sections	Published special sections	Special section papers	General technical section papers	Total papers published
2013	August	1	1	8	9	21
	November	1	1	10	7	19
2014	February	2	2	23	4	28
	May	2	3	21	6	26
	August	4	3	19	2	21
2015	November	8	4	26	9	35
	February	8	6	35	4	40
	May	8	6	32	7	41
2016	August	6	8	50	4	55
	November	7	4	30	6	38
	February	3	3	27	7	35
2017	May	5	5	22	11	34
	August	6	6	28	13	42
	November	6	6	13	18	33
2018	February	4	4	19	11	30
	May	4	2	23	12	38
	August	7	6	39	14	53
2019	November	5	4	20	14	35
	February	4	3	18	16	34
	May	3	2	14	19	36
2020	August	4	2	16	20	37
	November	4	4	27	21	49
	February	1	1	3	18	23
2020	May	3	2	10	20	30
	August	5	3	29	12	42
	November	5	4	21	15	36
2020	February	4	1	7	16	25
	May	4	4	17	18	36
	August	2	2	26	15	41
2020	November	7	7	54	32	86

**Table 15.**

Manuscript-handling statistics.

Year submitted 1 July–30 June	Average number of days required for first review
2013–14	64
2014–15	69
2015–16	59
Year submitted 1 January–31 December	Average number of days required for first review
2016	61
2017	66
2018	63
2019	64
*2020	61

\*First reviews have not been returned for all papers.

**Table 16.**

Manuscript-handling statistics.

Year published 1 July–30 June	Average number of days between acceptance and online publication
2013–14	82
2014–15	70
2015–16	58
Year published 1 January–31 December	Average number of days between acceptance and online publication
2016	68
2017	56
2018	73
2019	71
2020	73

the United States. There were fewer special sections published from geographic areas outside of these two countries.

Table 13 groups the contributions by type of institution. With the desire of university faculty and students to document their capabilities through peer-reviewed publications, it should be no surprise that universities contribute 60% of the papers, unchanged from previous years. However, note that the simple classification in these tables has a North-American bias — with many of the Chinese university authors working in institutions that are more accurately categorized as university-industry-government technology labs based at university sites.

The success of the journal led to a continued increase in the number

of unsolicited papers to the general technical section (Table 14). To aid in this effort, we have enlisted a suite of high-energy deputy associate editors, including Shuvajit Bhattacharya, Gaurav Dutta, Bruno Honório, Yunsong Huang, Murari Khatiwada, Chaoli Lan, Felipe Alberto Lozano, Marcilio Castro de Matos, Andrea Miceli Romero, Osareni Christopher Ogiesoba, Debapriya Paul, Xuan Tang, Sumit Verma, Xinming Wu, Rui Zhang, Shuo Zhang, and Tao Zhao. These deputy associate editors have been proficient in conducting efficient, timely, and objective reviews of papers on a wide range of topics.

The manuscript-handling statistics are listed in Tables 15 and 16. There is no significant change in the number of days required for the first review (Table 15) and in the average number of days spent between acceptance and online publication (Table 16). Out of papers receiving a final decision in 2020, 77% were accepted.

During its eighth year in 2020, the reputation of *Interpretation* has grown. Equally importantly, *Interpretation* has risen in the Clarivate Analytics Science Citation Index Expanded (SCIE) from 0.52 in 2015 to 1.394 in 2019 (Table 17). The pandemic did not seem to have any detectable impact on journal

**Table 17.**

Impact factor.

Year	Impact factor
2015	0.510
2016	0.690
2017	0.937
2018	1.172
2019	1.394

## REPORTS OF COMMITTEES

submissions based on the 2020 statistics.

In summary, through the efforts of the Tulsa-based editorial staff, the work of the special-section editors, the board of editors, and most importantly, the contribution of the authors and reviewers, *Interpretation* is running smoothly, addressing the needs of our readership, and further building its reputation as a peer-reviewed journal.

### Meetings Review and Planning

José R. Arce, chair

The main goal of the Meetings Review and Planning Committee (MRPC) is to analyze and approve SEG's involvement in meetings and activities apart from the Annual Meeting. Carmen Dumitrescu left the chair position for MRPC during the 2020 Annual Meeting, and José Arce assumed the position in October. Current committee members are Carmen Dumitrescu, Cengiz Esmersoy, Feng Zhang, Irina Filina, Jesse Baker, Mohammed Badri,

Paul Cunningham, Rick Miller, Rocco Detomo, Terrell Dhanpaul, Tim Dean, and José Arce. The SEG staff liaison is Kristi Casey.

The process for review and approval of events is streamlined into a monthly review through Basecamp. Members receive information regarding all of the events that require SEG's support. The voting process is performed online, and members have 10 to 12 days to send their responses.

In 2020, a total of 25 events were reviewed. From these, 22 were

approved and three were rejected. The approval rate was 88%. One of the rejected events was SEG operated, and recommendations were made to present an updated plan to hold it in the future.

The approved events were from various regions of the world. Due to the pandemic, a surge in virtual events was submitted for approval. Figure 4 shows the total number of approved events. Eight were in the United States; four were in the Middle East and Africa; four were in China, Asia, and Southeast Asia; two were in Europe; and seven were virtual.

A proper analysis of SEG's interaction with other societies is crucial in extending its reach to members worldwide. Figure 5 shows the focus of the approved events. At this time, there are almost the same number of SEG-operated and intersociety events. It is also interesting to note that the number of student events could be increased, particularly with the availability of virtual techniques.

The committee is currently in search of a vice chair. We are awaiting confirmation from a possible candidate.

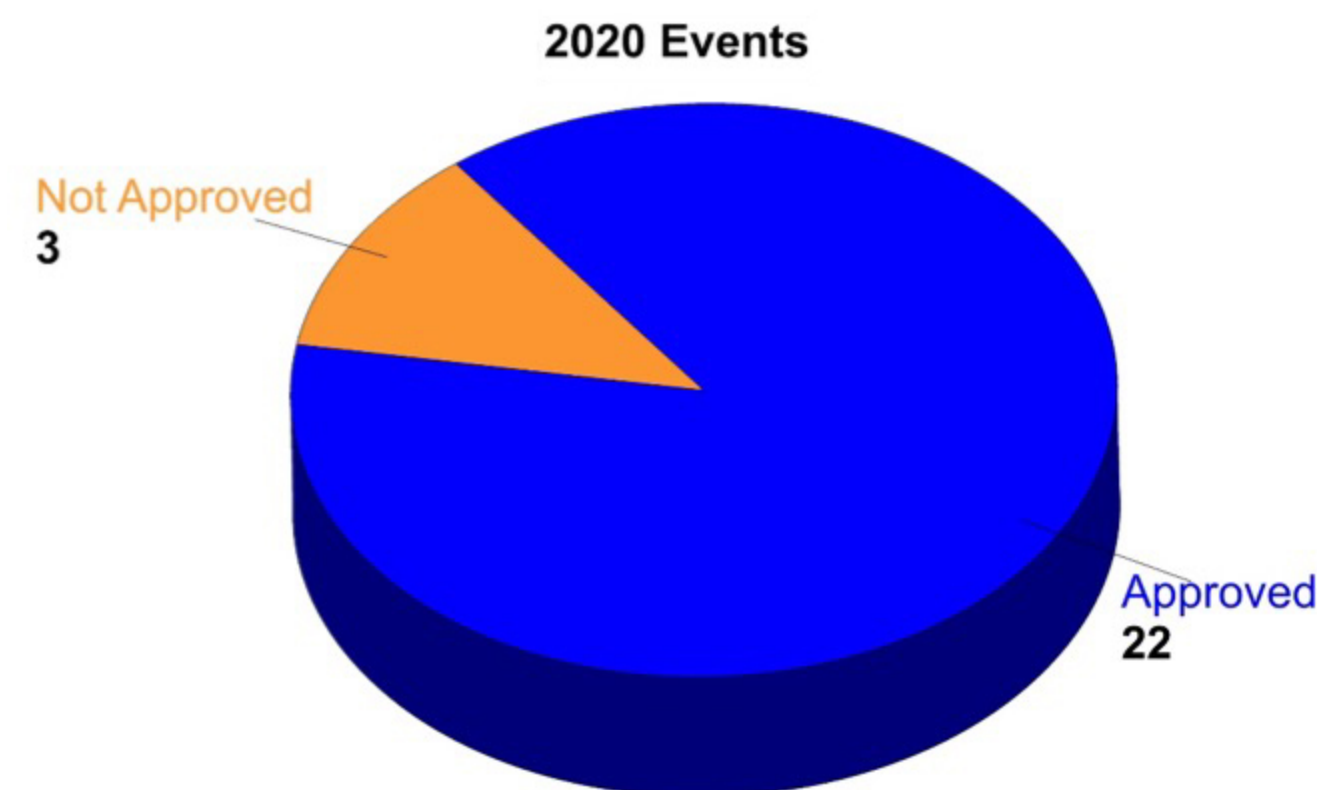


Figure 3. Results of the 2020 MRPC events evaluation.

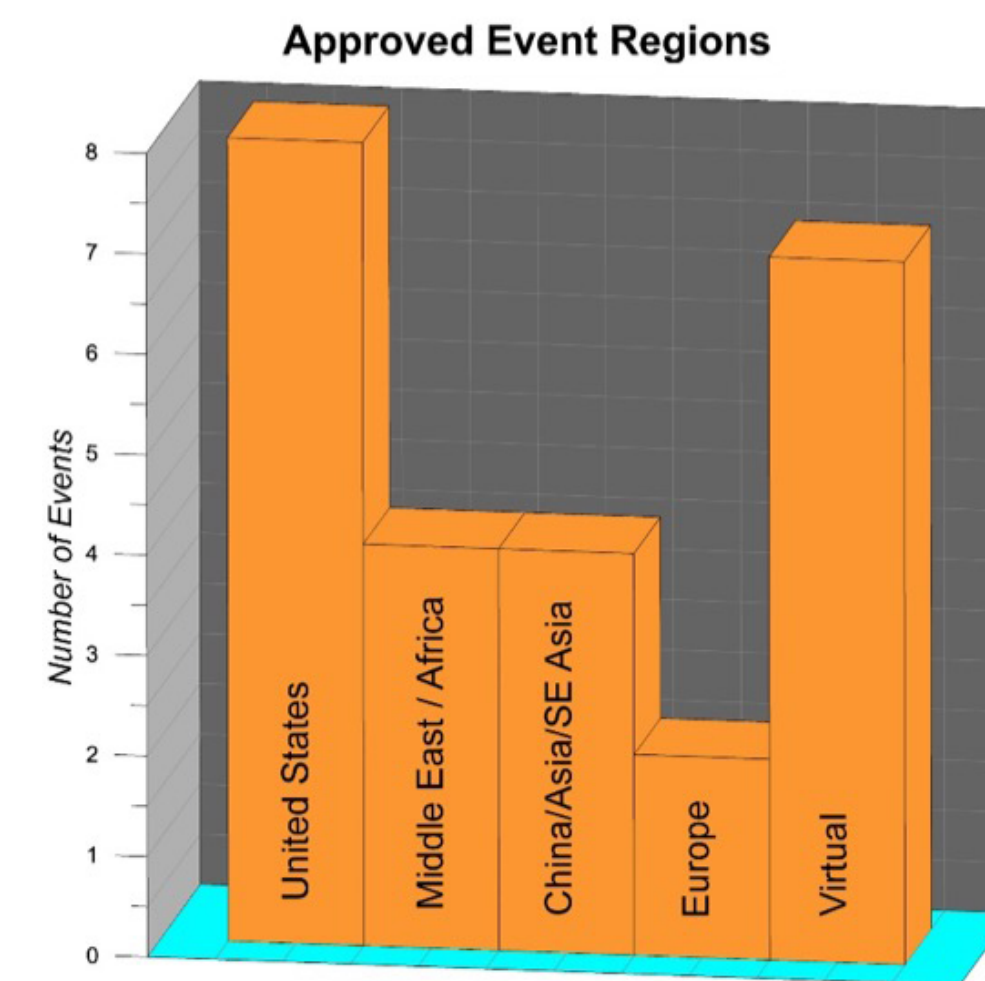


Figure 4. Regional distribution of approved events.

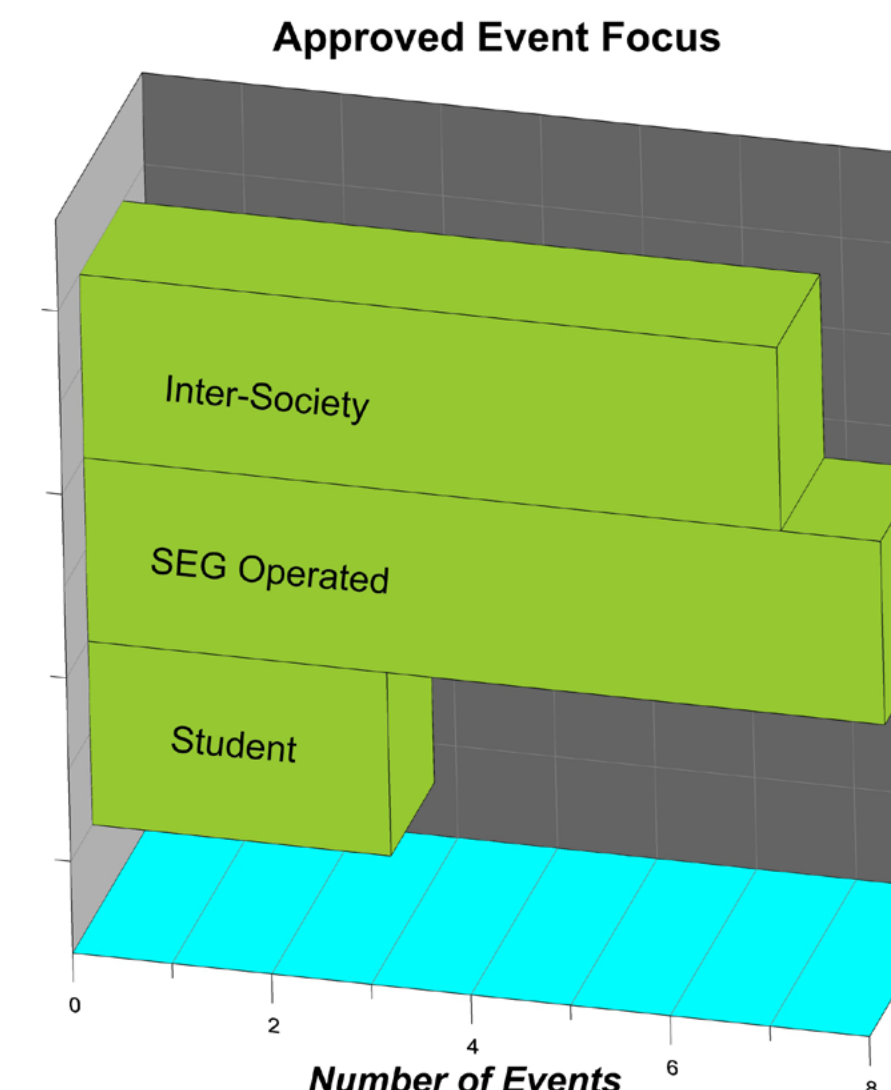


Figure 5. Focus of 2020 approved events.

## REPORTS OF COMMITTEES

One of the goals of MRPC is to participate in SEG's planning of strategic events. This is crucial to SEG's future involvement with the global geophysical community. Various possibilities are being discussed. From the included figures, it is readily noted that more participation from SEG is necessary

in student events as well as events in Latin America.

### Membership Jing Ba, chair

The Membership Committee set a series of goals to strive for, and progress was made during 2019–2020.

Due to the impact of COVID-19 on our members, the Membership

Committee recommended a relaxation of unemployment dues-waiver program requirements that the SEG Board of Directors approved, thereby amending the SEG Policies and Procedures Manual. Prior to the Board agreeing to change the policy during its April 2020 meeting, an unemployed member was required to have been a member in good standing for three years and to have paid dues in the most recent past membership cycle in order to be eligible for a dues waiver. Since the policy changed, any unemployed member who has paid dues during either of the previous two membership cycles is eligible.

The program also was expanded to include those on family leave from their employer for maternity/paternity or in order to provide care for themselves or a family member. There were 170 members who took advantage of the dues-waiver program during 2020.

SEG had 12,542 total paid members in 2020. This number included Active (8303), Associate (2471), and Student (1768) memberships. Active members included honorary, life-awarded, and emeritus members.

The Society had 5288 members in the United States and 7254 in other countries.

Due to a Bylaws change adopted in late 2019 and implemented in March 2020, all membership cycles for new members are based on the anniversary date of joining and no longer are tied to calendar years.

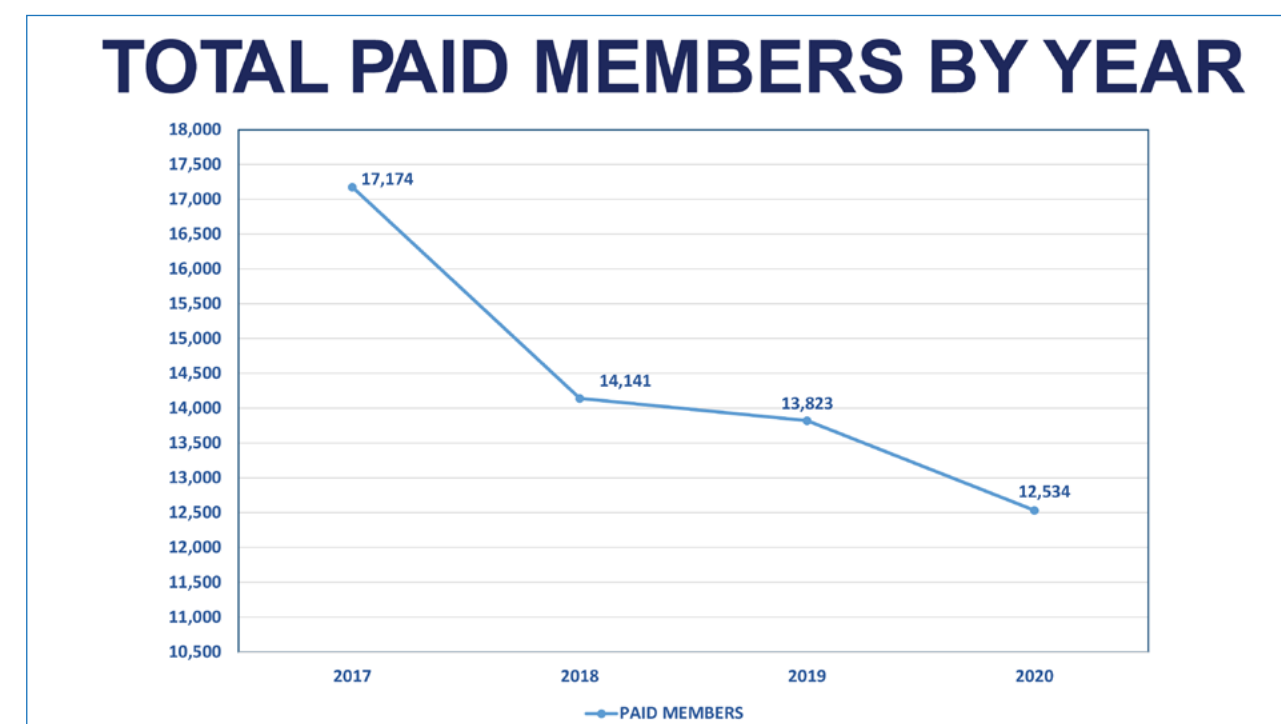
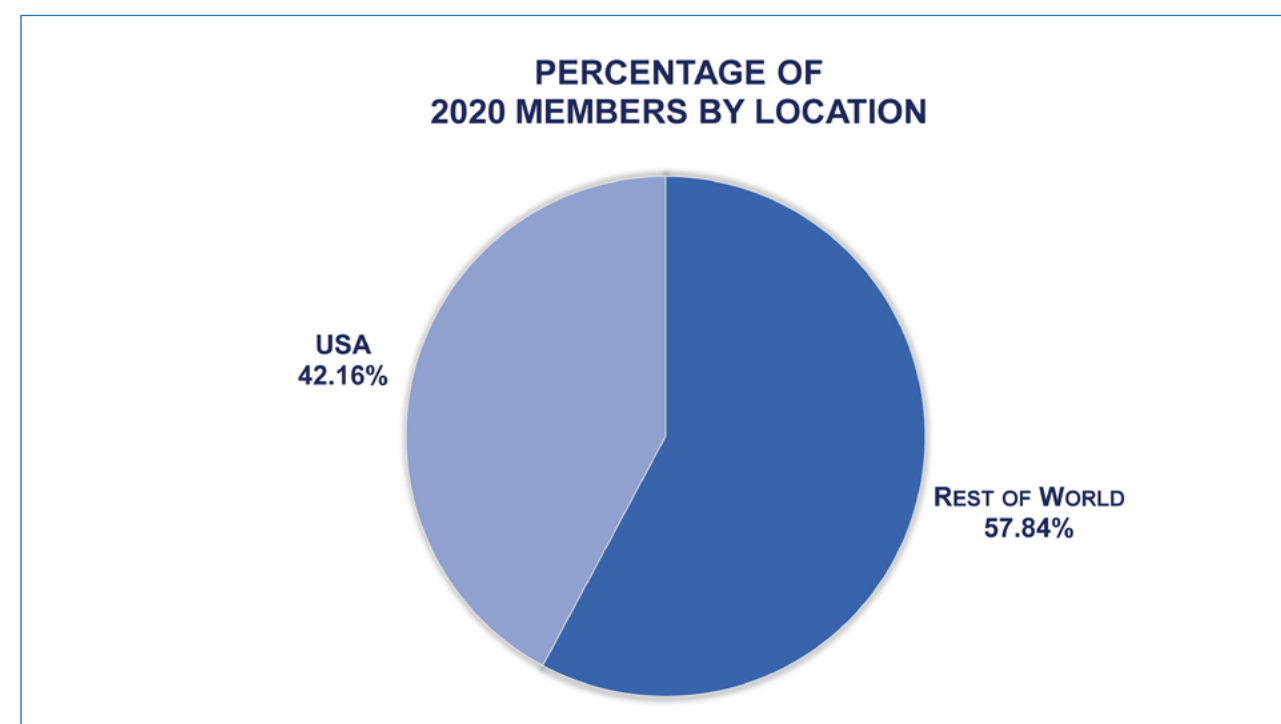
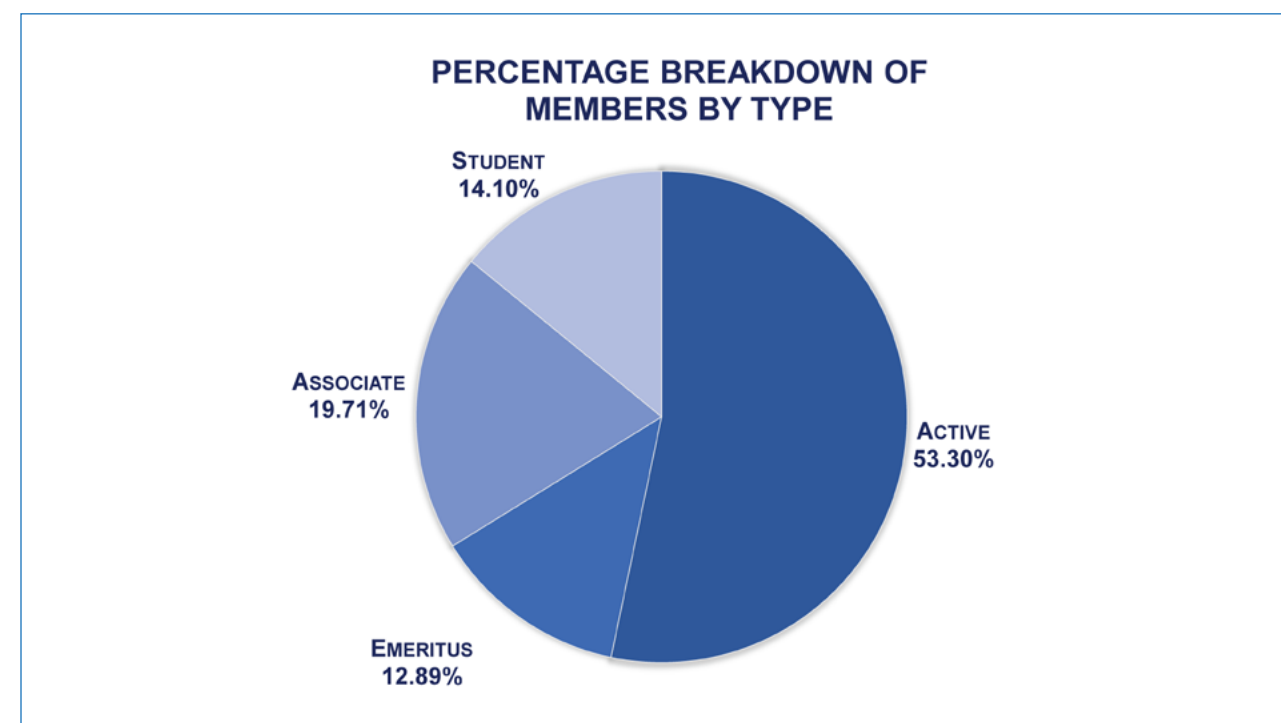


Figure 6. Membership statistics.

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### Mining

Jean Legault, chair

The 2020 Annual Meeting marked the end of my second and final term as chair of the Mining Committee, during which I have been ably assisted by Glenn Chubak (vice chair) and Sarah Devriese (technical committee chair).

Chubak now assumes the role of chair, and Devriese assumes the role of vice chair. Both are two-year terms. Jiajia Sun, assistant professor of geophysics at the University of Houston, was acclaimed as incoming technical committee chair during the committee's annual general meeting, held virtually 15 October 2020.

The main function of the committee continues to be the organization of mining-related activities at the Annual Meeting. Committee leadership communicates to members primarily via e-mails using the SEGMIN list server, sponsored by Seequent, and also through SEG's Basecamp.

This year's Annual Meeting in Houston was set to host our Biannual Mining Summit, which has been held every two years since the committee's inception in the 1970s. For the summit, the committee typically organizes a field trip, student night, luncheon, two full oral

sessions, at least one poster session, an annual committee meeting, and two postconvention workshops. In nonsummit years, committee events at the Annual Meeting typically involve technical sessions and occasional workshops.

This year, the pandemic threw a wrench in the planning of the Mining Summit. Our field trip to NASA in Houston was forced into cancellation. Our luncheon and student night also were cancelled. Luckily, we were able to salvage our keynote speaker, two sessions, and two workshops for the virtual Annual Meeting.

The pandemic also appeared to cause uncertainty in prospective speakers, with a mere 24 expanded abstracts submitted to the mining session by the 1 April deadline. We typically receive more than 30 abstracts during summit years.

The result was that the committee only had sufficient numbers for one oral session and one poster session at the Annual Meeting. The quality of abstracts was nevertheless very good, the speakers were well prepared, and attendees seemed interested in the topics. We enjoyed an excellent Mars-themed keynote speech by NASA's Michael Thorpe. The committee organized two quality workshops.

The joint machine learning workshop was coorganized with the Gravity and Magnetism Committee. The second workshop focused on the SimPEG geophysical simulation and inversion framework. Both seemed to be well attended and enjoyed.

In spite of the pandemic, the Annual Meeting was a success for the participants and organizers involved. This was due to the tireless efforts of committee chairs, SEG staff, and the dedication of all volunteers, including session chairs, presenters, workshop chairs, and workshop participants. SEG's ingenuity in providing a 100% virtual conference in such short order was exemplary. It was executed without a hitch. Hats off to SEG for this great accomplishment. Participants widely commented that adding a virtual stream to future Annual Meetings would be welcomed by those unable to attend in person.

My only criticism was that the decision to undertake a virtual Annual Meeting was made very late. An earlier decision could have led to stronger support for the event. SEG, nevertheless, did the best that it could under the circumstances.

The committee held three meetings during 2020. One meeting took place at the Association for Mineral

Exploration Roundup Conference in January in Vancouver. A second was held during the Prospectors and Developers Association of Canada International Convention in March in Toronto. Our third and final meeting was a virtual Zoom meeting held during the Annual Meeting in October. Attendance was varied, with a minimum of 12 and a maximum of 20. Topics discussed during the meetings included planning for the upcoming Annual Meeting, closer cooperation with the Near-Surface Geophysics Technical Section and Gravity and Magnetism Committee, and cooperation with other societies. Another topic was potentially moving our summit from even to odd years in order to coincide with non-oil-and-gas-specific centers, such as Denver in 2021 and New Orleans in 2023 (versus Houston in 2022 and Dallas in 2024). This would attract greater numbers of mining delegates to future SEG Annual Meetings.

In terms of intercommittee initiatives, the Mining Committee, Gravity and Magnetism Committee, and Near-Surface Geophysics Technical Section agreed in 2020 to welcome members to each other's meetings to act as informal liaisons and ensure better communication. More recently, in November, members of each formed a cooperative near-surface

geophysics intersociety committee on unmanned aerial vehicle/drone geophysical guidelines and standards. This was in the hope to reach out to other societies to establish best practices for the industry.

I want to take this opportunity to thank my current committee executive members, especially Chubak and Devriese, for their hard work and dedication during the last few years. I feel that the committee is in good hands. I also want to thank our past executive members, Sean Walker and José Arce, for showing me that patience and dedication are keys to the success of the committee. My thanks also go to Ted Bakamjian (staff liaison) and Jenny Cole (technical committee liaison) for all of their work and the kindness that they have shown during my six years on the committee. In particular, I want to thank SEG for its continued support of our committee and, through it, our mining geophysical students who represent our future. Finally, I want to thank all of the members of the committee for their support during my tenure. I feel that the best years still lie ahead for the committee. I wish the committee greatest success in the future.

## REPORTS OF COMMITTEES

### Near-Surface Geophysics Technical Section

Chester Weiss, chair

The 2019–2020 Near-Surface Geophysics Technical Section (NSTS) leadership included Chester Weiss (chair), José Arce (past chair), Catherine Truffert (chair-elect), John Goff (vice chair), Lia Martinez (secretary), Kennedy Doro (chair of the Global Subcommittee), and Sarah Morton Rupert (vice chair of committees). The new leadership that were elected 1 July include Erika Gasperikova (incoming chair-elect), Christine Downs (incoming secretary), and Chih-Ping Lin (incoming vice chair of the Global Subcommittee). Appointed leadership include Morgan Sander-Olhoeft (student program lead), Niels Grobbe (finance and grants lead), Kristen Burke (membership communication), Ariel Lellouch (publications lead for GEOPHYSICS), and Steve Sloan (publications lead for *The Leading Edge*).

NSTS has developed two subcommittees including the Student Subcommittee and Global Subcommittee. The Global Subcommittee is comprised of the global chair and vice chair along with Ahzegbobor Phillips Aizebeokhai, Theophile Ndougsa Mbarga, Elisha Shemang, and Gilles Grandjean. The

Student Subcommittee is comprised of the student program lead and vice chair of committees along with Kristen Burke, Christopher Terra, Alejandro Garcia, Iga Pawelec, and Noah Dewar. Both subcommittees have been active throughout the year.

NSTS has continued sustained growth. We participated in a variety of ways during the 2020 SEG Annual Meeting. This included hosting sessions on Geoscientists *Without Borders*® and humanitarian geophysics, machine learning in the near surface, urban geophysics, and hydrogeophysics.

Additionally, NSTS participated in two oral and five poster presentations. Sarah Morton Rupert organized a Business of Applied Geophysics plenary session on near-surface geophysics. A postconvention workshop titled “Applied Geophysics Addressing Top Challenges Facing Humanity” was organized by Bob Wiley. The 2020 Harold Mooney Award recipient was Julian Ivanov, and the 2020 Frank Frischknecht Leadership Award recipient was Hansruedi Maurer. The 2020 Near Surface Geophysics Research Award recipient was Daniel Locci Lopez.

### Nominations

Ken Tubman, chair

The Committee on Nominations is charged with assembling a list of candidates for the Board of Directors and district representatives, as well as overseeing all membership votes. The committee is made up of three immediate prior SEG past presidents; four representatives from sections, associated societies, technical sections, or geographic districts; the chair of the Council; and two SEG directors at large. This year’s committee members were Bill Abriel, Nancy House, Rob Stewart, Stuart Wright, Tim Dean, David Rampton, Gustavo Carstens, Tad Smith, and Ken Tubman.

Filling a slate of candidates is not an easy task. The Board and the Council need to represent and give voice to our diverse membership of different geophysical disciplines, geographic areas, and personal backgrounds. The committee looks for candidates who not only help balance this representation but also have commitment to SEG, have shown that they are willing to make an effort and commit time, have the best interest of the organization and its members in mind, and are willing to work hard to achieve the goals of the Society. Therefore, it is not surprising

that nominees are often people who have served on SEG committees, have been involved in the organization of the Annual Meeting, have served on the board of an SEG subsidiary, have been Council members, or have otherwise made contributions.

This year, we made a special effort to pair candidates from different geographic regions and demographic groups. This enhances the representation of our broad membership on next year’s SEG Board of Directors. The approach was discussed with the full Board and received strong endorsement.

After much deliberation and debate, the committee settled on a very strong slate of candidates.

### 2020 SEG ELECTION CANDIDATES

#### President-elect:

- Anna Shaughnessy
- Guillaume Cambois

#### Second vice president:

- Bruce Shang
- Huasheng Zheng

#### Treasurer:

- Pete Cramer
- Xuri Huang

#### Director at large:

- Sherif Hanafy
- Adel El-Emam

#### Director at large:

- Johannes Douma
- Brandy Hawkins

#### District 1:

- Patrice N. Mahob
- Tania Mukherjee

#### District 2:

- Frank Brown
- Tracy J. Stark

#### District 3:

- Sarah Gach
- Karen R. Christopherson

#### District 4:

- Debotyam Maity
- Doug Schmitt

#### District 5:

- Carmen C. Dumitrescu
- Rachel Newrick

#### District 6:

- Javier Núñez Ariza
- Ana Curcio

#### District 7:

- Anton Bogrash
- Yuriy Ivanov

## REPORTS OF COMMITTEES

### District 8:

- Horst Rüter

### District 9:

- Uche Irene Aigbokhai
- Isaac M. Marobhe

### District 10:

- Sankhadip Bhattacharya
- Shokhrukh Shomurodov

### District 11:

- Yonghyun Chung
- Yang Liu

### District 12:

- Ahmad Riza Ghazali

Survey & Ballot Systems Inc. (SBS) was contracted to conduct the SEG election for the Board of Directors. SBS designed and distributed an electronic ballot and a paper ballot to each voting member. SBS received, tabulated, and verified the votes and submitted the results to the SEG business office. The Committee on Nominations verified the count provided by SBS.

Official ballots were sent out 4 June 2020 to 9381 voting members eligible to vote in this year's election. The annual election had a participation rate of 22.61%.

## ELECTION RESULTS

- President-elect: Anna Shaughnessy
- Second vice president: Bruce Shang
- Treasurer: Pete Cramer
- Directors at large: Sherif Hanafy and Brandy Hawkins
- District 1: Patrice N. Mahob
- District 2: Tracy J. Stark
- District 3: Sarah Gach
- District 4: Doug Schmitt
- District 5: Rachel Newrick
- District 6: Ana Curcio
- District 7: Anton Bogrash
- District 8: Horst Rüter
- District 9: Uche Irene Aigbokhai
- District 10: Sankhadip Bhattacharya
- District 11: Yang Liu
- District 12: Ahmad Riza Ghazali

## Oil and Gas Reserves

Richard Xu, chair

The mission of the Oil and Gas Reserves Committee is to represent SEG as a society as well as its member companies and member individuals and to promote and assure that geophysical technologies and techniques are utilized effectively and reliably in the process of oil and gas reserves and resources assessment for the entities at all levels. In 2020, the main focus of the committee was to recruit members and rebuild the committee with the goal of enhancing

and improving geophysicists' and SEG's role in the reserves and resources business. This effort will continue in 2021. In addition, the Policies and Procedures for the committee was drafted, submitted to, and approved by the SEG Board of Directors.

### COMMITTEE MEMBERS:

- Chuandong (Richard) Xu, chair
- Dan Maguire, vice chair
- Andrew Royle
- Eric Von Lunen
- Mohammed Ibrahim
- Enzo Aconcha
- Robert Stewart, advisor
- Maria Angela Capello, Board liaison
- Annabella Betancourt, staff liaison

## PETROLEUM RESOURCES MANAGEMENT SYSTEM

SEG is one of the sponsoring societies of the Petroleum Resources Management System (PRMS). The latest edition of PRMS rolled out in 2018. Currently, the PRMS leading society, the Society of Petroleum Engineers (SPE), is organizing application guidelines for PRMS, including a seismic section. Our committee is organizing and drafting this section. The motive of the section is to provide practical guidelines for

utilizing geophysical (mainly seismic) methods to assist in the assessment of oil and gas reserves and resources under the frame of PRMS. PRMS-AG is expected to formally release in 2021.

### RESERVES WORKSHOP

Our committee and the Development and Production Committee organized a half-day postconvention workshop that was successfully held during the 2020 Annual Meeting. There were approximately 50 attendees. Six speakers from major oil companies, service companies, and third-party reserves evaluation companies presented their general practices and examples of seismic applications to reserves and resources assessment. They also shared PRMS concepts, definitions, and guidelines. An active and intriguing panel discussion followed. The SPE Oil and Gas Reserves Committee chair was invited to the workshop, where he presented and participated in discussions. A similar workshop is expected during the 2021 Annual Meeting.

### SPE OIL AND GAS RESERVES COMMITTEE

The committee continues to maintain and enhance a good relationship with the SPE Oil and Gas Reserves Committee. The SEG representative

and committee chair attended committee meetings that were held in May and October.

### COMMITTEE MEETINGS AND PLANS FOR 2021

In addition to the two quarterly meetings, the committee held its annual meeting in a virtual format during the 2020 Annual Meeting. Activities and achievements in 2020 were reviewed, and plans for 2021 were discussed. The 2021 plans include:

- Finish and formalize the seismic section for the PRMS-AG.
- Plan a technical session and postconvention workshop for the 2021 Annual Meeting.
- Initiate a webinar series to raise awareness and encourage geophysicists to become more involved in the reserves and resources process.
- Collaborate with SPE to organize joint workshops and seminars.
- Collaborate with SPE to develop training sessions to explain PRMS in practice and to reduce the gap between geophysicists

## REPORTS OF COMMITTEES

and engineers on reserves and resources.

- Establish regular communication with SPE, the American Association of Petroleum Geologists, Society of Petroleum Evaluation Engineers, European Association of Geoscientists and Engineers, and other professional societies and entities.
- Continue to gather best practices and examples of geophysical and seismic data and technologies used in reserves and resources evaluation.
- Continue to build the committee membership and diversity.

### KEY CHALLENGES

Reserves and resources is one of the company-level core businesses in the petroleum industry, proving the value of an oil and gas company's or nation's natural resources. The evaluation process is led by petroleum engineers, with some involvement by economists, geologists, and geophysicists. The number of geophysicists involved in reserves and resources assessments is traditionally not representative. The committee hopes to locate more geophysicists who are reserves experts and who have the aptitude and interest to become more engaged

in the process. Added to the lack of representation is the challenge to gather examples and practical workflows utilizing seismic in reserves and resources processes, and to normalize them in order to form a database that can serve as a reference for geoscientists and engineers.

### Passive Seismology

Ulrich Zimmer, chair

The Committee for Passive Seismology had a quiet year in 2020. One of the few activities was collaboration with the Interstate Oil and Gas Compact Commission (IOGCC). During the collaboration, committee members recommended qualified speakers on passive seismology to organizers of the IOGC winter webinar.

This year, members recognized that the committee needs a new vision in order to stay relevant. Emphasis on passive seismology has changed from specialist microseismic knowledge to interpretation integration. Although there is a lot of expertise regarding induced seismicity on the committee, it appears that the topic is covered by a multitude of other committees and consortia. Committee members are currently searching for a new chair to develop and implement a new vision.

### Publications

Sergey Fomel, chair

The Publications Committee had an active year on policy and procedural matters. Members of the committee instituted or revised guidance concerning several aspects of the Society's publishing program.

The range of sites on which authors can post preprints of articles submitted to SEG for publication consideration was expanded beyond sites controlled directly by authors or their institutions to include major noncommercial preprint servers.

The punitive-action section of Ethical Guidelines to SEG Publications was updated twice. The first update defines in more detail how issues related to alleged transgressions are handled. The second update allows journal editors and editorial-board chairs to levy probations without formal sanctions in cases in which elevation of a matter to the vice president, publications appears unnecessary or unproductive.

The committee also supported adding the Society as a signatory to the San Francisco Declaration on Research Assessments, which calls to deemphasize impact factor as a primary determining factor

in institutional advancement and promotes taking a more holistic view of researchers' contributions.

The committee also developed a more detailed and formal policy and procedures regarding how corrections, including retractions, are handled, following guidance from the Committee on Publication Ethics.

All of these policies were approved by the SEG Board of Directors. They are available at [library.seg.org/policies](http://library.seg.org/policies).

The committee endorsed a statement submitted in its name to the White House Office of Science and Technology Policy (OSTP) in response to its request for comment on a draft policy calling for immediate open access to articles reporting on federally funded research. The committee asked that OSTP keep current embargoes in place and take no action at least until it studies the impact that financially unsupported open access would have on nonprofit scholarly publishing sustainability.

Early in the 2019–2020 cycle, the committee reviewed and approved a proposal to participate along with six other geoscience publishers in a GeoScienceWorld-operated open-access journal. GSW acquired the journal *Lithosphere* from the Geological

Society of America and began operating it with SEG support earlier this year.

The committee is comprised of leaders of all SEG publications teams. Other members during 2019–2020 were Baishali Roy (vice president, publications), Jeffrey Shragge (GEOPHYSICS editor-in-chief), Kyle Spikes (*The Leading Edge* Editorial Board chair), Balazs Nemeth (*Interpretation* editor-in-chief), Lianjie Huang (Books Editorial Board chair), Olga Nedorub (Technical Program Committee chair), Raul Cova (Translations Committee chair), Karl Schleicher (Community Content Committee chair), Amit Padhi (Reviews Committee chair), and James Rector (member at large). Ted Bakamjian (associate executive director, publications and communities) served as staff liaison, and Jennifer Cobb (director, journals and books) and Jeno Mavzer (publishing platform manager) provided considerable support.

### Research

Sergio Chávez-Pérez, chair

The Research Committee serves to improve communication among earth scientists interested in applied research, to advise the SEG Board of Directors on research matters, to

## REPORTS OF COMMITTEES

identify research topics worthy of focused workshops, and to organize those workshops. The committee meets twice a year, with much of the committee's business conducted by e-mail. Membership is open to all researchers. Currently, the committee includes 89 members from a variety of industrial and academic segments, including young professionals and student members.

### 2020 PROGRESS

- In the Research Committee Update column of *The Leading Edge*, we aim to discuss a wide range of topics in exploration geophysics. Possible topics include carbon capture and storage, fiber-optic sensing, machine learning, sustainability, smart cities, urban environments, near surface, minerals, environment, engineering, humanitarian applications, etc. Currently, business models and the climate for future technology generation also are of interest to us. The committee consists of a variety of members with unique views and interests, so each update will be written by a different member. Four updates have been published to date.
- Episode 84 of Seismic Soundoff focused on the committee. It was

titled, "An insider's look at the SEG Research Committee."

- The committee met in October during the Annual Meeting. The next meeting will be 21–22 January 2021.
- Matt Brzostowski stepped down as vice chair. The new vice chair is Aria Abubakar.
- Sergio Chávez-Pérez joined the American Association of Petroleum Geologists' Research Committee and will serve as liaison between both groups.

### 2020 POSTCONVENTION WORKSHOPS

A total of 15 postconvention workshops sponsored by the Research Committee were held during the 2020 Annual Meeting.

- Anisotropic imaging velocity modeling — Preserving accurate structure and multiazimuth signal at the target — Current state and remaining challenges
- CO<sub>2</sub> geophysical monitoring: Achievements, challenges, and the road ahead
- DAS: Advances in fiber-optic sensing over the last decade

- Full-wavefield imaging
- Geophysical solutions for oilfield engineering applications
- Low-frequency FWI: How low do we need to go?
- Promises and challenges with sparse node ultra-long offset OBN acquisition in imaging and earth model building
- What are the latest in machine learning and data analytics for geoscience applications?
- Advancement in land seismic processing technologies
- Least-squares migration in complex overburden
- Machine learning blind-test challenge
- Microseismic monitoring: Proven versus nonproven
- Next-generation geoscience using machine learning
- Integrated geophysical and geomechanical evaluation of induced seismicity
- Values in elastic imaging and elastic full-waveform inversion

Three of the workshops were canceled and may be proposed to be held at the 2021 Annual Meeting.

- Geophysical challenges in presalt carbonates
- Seismic attributes and DHI analysis in the age of artificial intelligence: Examples, challenges, and opportunities
- Keeva Vozoff commemorative workshop

### Reviews

Amit Padhi, chair

In 2020, we published 27 book reviews. The numbers dwindled only marginally due to an initial pandemic-related slump in activity, which picked up momentum later in the year. Challenges posed by the pandemic included changed working conditions for members as well as difficulties in collecting books.

Committee membership remained constant and healthy at 32, the same as in 2019. The members are motivated, and it is their enthusiasm that helped the committee maintain output of reviews for publication at a satisfactory level despite the challenges of the year.

The committee welcomed its new chair, Bill Green, following the 2020 Annual Meeting. He has been on the committee since 1975 and has an outstanding record of reviewing books over a long period of time. The committee will continue to thrive under his able leadership.

A final word of warm thanks for her invaluable assistance in handling the affairs of this committee goes to Kelsy Taylor. She is organized, diligent, and ensures that the committee is never off track. The fact that we have reviewed 27 books this year despite the hurdles stands as testament to her commitment.

### Scholarships

Karl Schleicher, chair

Since its inception in 1956, the SEG Scholarships program has helped advance the field of applied geophysics by encouraging students who excel in geoscience. Gifts from SEG Members, their employers, corporate sponsors, SEG Sections and Associated Societies, and memorial funds given in honor of colleagues, friends, and family members provide substantial merit-based financial awards for deserving students. Approximately US\$11 million in scholarship money has been awarded to date to the top geoscience

students in the world. From freshmen just beginning their education to graduate students doing research to advance the field, SEG scholarship awardees are recipients of the most prestigious geoscience scholarships in the world.

During 2020, the SEG Scholarships Committee managed the application process for the 2020–2021 academic year. The committee evaluated 494 applications and granted 124 students scholarships totaling \$322,332.

During the evaluation process, each committee member ranked applicants for merit based on information provided in their applications. Individual rankings were compiled, and a composite forced ranking was created to determine the highest qualified applicants in each of six categories (freshman, undergraduate, and graduate, each divided into North American and non-North American).

The committee considered the specific selection criteria for each of the individual scholarships and carefully matched qualified applicants, in some cases with the assistance of advisory boards who provided feedback and recommendations on applicants. All scholarships are merit based, ensuring that the top geoscience students in the world are honored and awarded.

Committee members also are serving as advisors to each of the recipients for the 2020–2021 academic year, helping them learn more about career opportunities in geophysics and connecting them with valuable resources to enhance their education and prepare for their careers.

The 2020 Scholarships Committee included Karl Schleicher (chair), Esther Babcock, Lorie Bear, Lorelee Dickson, Yong Ma, Kai Zhang, Adam Mangel, and Ahmed Ismail.

For additional information, visit <https://seg.org/scholarships> and <https://seg.org/education/student/financial-assistance/scholarships/list-of-scholarship-recipients>.

### SEG–NGWA Collaboration

Rob Jacob, cochair

The SEG–NGWA Collaboration Committee (SNCC) was established as part of the SEG–NGWA affiliation MOU signed 23 May 2016. In the MOU, the National Groundwater Association was “charged with considering and making recommendations to the respective organizations regarding areas of cooperation, such as joint workshops or programs and continuing education courses.”

NGWA and SEG provide complementary support for geophysical sciences, with SEG focusing on methodology development in applied geophysics and NGWA primarily supporting geophysics as applied to hydrologic scientific questions.

SNCC identified the following areas of overlap between the two communities: water resource management, ground and surface water measuring and monitoring, and remediation of water resources.

SNCC meets four times a year, of which two meetings are in person at the major annual meetings of each organization. For 2020, there were no in-person meetings due to the pandemic. Both organizations moved their annual meetings to a virtual experience.

#### COMMITTEE MEMBERS:

- Rob Jacob, Bucknell University  
SEG cochair
- Bill Ally, NGWA, NGWA cochair
- John Lane, USGS
- John Jansen, Collier Consulting
- Jonathan Ajo-Franklin, Lawrence Berkeley National Laboratory
- Kristina Keating, Rutgers University
- Gordon Osterman, Aarhus University
- Stephen Moysey, East Carolina University

- Niels Grobbe, University of Hawaii at Manoa
- John Bradford, Colorado School of Mines
- Kathy Butcher, NGWA

A survey was sent to SEG members, some of whom also belong to NGWA. The survey focused on hydrogeophysics, hydrology, and other types of interests. There was a great response and information shared through the survey. Survey results will be presented to the SEG Near-Surface Geophysics Technical Section leadership, so they can determine if they want to develop virtual meetings around the topics of interest.

NGWA agreed to sponsor joint technical sessions, and the organizations are open to the development of joint meetings.

### Strategy and Planning

Maurice Nessim, chair

The Strategy and Planning Committee was formed to provide long-term strategic advice to the SEG president and Board of Directors. The initial implementation was designed to also assist the organization of SEG into portfolios of programs. With that being accomplished, the focus has moved to providing insights on long-term market

and industry trends. The expertise of committee members is focused on business rather than technical knowledge.

In 2020, additional members were added to the committee as discussions broadened and input was desired on specific topics. An example is the addition of Maria Angelo Capello. She joined in order to discuss the work she, Anna Shaughnessy, and Emer Caslin are doing on the Geophysical Sustainability Atlas and mapping geophysics to the UN Sustainable Development Goals. That work is an example of a key ingredient of the future of SEG.

#### COMMITTEE MEMBERS:

- Maurice Nessim (chair)
- Lee Bell
- Tom Smith
- Peter Duncan
- Mike Loudin
- Rick Miller
- Baishali Roy
- Kurt Marfurt
- Maria Angelo Capello
- Anna Shaughnessy
- Ken Tubman

The committee had multiple discussions on topics related to long-term plans for the Society. Topics included connections with

## SEG's Strategic Pillars to Accelerate Geophysical Innovation

*How our Society engages its stakeholders to train the power of applied geophysics in pursuit of many of the world's greatest challenges*



Figure 7. SEG strategic pillars.

stakeholders, SEG's strategy, approaches for improved operations, modernizing the business model, broadening SEG's activities, membership growth, and retention and environmental, social, and governance (ESG) criteria. Of these, the two topics with the most attention were stakeholder connections and strategy.

On the topic of stakeholders, there was dialog about how we communicate (approach and frequency). One point that came up repeatedly was that frequency and quality of our

communications could be enhanced by proximity. Although Tulsa has been the traditional location for SEG's headquarters, it is no longer a major hub for oil and gas activity. In addition, there is a need to broaden beyond hydrocarbon exploration and exploitation. Several alternatives were considered, but the group eventually settled on a recommendation that the headquarters be located in Houston. Houston is a major center of the energy industry. Houston, with such a large diverse economy and direct travel connections, opens many possibilities

beyond oil and gas. Even with our strong base in oil and gas, Houston presents significant opportunities to improve connections with a wide range of stakeholders. The committee prepared a motion to establish the SEG headquarters in Houston. That motion was presented to and approved by the SEG Board of Directors.

The other discussion topic worthy of highlight is SEG strategy. The SEG Board had several sessions to review the current strategy, consider updates where needed, and decide on action plans for implementation. The committee was active in this subject. It is clear that SEG faces multiple significant challenges as the market and society change. The energy market challenges presented by potential peak oil and demand for energy transition will continue to necessitate responses. We will define our future and the role we will play in the applied-geophysics industry. Six pillars are defined to guide our strategy discussions and implementation going forward. The Strategy and Planning Committee looks forward to providing perspective and insights to the president and Board as we move forward with strategy implementation.

### Technical Standards Shawn New, chair

The Technical Standards Committee (TSC) serves as a forum for discussion of geophysical developments for which standards need to be defined. When a standardization challenge is identified that warrants action by SEG, an appropriate subcommittee is appointed to develop standards and make a recommendation to the Board of Directors concerning its adoption.

Shawn New served as chair and will continue to serve as chair for the 2020–2021 term. Victor Ancira served as vice chair and will continue to serve as vice chair for the 2020–2021 term.

#### MINOR ADJUSTMENTS TO SEG-Y\_R2.0

Minor cosmetic changes to SEG-Y\_r2.0 — the second full revision of the SEG-Y standard — were adopted by the committee for publication for review in early 2021. Major changes were proposed and discussed during the November 2020 committee meeting. Final review, collation, and annotation is in progress, and submission for Board approval in the first quarter of 2021 is anticipated.

In November 2020, Jill Lewis presented at the 24<sup>th</sup> Petroleum Network Education Conference to:

- Explain the history of SEG data standards
- Provide an update on TSC activities, including clarifications of the standards
- Discuss and promote adoption of SEG-Y\_r2.0 to facilitate automation, artificial intelligence, and machine learning

Lewis also reviewed the SEG-Y\_r2.0 reference document with the National Data Repository, TSC, and some operators. Consensus is that more operator feedback is needed in 2021 before the guide is published on the SEG website.

#### SEG-Y IN THE CLOUD

There has been a great deal of discussion among committee members regarding the efficacy of SEG-Y in cloud environments. This stems from many operators and service companies participating in the Open Subsurface Data Universe (OSDU) consortium, which seeks to develop a new standardized data platform for geoscience.

Initially, this was believed to promote the replacement of SEG-Y. Further engagement with OSDU representatives confirmed that SEG-Y is not excluded as a storage format within the platform. Each participating company decides which data formats to implement. SEG-Y remains the industry standard, and companies that participate in OSDU have not abandoned it.

However, some have claimed that the standard is not performant in cloud environments, hence the investigation into an alternative. In 2021, a TSC subcommittee will investigate and provide guidance for the industry on proper use and implementation of the SEG-Y standard for optimal performance.

A request was made in July 2020 by OSDU to use SEG-Y standard descriptive terms for trace identification codes in their future release. This was approved in September, with guidance regarding proper source attribution. In November, discussions began regarding a Memorandum of Understanding between OSDU and SEG to facilitate further sharing of information. The committee thinks this is a great opportunity and will work with the staff liaison for approval in early 2021.

## ADDITIONAL ACTIVITIES FOR EARLY 2021

- Publish example data sets in SEG-Y version 0 and revisions 1 and 2. TSC is considering publicly available data but would also like to begin discussions with the SEG Advanced Modeling Corporation (SEAM) on collaboration.
- Complete the subcommittee evaluation of P1/11 position data exchange formats as a replacement for SPS\_r2.1 (Shell Processing Support Format). More operator review is required to confirm whether P1/11 can replace SPS as written or whether the subcommittee should provide the International Association of Oil and Gas Producers (IOGP) — to which SEG transferred positioning standards several years ago — with additional format requirements before SPS can be retired.

## The Leading Edge Editorial Board

Kyle T. Spikes, chair

The *Leading Edge* (TLE) Editorial Board members for the 2019–2020 term were Kyle Spikes (chair), Yongyi Li, Steve Sloan, Ulrich Zimmer, Madhumita Sengupta, Arpita Bathija, and Chengbo Li. Spikes completed his term of service on the Editorial Board in

October 2020 at the conclusion of the virtual 2020 Annual Meeting. Chester Weiss was added to fill the vacated membership position. Li was selected as chair for the 2020–2021 term and officially assumed that position at the close of the 2020 Annual Meeting.

Business office editorial staff processed 137 submissions to *TLE* in calendar year 2020, which was the highest number since 2017. In all, 81 technical articles were published in *TLE* in calendar year 2020, with 65 of those being published in special sections and the other 16 appearing as “standalone” technical papers. Numerous nontechnical articles related to Society events and activities also were published.

## SPECIAL SECTION TOPICS COVERED IN CALENDAR YEAR 2020

- January: CO<sub>2</sub> in the subsurface
- February: Reservoir characterization Part I
- March: Reservoir characterization Part II
- April: Offshore technology
- May: Near-surface imaging and modeling
- June: Middle East
- July: Reservoir monitoring
- August: Southeast Asia
- September: Smart city geophysics
- October: Machine learning and AI
- November: Distributed acoustic sensing

- December: Geothermal energy

The 2019 *TLE* Best Paper Award was presented to Jacob Bayer, Bryce Jensen, Yingping Li, Tianrun Chen, and Ken Matson for their paper, “Salt/sediment proximity to delineate salt boundaries using seismic while drilling in the Gulf of Mexico.”

Additionally, Honorable Mentions were awarded to Ted Manning, Dinara Ablyazina, and John Quigley for their paper, “The nimble node — Million-channel land recording systems have arrived” and to Ping Wang, Zhigang Zhang, Jiawei Mei, Feng Lin, and Rongxin Huang for their paper, “Full-waveform inversion for salt: A coming of age.”

## Translations

Raul Cova, chair

The Translations Committee reviews applied-geophysics books and articles published globally and recommends to the vice president, publications and/or chair of the Books Editorial Board published materials deemed to be of sufficient interest to the general membership to warrant translation and publication either in SEG journals or as an SEG special publication.

Historically, the committee focused on translations into English but

has expanded its role to consider translations of works into other languages as well. In addition to fulfilling its charter, the Translations Committee advises the Board on policy matters related to publications translations. It also collaborates with the Community Content Committee (previously named the Wiki Committee) in the translation of content published through the SEG Wiki.

In 2020, the Translations Committee continued its collaboration with the Community Content Committee in the Spanish translation of the *Encyclopedic Dictionary of Applied Geophysics, fourth edition*. All of the terms, figure labels, and tables have been translated, and a review to ensure quality and consistency continues.

The committee also received a recommendation for translation of *Geophysics State of Bahia: Geological Studies and Mineral Exploration* originally published in Portuguese. A formal submission and its distribution to reviewers are in progress.

The committee also advised the Latin America Regional Advisory Committee (LARAC) in its initiative to translate into Spanish the book *Digital Imaging and Deconvolution: The ABCs of Seismic Exploration and Processing* by Enders Robinson and Sven Treitel. The

committee looks forward to continuing to work with LARAC on this project.

## Travel Grants

J. Tyler Schwenk, chair

The primary purpose of the Travel Grants Committee is to evaluate student and recent-graduate applications for grants that offset costs associated with attending the Annual Meeting. The majority of grants go to attendees of SEG-sponsored student programs, including the SEG/ExxonMobil Student Education Program (SEP) and the SEG/Chevron Student Leadership Symposium (SLS). The committee also evaluates applications for the SEG Technical Program Travel Grant for those planning to present their research at the Annual Meeting. Lastly, the committee evaluates applications for the SEG Near-Surface Research Award, which offsets costs associated with a near-surface geophysics project.

The year 2020 brought new challenges to our community. The pandemic impacted the process and outcome of our standard procedures. In summary:

- SEP was canceled. All 85 applications were reviewed by the committee.

- SLS was conducted virtually, with 54 participants awarded out of 91 applicants.
- The Technical Program Travel Grant was given to all 33 applicants, after eligibility verification, in the form of registration to the Annual Meeting. There were 24 recipients in 2019.
- The Near-Surface Research Award had five applicants. It was awarded to Daniel Locci of Louisiana State University for the project, "Point bar systems geophysical characterization at low effective pressure during seasonal river stages in the Lower Mississippi River Valley."

## 2020 ACTIONS

The Travel Grants Committee chair interfaced with members of the Committee on University and Student Programs to provide a webinar on the grant review process and best practices for a successful grant application. In addition, the Travel Grants Committee implemented a three-person application review format. This practice will continue into the future.

## 2021 PLANS

The committee will continue to search for new and diverse membership

throughout the year. Members of the committee plan to review and suggest improvements to the descriptions and available information for all grants listed on the SEG website.

I would like to acknowledge and thank the members of the committee for their service to SEG during 2020:

- Paloma Acuña
- Emma Butler
- Chandra Dubey
- Seth Haines
- Dalton Hawkins
- Sara Kellal
- Ali Mahdy
- John Onayemi
- Cecilia Ramirez
- Zhiguo Wang
- Deborah Wehner

## University and Student Programs

Joan Marie Blanco, chair

In 2020, the Committee on University and Student Programs (CUSP) continued to build better connections with student chapters through regular contact from CUSP members. The committee added new points of contact for student chapters in India, Indonesia, and Malaysia to better connect with chapters in those areas.

In the first and second quarter of the year, the committee produced three webinars for student chapters. The webinars discussed scholarship and field camp grant applications, travel grants, and Student Chapter Excellence program applications. They featured panel discussions with experts to answer questions about careers in applied geophysics. They also provided student chapters with information on SEG and SEG's student programs. The webinars are designed to encourage better understanding of SEG and to provide student chapters with an opportunity to interact with each other. Additional webinars are planned for 2021.

In the third and fourth quarter of the year, the committee focused on brainstorming and planning for new paper/project competitions that would encourage student participation on a global scale. The competitions would be conducted online with minimal expense. These plans will be further developed and perhaps implemented in 2021.

The Student Chapter Excellence Program Subcommittee of CUSP evaluated applications for the 2020 Best Student Chapter. There were 223 active student chapters in 2020. Nine new chapters were approved by the SEG Board of Directors. A total of 74 chapters submitted applications for

the award. The evaluators selected Uppsala University in Sweden as the Best Student Chapter and Universidad Industrial de Santander in Colombia as the Most Improved Student Chapter.

## 2021 OBJECTIVES

The committee's main objectives for 2021 include:

- Continue improvement of connections to student chapters on a regional level through Zoom meetings
- Plan and implement a student innovation competition to be conducted online

## Women's Network

Blair Schneider, chair

The SEG Women's Network Committee (WNC) was created in 2011 to raise awareness and find solutions for the challenges women encounter in applied geophysics.

## ACCOMPLISHMENTS

The committee achieved several accomplishments in 2020.

- WNC provided 10 free webinars on technical topics and soft skills. The

webinars were well attended, with an average of 200 registrants.

- The committee organized and offered a virtual career panel discussion. The panelists represented industry, academia, government, and public outreach. The discussion was held on the first day of the SEG Annual Meeting. There were more than 400 registrants.
- WNC created a quarterly newsletter that provides timely information on upcoming activities, updates, and relevant information for our community.
- Members of the committee created the criteria for a new award, sponsored by WNC, titled the SEG IDEAL Award. The award will honor an individual for leadership in inclusion, diversity, and equality in geophysics.
- WNC responded to the pandemic by offering a free resume review program for student and early-career members of SEG. Members of the committee provided feedback on hundreds of resumes.
- The committee prepared and presented an exhibit to the SEG Board on efforts that SEG should take to address diversity, inclusion,

and equity within our Society. This exhibit had an influential affect on current work by the Equity in Process Task Force.

- WNC partnered with Science-A-Thon to raise funds for social good.

### FUTURE GOALS

- Work with the SEG Honors and Awards Committee to include the IDEAL Award in its offerings
- Continue to offer the resume review service for student and early-career members
- Continue efforts to globalize WNC through regional initiatives and student-chapter activities led by young professionals and students
- Revamp the WNC website to better serve audiences
- Establish guidelines for student chapters across the world
- Canvass and nominate more women for SEG honors and awards

### COMMITTEE LEADERSHIP

- Blair Schneider, chair
- Ellie Ardakani, vice chair
- Natt Srisutthiyakorn, newsletter editor

### ADVISORY COUNCIL

- Eve Sprunt
- Hendratta Ali
- Nancy House
- Maria Angela Capello
- Maitri Erwin

# REPORTS OF TASK FORCES

## REPORTS OF TASK FORCES

### Annual Meeting

Maurice Nessim, chair

SEG President Rick Miller formed the Annual Meeting Task Force in 2020 and made President-elect Maurice Nessim its chair. The task force included six Board members (Ken Tubman, Rob Stewart, Baishali Roy, Gustavo Carstens, Bob Brooks, and Scott Singleton), three volunteers (Lee Bell, Mai Elfouly, and Sharon Teebeny), SEG senior management team members and staff (Rhianna Collier, John Koehr, Laurie Whitesell, and Trisha DeLozier), and 2020 Annual Meeting General Chair Wafik Beydoun. In the face of the global pandemic and a changing industry environment, the responsibility of the task force was primarily twofold.

#### OBJECTIVE 1: 2020 ANNUAL MEETING

Objective 1 was to evaluate the viability of a 2020 in-person Annual Meeting in Houston, Texas. Its aim was to identify challenges from a financial; logistical; health, safety, security, and environment; and attendance-uncertainty standpoint. It also aimed to propose alternatives, including actions needed to reduce net-revenue losses from contractual and other binding agreements.

#### OBJECTIVE 2: FUTURE ANNUAL MEETING FORMAT

Objective 2 was to identify opportunities to modernize the Annual Meeting in order to meet the SEG strategic initiatives to diversify globally, demographically, and beyond oil and gas while embracing the latest digital technologies and current industry trends of the energy transition. The objective included identifying opportunities and rationale to partner with other societies such as the Society of Petroleum Engineers (SPE), American Association of Petroleum Geologists (AAPG), American Geophysical Union, and the Society of Petrophysicists and Well Log Analysts. Finally, it included looking for opportunities to reduce SEG's financial dependence on the Annual Meeting.

#### OUTCOME OF OBJECTIVE 1

With the increasing number of COVID-19 cases globally, lockdowns in Houston, a reduction in travel, and budgetary constraints resulting from an industry downturn, Objective 1 rapidly became a critical matter. The task force met weekly to evaluate pandemic restrictions and financial ramifications to SEG in the event that the in-person Annual Meeting needed to be canceled. The task force built

four scenarios to analyze the negative financial impacts in each case.

Simultaneously, progress continued in setting the technical program and keeping track of exhibitor registration and presenter commitments. A sub task force fiercely investigated all of the fully virtual and hybrid meeting options. By June 2020, it was evident that an in-person meeting was impossible. Even a hybrid event (small in-person attendance plus a virtual meeting) was becoming out of reach. The meeting venue (the George R. Brown Convention Center) remained closed based on City of Houston guidance. In July, the Annual Meeting Task Force brought forward a motion to the SEG Board of Directors to approve a 100% virtual meeting and requested SEG staff to move forward with preparations.

#### OUTCOME OF OBJECTIVE 2

Keeping SEG's strategy of diversification as an overarching goal, Nessim subdivided the task force into two subgroups. This was in order to assess the future of SEG Annual Meetings and to provide recommendations and justifications on how to select and frame meeting formats in terms of delivery method, location preference, meeting frequency, meeting content, target audience, and

	Annual Meeting	Regional Meetings
<b>Delivery</b>	Hybrid/Concurrent w/ strong Digital content	Hybrid/Concurrent, w/ stronger Digital content
<b>Geography</b>	Houston + rotate Global (opportunistic)	In hotspots, check joint regional events <sup>(1)</sup>
<b>Content</b>	Seek partner with similar aspiration to develop a joint program (subsurface, O&G & beyond)	Seek partner with similar aspiration to develop a joint program (subsurface, O&G & beyond)
<b>Frequency</b>	Annually, same time period	1 Global/year (from opportunistic to strategic)
<b>Style</b>	60% Technical + 30% Business-Strategy + 10% PNA <sup>(2)</sup> (experimenting)	50% Technical + 40% Business-Strategy/region driven + 10% PNA <sup>(2)</sup> (experimenting)

(1) International/regional meetings: IPTC\*, OTC Brasil\*, OTC Asia\*, ADIPEC\*, GEO\*, ONS, OE, SPE ATCE, AAPG ICE, EAGE, Society of Economic Geologists, Geothermal Resources Council, EEGS (Environmental and Engineering Geophysical Soc.), AGU, ASCE (civil engineers), EDF? - \*SEG involved - For Middle East: c/o Yoganani  
(2) PNA - Prospective 'New' Areas: Near surface, CCUS, Planetary Geophysics, Earth resources (H2), Renewable energy, Geothermal, Sustainability, Monitoring Emissions, Geotechnical/civil eng., STEM, Enabling technologies AI/ML/Cloud, UAV/Drones, Hydrogeophysics, Value to communities from prof. societies working together

Figure 8. Recommendations from teams A and B.

meeting style. Team A, led by Roy, focused on the SEG Annual Meeting only (with no association with sister societies). Team B, led by Beydoun, focused on partnership opportunities between the SEG Annual Meeting and sister societies. Both teams, after multiple brainstorming sessions, converged on a joint set of recommendations that are shown in Figure 8.

One of the key ideas proposed through the subteam efforts is the SEG regional meeting expansion concept, which would be achieved through concurrent meetings. The goal of a regional Annual Meeting expansion (in addition to topical-themed workshops) would be to produce a successful and profitable SEG annual global meeting while expanding SEG's global reach. Benefits to SEG would include:

- connecting the world of applied geophysics
- increasing global engagement and enabling strategic growth of SEG membership globally
- increasing revenue by charging a reasonable fee for virtual/hybrid attendees
- finding opportunities for new business development globally
- leveraging the current shift to virtual meetings to expand the concept for regional meetings
- engaging and working with relevant SEG regional offices and Regional Advisory Committees to meet goals and objectives of the expansion

An example of a rotating regional meeting framework is shown in Table 18. The task force also made the recommendation to shift the location of North American Annual Meetings to Houston starting in 2024. This was decided based primarily on attendance statistics and exhibitor convenience.

Team A and B analyses are shown in Tables 19 and 20, respectively. Team B summarized the analysis of other professional societies/associations and their strategic fit into future trends and SEG needs in Figure 9.

Next-step recommendations of the two teams are:

- An Annual Meeting Task Force 2.0A should be assigned. It would include Board members and SEG office leaders (headquarters and regional offices), totaling approximately five people, to detail an SEG regional expansion plan.
- Annual Meeting Task Force 2.0A would work on Annual Meeting/ regional meeting value proposition. This would include defining SEG stakeholder engagement, a local partnership model for regional meetings, cost structure for hybrid/ concurrent meetings, benefits for all parties, etc.

- Annual Meeting Task Force 2.0B would define the Annual Meeting partnership vision and value proposition and oversee negotiations. It would identify the top three to five societies to approach. We recommend starting with AAPG, the European Association of Geoscientists and Engineers, and SPE. To broaden SEG areas in applied geophysics, we suggest approaching the Environmental and Engineering Geophysical Society, American Society of Civil Engineers, Geothermal Resources Council, and Society of Economic Geologists.

society board representatives to form the Joint Annual Meeting Task Force (JAM). JAM would define a joint Annual Meeting/ regional meeting plan and secure endorsements from respective boards.

- Annual Meeting Task Force 2.0C would investigate opportunities for financial risk reduction tied to Annual Meetings.

- Annual Meeting Task Force 2.0B would engage with selected

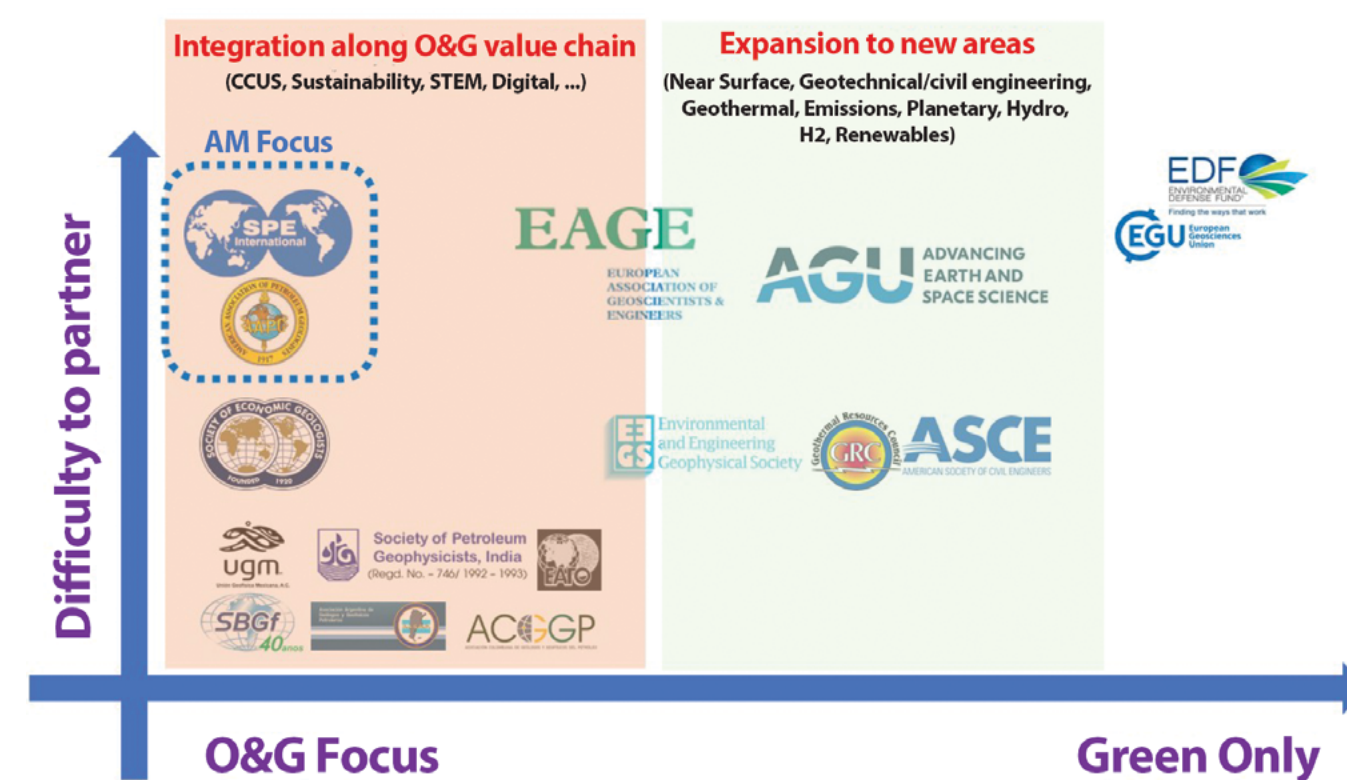


Figure 9. Team B analysis of other professional societies/associations.

**Table 18.** Example of a rotating regional meeting framework.

Year	SEG Annual Meeting	Regional concurrent location	Regional concurrent location	Regional concurrent location
2021	Denver	APAC (Beijing)		
2022	Dallas/San Antonio	Dubai	APAC (KL)	Rio
2023	New Orleans	APAC (Beijing)	Europe (PESGB)	
2024	Houston	Dubai	APAC (KL)	Rio
2025	TBD	APAC (Beijing)	Europe (PESGB)	

**Table 19.** Team A analysis.

Strengths	Opportunities
Tradition. We know how to do this, and we have well-known colleagues. It is our meeting and community.	The Annual Meeting should be held in Houston for the next several years due to simplicity of logistics, number of participants, knowledge of the site, and the minimization of expenses for exhibitors and attendees.
Independent, nimble, simple, and focused	The Annual Meeting in Houston could be simultaneous with a regional meeting.
SEG's mandate is to advance the science of exploration geophysics and its application as well as develop its member expertise and fellowship. Thus, the Annual Meeting should serve all of these broad purposes (technical, economic, and social).	SEG has expended great effort on its regional offices and deep commitment to globalizing our interest and impact. The three regional offices (China, Dubai, and Kuala Lumpur) should be encouraged to develop a regional meeting in their sectors to serve SEG's strategic direction.
The Annual Meeting should continue to knit the scientific fabric and social network of our members, continue to advance geophysics, provide leadership in the expanding application of geophysics, and maintain our identity.	SEG's official meeting needs to be every year but could be conferred at different regions. A regular meeting, more topically focused, could be at an appropriate site outside of our office locations.
Weaknesses	Threats
Does not meet strategic initiatives on diversification beyond geophysics. There is smaller, less cross-disciplinary fertilization.	Losing members due to the risk of defocus from technical workshops and losing engagement of U.S. regional geophysical societies
Too many organizations. Stakeholders (exhibitors) want joint combinations, such as URTeC, Energy in Data, OTC, etc.	A Houston-only meeting could be perceived to be oil and gas focused, alienating non-oil and gas stakeholders.

**Table 20.**  
Team B analysis.

Strengths	Weaknesses
Share cost and risk	Board of director endorsement
Gain scale and impact on global/geographic reach	Consistent position from joint company representatives in each of the societies
Lower liability risks by partnering (hotels, convention, etc.)	SEG is global, but still North-American centric
Expand to become more global and multidisciplinary	Geophysics in the current context is a bit sidelined
Connect/put in context geophysics and other parts of the value chain, without compromising depth	Poor communication on the value of geophysics when approaching other societies/disciplines
Opportunities	Threats
Provide more services to members in a trend where staff and budget in professional societies are diminishing	Sister societies may not share same vision/ aspiration to join
Multidisciplinary aspect of the industry; strong benefit to work jointly during the Annual Meeting on cross-disciplinary topics while strengthening each society's core technical edge	Belief that this is a normal downturn cycle and things will go back to the "old normal" after the crisis
Rebranding multisociety events appropriately by communicating value proposition/reason to belong	Competing strategies (by discipline and/or regionally)
Learning to work more efficiently with sister societies on the Annual Meeting opens up more opportunities to expand into other activities	Not getting SEG proposal through sister societies' board; lack of buy-in by initial contacts in the sister societies
Seek a society that complements SEG geographically, enabling it to become more global	Threat of merger and loss of identity and what we stand for as a society; losing SEG's strength/ identity
Be the go-to society for applied geophysics across the board	
Challenge: several captains steering the joint ship; one needs clear R&R/governance to respect identities	

The Annual Meeting Task Force will continue to pursue these recommendations to build action plans for regional meeting expansion. The task force will continue investigating options to move the Annual Meeting into a lower-risk/higher-profit global event that meets the Society's need to reach a broader applied-geophysics community beyond oil and gas. Engaging a younger demographic globally will remain a key objective.

### Business Continuity Maurice Nessim, chair

The Business Continuity Task Force was established by SEG President Rick Miller on 3 April 2020 in reaction to the global industry environment and pandemic. President-elect Maurice Nessim was designated as its chair. The task force was made up of three Board members (Ken Tubman, Baishali Roy, and Gustavo Carstens), one volunteer (Lee Bell), and SEG staff (Rhianna Collier, John Koehr, Derek Williamson, Linda Ford, Tom Agnew, and Ted Bakamjian). The mission of the task force was to recommend to the Board and the SEG senior management team what measures should be taken to mitigate the impact of the situation on the Society's revenue.

The first order of business was to work with the Finance Committee and staff to examine scenarios of the revenue and expenses of the Society, which would supersede the previous budget constructed in January. The situation was very uncertain and changing rapidly as the pandemic progressed and the oil market faced additional stress. The scenario approach enabled us to test a range of assumptions. The budget as approved in January was essentially breakeven (Figure 10).

It quickly became obvious that the Meetings Portfolio (the Annual Meeting plus partnered events including the Offshore Technology Conference [OTC], the North American Prospect Expo [NAPE], and the International Petroleum Technology Conference)

### 2020 Approved Budget

Board Approved Budget (Without IDC)			
	Revenue	Expense	Net
Support Services	\$ 250,000	\$ 3,774,148	\$ (3,524,148)
Business Development	\$ 1,086,664	\$ 1,075,171	\$ 11,493
Students & Early Career	\$ 1,034,500	\$ 1,135,046	\$ (100,546)
Meetings	\$ 6,665,334	\$ 4,030,749	\$ 2,634,585
Publications	\$ 3,027,665	\$ 2,733,580	\$ 294,085
Constituent Engagement	\$ 1,084,118	\$ 426,647	\$ 657,471
Professional Development	\$ 913,500	\$ 1,261,741	\$ (348,241)
Regional Offices	\$ 1,407,296	\$ 1,030,818	\$ 376,478
<b>TOTAL</b>	<b>\$ 15,469,077</b>	<b>\$ 15,467,900</b>	<b>\$ 1,177</b>

Figure 10. The budget as approved in January.

was critical to revenue. By mid-April, OTC and NAPE had been canceled.

While looking at the possibilities for the Annual Meeting, we considered its impact in four scenarios. The first scenario was mostly in person with 3000 attendees. The second scenario included 1500–2000 attendees with a virtual option (hybrid). The third scenario was purely virtual as the result of force majeure. The fourth scenario included SEG canceling the event. In addition, all nonstaff expenses that could be reduced were cut. The impact on the budget is displayed in Figure 11. The large negative in scenario 4 is due to the convention and hotel cancellation penalties if the city did not declare force majeure.

It became obvious that the Society was going to have to dip into its reserves. Scenario 2 appeared most likely at the time. To limit the call on the reserves to US\$2 million, the task force recommended to the Board a reduction in staff-related expenses of \$1.44 million. The Board approved. This was accomplished in May because waiting longer would have meant deeper cuts.

With the eventual declaration by the City of Houston of force majeure for the convention center, the Society moved to scenario 3. The Annual Meeting became virtual, with a similar expense profile as scenario 2.

In summary, the budget shortfall due to the conversion of the Annual Meeting to virtual, the cancelation of the partnered meetings, the elimination of the hotel and convention termination fees, the reduction in staff expenses, and the use of \$2 million from reserves remedied the budget crisis as reflected in scenario 3. This analysis shows the challenges that await the Society for the 2021 budget because the twin global predicaments still will be largely present.

## Climate Change

John Bradford, chair

The Climate Change Task Force was established in January 2020 to review SEG’s current statement on climate change and recommend changes. The task force continues to work on a revised statement that will explicitly acknowledge climate-change science with citations, recognize the need for urgent action, acknowledge efforts of the industry, and delineate how applied geophysics can help understand the challenge and specify actions that geophysics actions can take.

## Digital Transformation

Bill Abriel, chair

The purpose of the Digital Transformation Task Force is to identify business opportunities within the virtual operations of SEG. Members of the task force include Jennifer Crockett, Linda Ford, Brandy Hawkins, Xiaojun Huan, Jenő Mavzer, Rick Miller, Shelly Oakley, Scott Singleton, Mick Swiney, Ken Tubman, Ted Bakamjian, and Bill Abriel.

Over the past several months, the team has engaged in defining a foundational framework for the digital business. This was accomplished by first defining and segmenting the customer base, which led to the identification of job types and marketing personae. The second foundational framework was the specification of SEG services and products undergoing digital transformation. Third, the team defined the four basic types of markets in which SEG operates: knowledge, services sector, technology development, and community management. It is now possible to conceive a digital SEG experience to move efficiently through and between these markets online while business-intelligence software directs and serves the user experience.

The current focus of the team is to identify and develop the best business

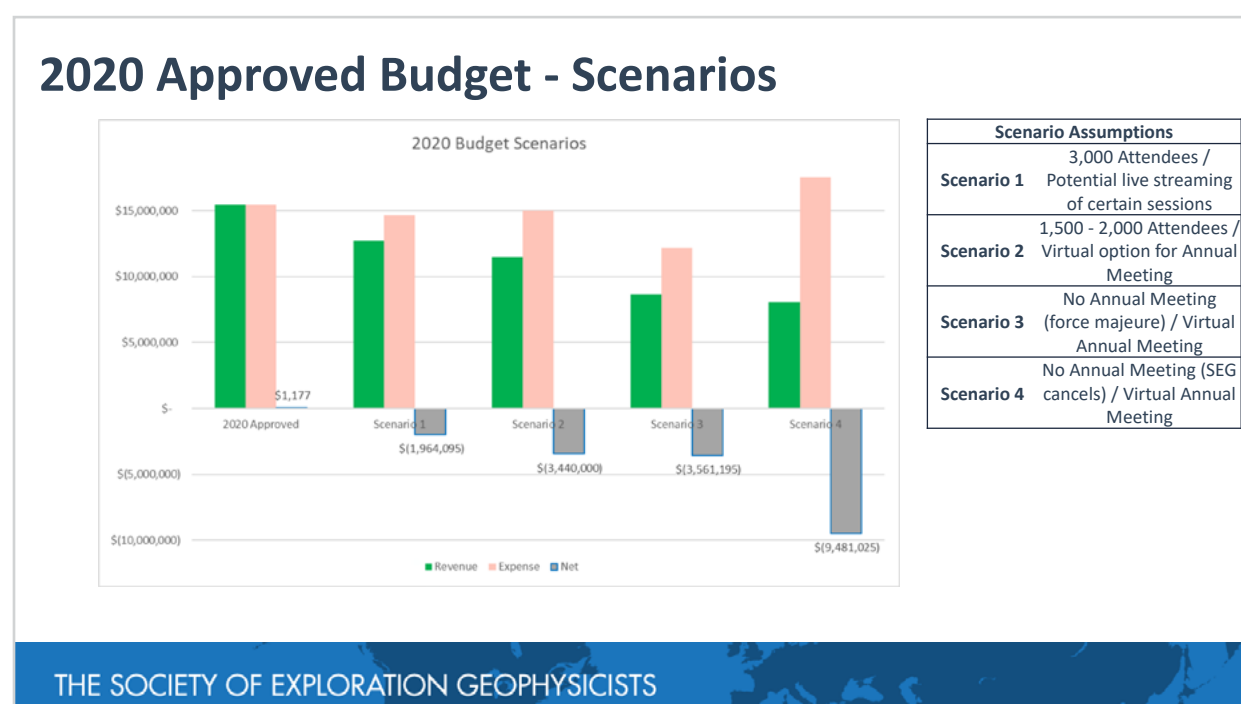


Figure 11. Budget scenarios.

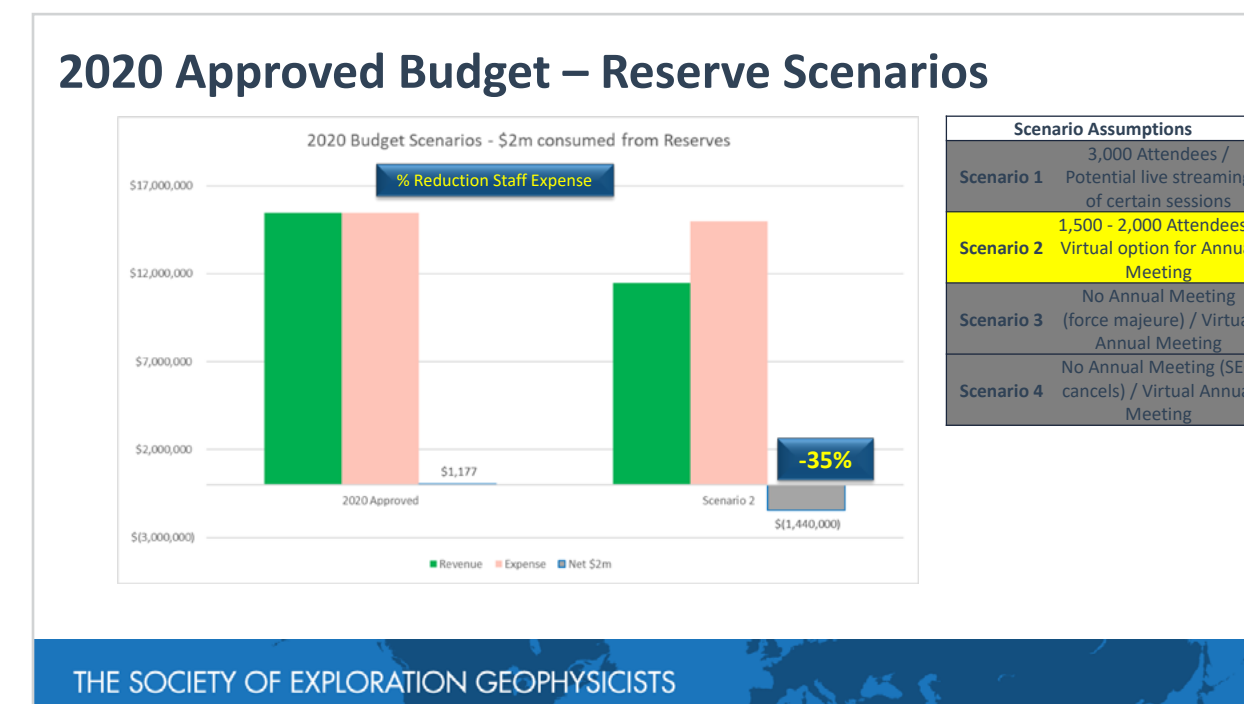


Figure 12. Reserve scenarios.

opportunities in the four markets and detail an appropriate business model for the profitable operation of SEG.

### Equity in Process

Anna Shaughnessy, chair

The Equity in Process (EIP) Task Force was initiated by SEG President Rick Miller in August 2020. The purpose of the task force is to do a deep dive into SEG's Policies and Procedures and Bylaws to root out any process or activity with bias or that cultivates a culture of inequality (racism, bigotry, or discrimination) in any form.

Members of the task force will provide recommendations to the SEG Board of Directors about areas experiencing bias and in need of realignment.

Once the EIP Task Force completes its task, a second task force will be established. It will provide review and oversight of all SEG processes and associated guidelines, policies, and procedures involving evaluations, reviews, nominations, judging, and other selection processes where inherent bias or systemic racism may play a role. This second task force will roll into a standing committee once the policies and procedures are established.

Members of the EIP Task Force are:

- Samir Abdelmoaty
- Tariq Alkhalifah
- Hendratta Ali
- George Apostolopolous
- José Arce
- Estella Atekwana
- Kim Begay-Jackson
- Kennedy Doro
- John Eastwood
- Lillian Flakes
- Eileen Martin
- Manika Prasad
- Anna Shaughnessy (chair)
- Jie Zhang
- Linda Ford (staff liaison)
- Shelly Oakley (staff liaison)

### Houston Office

Rob Stewart, chair

The Houston Office Task Force was formed to develop a business plan that provides a balanced budget, supports members throughout the southern United States, does not compete with local societies, enhances engagement with applied-geophysics professionals and companies using applied geophysics, and serves to support the international community with a presence in Houston. The task force held a series of meetings during 2018–2020 to outline key rationale for a Houston office. Efforts have resulted in a detailed staff business plan and hiring of key staff, including the executive director, in Houston. The office is expected to be operational in early 2021, and the committee has been disbanded.

### Machine Learning

Christopher Liner, chair

The Machine Learning Task Force consisted of Christopher Liner and Bill Abriel. It was established in 2019 with the purpose of recommending a machine learning (ML) special interest group or committee to the SEG Board of Directors. Meetings were held weekly throughout 2020, during which it was decided the appropriate format was a committee rather than special interest group. Founding committee chairs were approached and agreed to serve, including Bob Clapp (Stanford University) and Mauricio Araya (Total).

Weekly meetings continued with the cochairs. Ted Bakamjian was appointed initial staff liaison to the proposed committee and advised the drafting of a committee charter for the Policies and Procedures Manual. This activity culminated in a motion to the SEG Board of Directors on 8 October 2020. The Board voted to establish the SEG Machine Learning Committee. With successful establishment of the committee, the task force was dissolved.

SEG has a long history in machine learning, dating to 1984. Machine learning is a key integrating technology for merging geophysics, geology, and engineering across many of the great societal issues of our time, including



Figure 13. Members of the Equity in Process Task Force.

energy, food, water, and climate. My heartfelt thanks go to Rick Miller and Rob Stewart for encouraging this effort, Abriel for his tireless effort and unerring guidance, SEG Board members for voting the committee into reality, and Clapp and Araya for outstanding volunteer work as cochairs. The Machine Learning Committee is a gathering place, a symbol of SEG’s commitment to machine learning, and a tribute to those researchers who have already pushed the frontier.

## Wiki

Baishali Roy, chair

President Rick Miller formed the SEG Wiki Task Force with a charge to “develop and evaluate options for enhancing the SEG Wiki.” The task force held one meeting (April) and covered the following:

- Reviewed current content and content-development activities
- Listened to comments from task-force members about how the wiki could be improved
- Reviewed the 2019 expansion of the SEG Wiki Committee remit to include podcasts and blogs

Joining me for this session were Karl Schleicher (Wiki Committee chair),

Sergey Fomel (Publications Committee chair), Ted Bakamjian (associate executive director, publications and communities), and Andrew Geary (publications outreach and EVOLVE program manager).

Geary gave a presentation covering the SEG Wiki’s history, growth, and superior activity level in comparison with wikis operated by the Society of Petroleum Engineers (SPE) and American Association of Petroleum Geologists (AAPG). All three wikis were launched in 2012. As of 15 April 2020, the SEG Wiki had 4041 content pages, compared with 253 pages for SPE’s PetroWiki and 888 pages for the AAPG Wiki. Number of edits is more indicative of the relative level of volunteer activity. There had been 147,219 edits for the SEG Wiki in April compared to 13,414 for PetroWiki and 28,971 for the AAPG Wiki. By the end of 2020, there had been more than 160,000 edits to the SEG Wiki. A majority of these are associated with crowd-sourced translations of Robert E. Sheriff’s *Encyclopedic Dictionary of Applied Geophysics* and primarily the translation into Spanish.

The SEG Wiki continues to grow in usage, too. In 2020, there were 1,353,176 page views — an increase of nearly 20% compared with total page views in 2019.

Geary’s presentation to the task force also covered the expanded role of the SEG Wiki Committee. It was proposed, and all attendees agreed, that the committee should be renamed the Community Content Committee to cover the scope of its new role, and this change was approved by the SEG Board later in the year.

Participants discussed possible organization, leadership, technology, and workflows for a blog. There also was discussion about prospects and capacity for developing a stronger program of video presentations and buildup of SEG’s YouTube channel. Other topics included the need for new wiki funding through the SEG Foundation, the value of repro zoos and hackathons, and the prospects for conducting them online amidst the pandemic.

Geary left SEG’s staff in August 2020 yet continues to produce three episodes of the Seismic Soundoff podcast each month. Susan Stamm, SEG’s books manager, has taken on staff support for the SEG Wiki and is working closely with the translations teams.

# REPORTS OF REPRESENTATIVES

## REPORTS OF REPRESENTATIVES

### GeoScienceWorld

Ted Bakamjian, representative

GeoScienceWorld (GSW) is a nonprofit collaborative and comprehensive online resource for research and communications in the earth sciences that is built on a core database of peer-reviewed journals and is integrated with the GeoRef index. SEG is one of GSW's seven founding organizations, along with the American Association of Petroleum Geologists (AAPG), the Geological Society of America (GSA), the Geological Society of London (GSL), the American Geosciences Institute, the Mineralogical Society of America (MSA), and the Society for Sedimentary Geology (SEPM). The journals aggregation launched in February 2005 and today includes 50 journals from 33 publishers. SEG has three journals available through GSW: *GEOPHYSICS*, *The Leading Edge (TLE)*, and *Interpretation* (copublished with AAPG). SEG also is one of 13 publishers participating in GSW eBooks, which launched in 2014 and includes more than 1200 titles, including more than 145 from SEG.

GSW is supported by institutional journal and book subscriptions and perpetual-access sales of books to institutions. Institutions subscribing to the journals are required to purchase access to the entire

journals aggregation. Compensation to participating publishers is based on a combination of the amount of content the publisher contributes and how much it is used. By participating in GSW, SEG extends the usage of its publications beyond the SEG Library while also earning royalties. GSW also serves as a collective, giving strength to SEG and other independent geoscience publishers in an increasingly challenging scholarly publishing economic climate.

Approximately 20% of usage of *GEOPHYSICS*, *TLE*, and *Interpretation* occurs through GSW, with nearly all of the rest enabled by the SEG Library. Usage of SEG publications on GSW improved by about 25% in 2019 following a significant decline in 2018 due to some adjustments that enhanced article discovery. However, the share of total usage of SEG journals that occurred on the GSW platform declined because usage on the SEG Library soared following an SEG Library major platform upgrade in February 2019. Usage of SEG journals on the GSW platform used to account for approximately one-third of all usage of the Society journals. Royalties SEG earns from its participation in the GSW journals program remain a significant portion of SEG's total subscription revenue.

An aggregator throughout its history, GSW expanded into publishing by launching its own open-access journal in January 2020. Rather than start from scratch, GSW purchased an existing journal, *Lithosphere*, from GSA. SEG is participating in *Lithosphere* along with AAPG, GSA, GSL, MSA, SEPM, and the Society of Economic Geologists. The journal is compliant with research-funder mandates that are requiring authors to publish in fully open-access journals. SEG's journals are hybrid open-access journals, meaning that authors can pay a fee to make their articles free under an open license.

By participating in *Lithosphere*, SEG gives authors who must or want to publish in a fully open-access journal the option of gaining one round of peer review through *GEOPHYSICS* or *Interpretation* prior to manuscript transfer. During 2020, only one *GEOPHYSICS* manuscript had been transferred under this arrangement. SEG editors can recommend transfer of other manuscripts that they decline to accept for their own journals that they deem sound scientifically but that may be lean on novelty or are out of the journal's scope. SEG, meanwhile, secured a commitment from Shuo Guo of Tsinghua University in China to serve as an associate editor on the editorial

board of *Lithosphere*, to which any author may submit a paper directly.

After 10 years at GSW's helm, Alix Vance stepped down as CEO in August 2020 to become CEO of AIP Publishing, the American Institute of Physics' publishing division. Phoebe McMellon, an executive with Elsevier for 12 years including service as leader of the Geofacets program, was hired as CEO of GSW in November. McMellon has prior connection to SEG not only through Geofacets in which our Society participates but also as a former member of the Geoscientists *Without Borders*® Committee.

### International Association of Oil and Gas Producers

Shawn New, representative

SEG's Technical Standards Committee (TSC) has been discussing whether P1/11 position data exchange formats managed by the International Association of Oil and Gas Producers (IOGP) can function as a replacement for SPS\_r2.1 (Shell Processing Support Format). The TSC plans to form a subcommittee to engage operators in a review to determine whether P1/11 can replace SPS as written or whether the TSC should provide the IOGP — to which SEG transferred positioning standards several years ago — with

additional format requirements before SPS can be retired.

### IPTC Management

Joseph Reilly, Board member  
Mohammed Badri, Board member

The International Petroleum Technology Conference (IPTC) rotates between Asia Pacific and Middle East locations. IPTC is organized to advance technology related to exploration, drilling, and production as well as transportation and processing covering upstream and midstream technologies. IPTC partners are the American Association of Petroleum Geologists (AAPG), the European Association of Geoscientists and Engineers (EAGE), the Society of Petroleum Engineers (SPE), and SEG. SPE operates IPTC on behalf of the partnership.

Key factors responsible for IPTC's success are the host national oil company, an international oil company cohost, and service-sector support. Structurally, IPTC is incorporated with the four societies as owners (20% interest to SEG). The board of directors consists of eight members, two appointed from each society. Joseph Reilly, chief geoscientist for ExxonMobil, and Mohammed Badri, managing director for Schlumberger

## REPORTS OF REPRESENTATIVES

Research Dhahran, are SEG's IPTC board of director's representatives.

### **IPTC 2020 IN DHAHRAN (13–15 JANUARY 2020)**

IPTC 2020 attracted a record-breaking attendance of more than 18,000 attendees from 1080 companies and 75 countries. This was the first international multidisciplinary intersociety oil and gas conference and exhibition held in the Kingdom of Saudi Arabia.

The event was opened on behalf of His Royal Highness Prince Mohammed Bin Salman Bin Abdulaziz Al-Saud and His Royal Highness Prince Abdulaziz bin Salman Al Saud. This marked the beginning of three days that catered to the dynamic interests of global oil and gas professionals and sparked discussions about key solutions and technologies that will take the industry on a path of further development and innovation. In attendance were global thought leaders, leadership from national and international oil companies, and government officials.

The Ministerial Dialogue covered a wide range of issues in the industry, such as sustainability, oil price volatility, and the future of the oil and gas industry. The CEO Plenary Session addressed how the energy

sector can satisfy growing demand for environmental protection and climate change and how it is being transformed.

The Energy Think Tank Session addressed navigating global dynamic energy. It also shared how innovative energy solutions are integral for the long term, as harmful emissions threaten the environment and human health. The Executive Plenary Session discussed shaping the upstream ecosystem for a new energy era and how securing the energy needs of tomorrow will require innovation to maximize the value chain for all stakeholders.

Five panel sessions highlighted a wide range of noteworthy topics to help attendees deepen their knowledge and understanding of emerging technologies, best practices, and trends in the industry. A total of 100 technical paper sessions took place, covering a variety of disciplines.

The IPTC Society Presidents Panel Session featured the presidents of IPTC's four sponsoring societies. They shared their perspectives and visions about how the latest technological advances are shaping the future of the industry.

Six ask-the-expert sessions featured leading academic and industry professionals who discussed oil recovery, simulation, and innovative seismic technology. The sessions were followed by interactive question-and-answer discussions.

A total of 162 e-poster sessions took place, where authors presented their technical papers and attendees had the opportunity for further knowledge-sharing and networking opportunities.

Two project case study sessions reviewed the application of innovative technologies and practices. In addition, two seminars helped professionals improve their expertise and stay up to date on best practices in a dynamic industry.

The Diversity and Inclusion Program included a workshop and a number of panel sessions. They discussed best practices to increase diversity, promote inclusion, and encourage the concept of belonging.

IPTC Education Week aims to give students around the world a clear insight into the industry and provide them with the opportunity to interact with a number of major industry employers. This year, more than 400 student applications were received, of which 93 students representing

64 institutions and 29 countries were invited to participate.

Finally, a world-class exhibition featured more than 250 companies exhibiting their products and services, showcasing the latest solutions and technologies, and enabling delegates and visitors to discuss potential partnerships and projects.

### **IPTC 2021 IN KUALA LUMPUR (23 MARCH–2 APRIL 2021)**

Considering the rapidly changing guidance and restrictions by governments and companies, and following consultation with key partners and stakeholders, the decision has been made to hold IPTC 2021 as a virtual conference and exhibition.

The virtual event will be held from 23 March to 2 April 2021 and will include exciting new sessions. PETRONAS will serve as the host organization, with Mubadala Petroleum and Schlumberger participating as cohost organizations. The event is being planned to have minimal financial impact on IPTC, as it is expected to break even.

### **FINANCIALS**

The audited financial surplus from IPTC 2020 was US\$1,366,596.

SEG's distribution share was 20% (\$273,219.20). A total of 50% of the IPTC 2020 surplus share plus balance from previous editions was paid to SEG in August for a total amount of \$193,885.00. A balance of \$137,369 remains in the reserve and will be settled at a later date.

## REPORTS OF REPRESENTATIVES

### NAPE Advisory

Patrick Ruddy, representative

Partners in the North American Prospect Expo (NAPE) are the American Association of Petroleum Landmen (AAPL), the Independent Petroleum Association of America (IPAA), the American Association of Petroleum Geologists (AAPG), and SEG. NAPE was founded by AAPL in 1993. IPAA joined as a partner in 1995. In 2004, AAPG and SEG came aboard, each taking a 10% interest. This left IPAA with 29% and AAPL with a majority-ownership 50.5% position. NAPE Management LLC retains 0.5% and serves as NAPE's general partner. Partners participate through the NAPE Advisory Board, on which I began serving as SEG's representative in early 2019.

NAPE is an environment where prospect developers interact with potential buyers with the expectation of doing business. This environment naturally draws engineers, geoscientists, landmen, lenders, capital providers, etc. Because there is the expectation of making deals, many attendees are decision makers.

NAPE began in Houston with Winter NAPE (now called

NAPE Summit) and expanded to include Summer NAPE. Later, two regional conferences were added in Pittsburgh and Denver. However, they were discontinued when they proved unprofitable.

### NAPE SUMMIT 2020 (3-7 FEBRUARY, HOUSTON, TEXAS)

Although NAPE Summit 2019 attendance and financial returns were strong, 2020 broke the streak. Overall attendance declined by 9%, which was likely the result of layoffs and cost reduction. Compounding the decline was an 11% reduction in income per attendee. Although Expo attendance bore the brunt of the decline, with an 11% reduction, Business Conference attendance was up by 10%. This reflects a concerted push for quality by the NAPE operators that resulted in consistent increases in previous years. The number of exhibitors and sponsoring

companies declined, and expenses crept up by 2%. All of this contributed to a net surplus that was down by 21%.

Per the recommendation of NAPE's auditors, US\$1 million was held back from the NAPE Summit 2020 net surplus. This was done in order to cover expenses due to the global pandemic and state of the industry. As a result, \$293,068 was distributed to SEG, and \$100,000 was held back. With SEG's own financial challenges in 2020, its share of the remaining surplus was especially attractive. We expressed our desire to have the funds released, but not at the expense of imperiling NAPE's ongoing financial health.

### SUMMER NAPE 2020 (11 AUGUST-14 SEPTEMBER, HOUSTON, TEXAS)

Summer NAPE, which had already been struggling to maintain the

numbers it posted in 2018, took a major hit in 2020 due to the combination of the oil price crash and pandemic. Despite the entire NAPE team executing a heroic and skillful transition to a virtual format and achieving revised attendance goals, our loftiest ambition of breakeven was not realized. Summer NAPE 2020 resulted in a shortfall of approximately \$250,000. Losses were probably reduced by the introduction of the season pass package in 2019, which enabled registrants to attend both NAPE Summit and Summer NAPE events. The season passes locked in some of the registration revenue. SEG's share of the shortfall is -\$24,873, which reduces our portion of the held-back surplus to \$75,127.

### NAPE SUMMIT 2021 (18-20 AUGUST [IN PERSON] AND 9 AUGUST-3 SEPTEMBER [VIRTUAL])

In mid-November, NAPE operators made the difficult decision to move NAPE Summit 2021 to 18-20 August. The committee felt that this decision was best for the health and safety of attendees, exhibitors, sponsors, partners, staff, and the community. The NAPE Advisory Board unanimously supported the decision. In 2022, we are hopeful that NAPE Summit will return to its regular February schedule.

### NEW INITIATIVES

Initiated last year, the quarterly NAPE magazine continues to receive rave reviews. During this time of reduced physical interaction, it will help maintain regular contact with NAPE's audience. Prepandemic, the

**Table 21.**  
NAPE Summit attendance versus surplus.

	Attendance			Number of exhibitors	Net surplus (8/8 <sup>ths</sup> \$)
	Expo	Business Conference	Charities luncheon		
Summit 2018	12,298	915	1083	720	\$4,610,140
Summit 2019	12,368	963	1600 (sold out)	704	\$5,000,933
Summit 2020	11,004	1064	1300 (sold out)	671	\$3,930,679

**Table 22.**  
Summer NAPE attendance versus surplus.

	Attendance			Net surplus (8/8 <sup>ths</sup> \$)
	Expo	Business Conference	Number of exhibitors	
Summer NAPE 2018	2866	268	226	\$893,876
Summer NAPE 2019	2487	318	178	\$540,038
Summer NAPE 2020 (NAPE Network)	1501	181		(\$248,728)

## REPORTS OF REPRESENTATIVES

magazine was breaking even and had a circulation of 15,000, 70% of which was manager level or above. The editors are always open to ideas for stories on all things NAPE, including dealmaker and CEO profiles, articles on technical trends, and practical perspectives on the roles that landmen, geoscientists, and engineers will play in the energy transition.

### Offshore Technology Conference

Alex Martinez, SEG Board representative

#### OTC HOUSTON

The Offshore Technology Conference (OTC) 2020 was initially postponed and then canceled due to the global pandemic. In order to keep the momentum going and maintain brand recognition for the event, manuscripts accepted for the technical program were placed online, and several panel sessions were held virtually over the summer and fall.

The cancellation of the conference resulted in OTC not distributing revenue for 2020. This is an approximately US\$1 million revenue impact for SEG. However, the sponsoring organizations were given the opportunity to do a

limited draw on expected 2021 revenue to help with cash flow if needed.

The OTC 2021 technical program has been finalized. It is smaller than previous years, partially due to lower abstract proposal submissions and a strong desire to maintain technical quality. The current plan is to have a blended event, with some of the technical program in virtual format and the in-person portion in Houston. It is anticipated that there will be lower attendance in 2021 than in previous years due to lingering pandemic issues and the general state of the industry. Therefore, the organizing societies should expect lower revenue from the event.

OTC 2020 exhibitors were given the opportunity to roll over their exhibition payments to date to OTC 2021. Most took that option rather than receiving a refund. When the exhibitors were polled, there was a strong preference for an in-person rather than virtual event. Thus, OTC 2021 has been moved to August 2021 to provide a higher chance of an in-person event.

#### OTC BRASIL

This event has been postponed from 2021 to 2022. The event location is under evaluation.

#### OTC ASIA

OTC Asia moved from an in-person conference to a successful virtual event in October 2020.

### Unconventional Resources Technology Conference Management

Frank Brown, representative

The Unconventional Resources Technology Conference (URTeC) is a science-based annual conference developed as a collaboration of the American Association of Petroleum Geologists, the Society of Petroleum Engineers, and SEG. URTeC focuses on unconventional reservoir development with a specific emphasis on integrated workflows. URTeC operates through the Management Committee outlined in a Sponsoring Organizations Agreement. Leadership of the committee rotates among societies. The Technical Program Committee operates with cochairs from the three societies. SEG's cochair for 2020 was Scott Singleton.

URTeC 2020 was scheduled to be held in Austin, Texas. Due to the pandemic, the meeting was held virtually. The pivot to a virtual meeting, which began in May, was a success.

URTeC 2021 is scheduled for 26–28 July in Houston, Texas.

#### URTEC 2020 HIGHLIGHTS

Although the pivot to a virtual format presented challenges, the 2020 conference included many highlights.

- The opening plenary session was titled “Restructured global finance and geopolitics merge with a focus on environmental, social, and governance issues.”
- Conference registration was 2956.
- A total of 45 companies served as exhibitors.

#### URTEC ONE-DAY WORKSHOPS

Unfortunately, one-day workshops scheduled for Midland, Texas; Denver, Colorado; and Oklahoma City, Oklahoma, were postponed due to the pandemic. We are hopeful that the workshops will be able to be conducted in 2021.

#### GLOBAL URTEC CONFERENCES

Latin America URTeC, originally scheduled to be held in Buenos Aires 16–18 November was transitioned to a virtual format.

- There were 184 registrants for the conference.
- A total of 48 presentations were shared.
- Preliminary accounting suggests that it was a breakeven conference.

# FOUNDATION REPORT

## FOUNDATION REPORT

### Foundation Board of Directors

Michael G. Loudin, chair

As I write this late in 2020, it's easy to be discouraged. Many of us have lost friends and family to a terrible pandemic, and many of our colleagues have been caught up in layoffs. SEG itself has not been insulated from the economic damage inflicted on many of our partners and has seen deep cuts in both positions and programs. The SEG Foundation's plans for new fundraising initiatives in 2020 were postponed. In addition, the Foundation's Black Tie Gala fundraiser for Geoscientists *Without Borders*® (GWB) was canceled in light of the health risks it posed. Thankfully, the promise of vaccinations in 2021 is showing us some light at the end of the tunnel.

The SEG Foundation, a wholly owned subsidiary of SEG, is the fundraising arm of the parent organization. The SEG Foundation is an IRS 501(c)(3) charitable organization, which means donations to the Foundation are tax deductible in the United States. The Foundation financially supported 17 programs that benefited thousands of SEG members in 2020 by contributing almost US\$1.1 million to SEG from the combination of endowment spending and numerous pass-through

donations from corporations and individuals. At the end of 2020, the SEG Foundation's endowment was approximately \$16 million, of which about half supports scholarships, and our annual spending rate for endowed programs was 4%.

Thank you to the many corporations and hundreds of individuals who contribute their time, talent, and treasure to the SEG Foundation each year. You enable the education and continued development of thousands of members globally, as well as the application of geophysics in the service of humanity.

### 2020 FUNDRAISING RESULTS

- \$692,869 (unaudited numbers)

### CORPORATE GIVING: \$228,000

- Cimarex Energy Co. — GWB/Annual Fund: \$15,000
- In-Depth Geophysical — GWB/Annual Fund: \$3000
- PGS — Distinguished Lecture program: \$50,000
- Schlumberger — GWB: \$100,000
- TGS — Field Camps: \$60,000

### INDIVIDUAL GIVING: \$464,869

- Major Gift Donors — Cumulative total: \$228,167
- 26 Sustaining Trustee Associates
- Donations with SEG Membership dues: \$33,313
- Employer Matching Gifts: \$26,850

### 2020 FOUNDATION BOARD OF DIRECTORS

The Foundation Board included Michael G. Loudin (chair), Arthur Cheng (vice chair), Mark S. Leonard (treasurer), David C. Bartel, Craig J. Beasley, Alex Biholar, Maitri Erwin, Raymond C. Farrell, Michael C. Forrest, Gretchen M. Gillis, Julie K. Hardie, John A. Lambuth, and Zhaobo "Joe" Meng. Mid-term resignations were accepted for Pete W. Cramer (elected to the SEG Board) and Anna C. Shaughnessy (voted as the SEG president-elect).

### FUNDRAISING IN 2021 AND BEYOND

Despite such an annus horribilis, I am quite optimistic as I look forward to 2021 and beyond. The SEG Foundation spent much of 2020 building a strong framework for success in partnership with SEG

leadership and also in a GWB-focused partnership with the American Geosciences Institute.

Despite seven of our directors leaving the Foundation Board (three of whom were elected to leadership roles in SEG and AAPG), our six new directors bring an exciting diversity of background and talent. David Bartel, our talented development committee chair, has reorganized the committee, with every director playing a vital role. The Foundation's executive committee hired new and dynamic fundraising consultants and selected Mark Leonard to be our new major gifts officer. Leonard is an accomplished geophysicist who spent his career with Shell, served on the Foundation Board, and is an experienced and successful fundraiser. His initial focus will be on individual giving from new donors.

Furthermore, the Foundation's leadership took part in the search for and selection of our new SEG Executive Director Jim White. He has already strongly engaged with the SEG Foundation as we plan for 2021. Finally, we have enjoyed strong support from and regular communication with the Society's presidents and presidents-elect: Rick Miller, Maurice Nessim, and Anna Shaughnessy.

The SEG Foundation aspires to help geophysicists adapt and respond to humanity's increasingly diverse and urgent needs. Carefully stewarded and strategically applied by the Foundation, philanthropic investment will be vital to our profession's dynamic future, yielding exceptional educational, scientific, economic, and humanitarian benefits as applied geophysics continues to evolve.

# **SUBSIDIARIES REPORTS**

## SUBSIDIARIES REPORTS

### SEAM Board of Directors

John Eastwood, chair  
Shelly Oakley, director of operations

SEAM is the research arm of SEG. Our mission statement asserts: “SEG Advanced Modeling Corporation (SEAM) is a not-for-profit research entity that hosts collaborative projects between sponsoring stakeholders to further geophysical research by industry and academia.”

To this end, we organize collaborations among industry, government, and academia to build realistic subsurface models based on geophysical data simulations. In so doing, we stimulate research and development and provide a basis for industry leaders to discuss and learn about specific geophysical problems of common interest.

The 2020 SEAM Board of Directors included John Eastwood (chair), Adriana Ramirez (vice chair), Edith Miller (treasurer), Paul Williamson, Eric Verschuur, Aria Abubakar, Peter Haffinger, Adam Mangel, Ellie Ardakani, and Ken Tubman (SEG Board liaison). The Executive Committee, consisting of the officers of the Board, meets every two weeks to discuss current issues or concerns. Working committees are utilized on an as-needed basis. The Board continues

to ensure that the operations of SEAM are conducted in a fiscally and legally responsible manner.

### SEAM PROJECTS ACTIVE IN 2020

- Life of Field (2016–2020). This project began active development in 2017, following the learnings of the 2016 Time Lapse Pilot (or Pore Pressure Extension) project. The project began with six participants and has grown to nine participants. An ambitious clastic model was chosen. Tasks to be completed include reservoir simulations, petrophysical modeling, and cross-scaling and geophysical simulations.
- With an increase in participants, the budget was available to construct a carbonate model. SEAM contracted with Chevron to accomplish this project. Because of the additional work, the Life of Field Management Committee approved a no-cost extension of the project until 31 December 2020. The project will provide additional deliverables including: (1) migration of the baseline and three monitor surveys for the clastic model and (2) simulation and migration of one additional monitor survey (for a total of three monitors) for the carbonate model. The project manager is Mike Oristaglio (Yale), and the

Management Committee is chaired by Shauna Oppert (Chevron).

- Artificial Intelligence (2019–2021). The Artificial Intelligence project was launched in September 2019 with six participants. Since the launch, an additional participant has joined, and another participant is in contract negotiations. The Management Committee includes: Konstantin Osypov (Aramco), Adam Halpert (chair, Chevron), Jicai Ding (China National Offshore Oil Corporation), Aria Abubakar (Schlumberger), Pandu Devarakota (Shell), Rami Nammour (Total), and Rekha Patel (Xrathus).
- The first round of a data challenge hosted by AICrowd, designated as “Parihaka Geology and Seismic Facies Classification,” was successfully completed in October 2020. A town hall, hosted by AICrowd, was held in November 2020 to announce and award prizes. The second round of the data challenge launched 10 November and ran through 8 December 2020. Cash prizes will be awarded to the top three leaders. Information and knowledge gathered from the competitions will serve as a valuable resource in hosting other data challenges and developing parameters and metrics for constructing a cloud collaboration

platform. Plans for early 2021 include a multiday workshop/hack-a-thon on machine learning in geophysics.

### PROJECT DEVELOPMENT

- SEAM Data Platform. The vision for this project is to establish the SEAM Data Platform as the global platform for geophysical synthetic data sets and models for industry, university, and individual users in geophysics and associated fields. The goal is to collect and host open-source data sets/models from industry and academia along with the best-in-class data sets/models produced by SEAM projects on the platform. A product manager has been hired to explore the viability of the project.
- CO<sub>2</sub> Sequestration Monitoring/Microseismic. The purpose of the project is to improve fracture detection (CO<sub>2</sub> sequestration reservoirs), monitor CO<sub>2</sub> plume in subsurface, and CO<sub>2</sub> containment. The project proposes to use models to simulate CO<sub>2</sub> injection in the subsurface and test the capabilities of methods to track the CO<sub>2</sub> plume in the subsurface. Planning is under way involving interested parties from industry, academia, and government labs. A DOE grant is being considered.

- Near surface/civil engineering. SEAM is scoping options for a near-surface geophysical project focused on either groundwater or civil engineering. The current Life of Field project executed over the past few years has advanced the art and science of coordinated numerical modeling for geology, engineering, geomechanics, and geophysics. The opportunity now exists to focus this capability toward other geophysical applications in non-oil-and-gas industries. Business development for SEAM in groundwater and civil engineering will proceed with two important processes. First is defining the value proposition of cooperative numerical modeling in near-surface geophysical communities. The second will be the formation of workshops with potential participants to detail the deliverables of the project. Over the months to come, SEAM will be reaching out to industry and academia for advice on designing one or more projects to advance modeling in near-surface geophysics.

## SUBSIDIARIES REPORTS

### SEG Global Inc.

Bruce Shang, chair

SEG Global Inc. (SGI) is the SEG subsidiary established to promote and expand the global impact of applied geophysics around the world. It was originally tasked with operating all of SEG's regional offices. The scope of SGI's business interest has been concentrated in China, with oversight of the China office. The operating model has been evolving and maturing thanks to the great effort of staff at the SEG headquarters and China office to optimize the impact and efficiency of SGI. The SGI board of directors is comprised of leaders in the global community and serves to complement the SEG China Advisory Committee.

#### SGI BOARD OF DIRECTORS

- Bruce Shang (chair)
- Huasheng Zheng (vice chair)
- Tien-When Lo (treasurer)
- Said Sadykhov
- Alfred Liaw (executive director)
- Abdulaziz M. Muhaidib
- Jie Zhang
- Xuri Huang
- Richard Xu
- Jianwei Ma

With the pandemic and oil price collapse, 2020 has been a challenging year for our industry, profession, and Society. The SGI board conducted quarterly reviews and provided guidance on SEG China technical programs and financial activities. With a volunteer executive director and four employees, the SEG China office has demonstrated great endurance, nimbleness, and creativity to make 2020 a successful year on multiple fronts.

#### ORGANIZATION OF SEG EVENTS

Starting in February 2020, the pandemic made traditional physical events impossible in China. The SEG China office moved quickly to explore and implement virtual alternatives. As the situation permitted, events moved to a hybrid format to accommodate physical attendance. A positive outcome of this challenging situation is the increased reach to speakers and audiences, which was made possible with the virtual formats. Many people delivered speeches and attended the events remotely from around the globe. There were a total of eight events:

- 1) U.S.-China Gas Industry Cooperation Workshop, 9–10 June, SEG/China Energy Cooperation Program, Beijing, China (live stream)

- 2) Broadband and Wide-azimuth Deepwater Seismic Technology, 13–15 July, SEG/China National Offshore Oil Corporation, Beijing, China (live stream)
- 3) Workshop on Underground Water and Karst Imaging, 27–29 August, SEG, Beijing, China (hybrid)
- 4) International Geosciences Student Conference, 6–10 September, SEG/student chapters, Hefei, China (live stream)
- 5) Society of Petroleum Geophysicists/SEG International Geophysical Conference, 13–16 September, SEG/SPG/Sinopec, Nanjing, China (in person)
- 6) 8<sup>th</sup> Bureau of Geophysical Prospecting (BGP) Cup Geophysical Students Competition, 3 November, BGP/China University of Petroleum-Beijing (CUPB) student chapters/SEG/SPG, Beijing, China (hybrid)
- 7) 2<sup>nd</sup> Borehole Geophysics Workshop, 26–27 November, SEG, Beijing, China (live stream)
- 8) SEG/Society of Petrophysicists and Well Log Analysts 7<sup>th</sup> Workshop on Porous Media, 2–3 December, SEG/CUPB, Beijing, China (hybrid)

The events attracted 1215 participants from seven countries and 2475 online course registrants from 69 countries.

#### INITIATIVES TO INCREASE MEMBERSHIP AND OUTREACH

The SGI strategic initiatives approved by the SEG Board of Directors in 2019 include acceptance of membership dues in local currency and establishment of an SEG website in Chinese. Both have been fully implemented and achieved good initial results toward intended objectives. For example, total SEG membership in China has grown by 35%, from 736 to 990 members during 2020. Almost all new members are paid Active and Associate members. Marketing functions through the SEG China website include the promotion of SEG virtual courses, Distinguished Lectures, Honorary Lectures, SEG Live lectures, online resources, membership benefits, and student programs. SEG China also published eight interviews of prominent SEG members.

Building on the initial success of these new initiatives and the global momentum toward virtual meetings, SEG China will be able to collaborate with the SEG headquarters and other SEG offices more broadly in the future.

After more than five years of serving as the executive director of SEG China, Liaw has decided to retire from the post. We are enormously grateful for his leadership and contributions to SEG Global Inc. and SEG at large. Xuri Huang has graciously accepted the nomination to serve as the new executive director of SEG China. With his strong technical background and broad industry network, Huang is perfectly suited to lead SEG China for many years to come. The SGI board of directors elected Huasheng Zheng, Tien-When Lo, and Abdulaziz M. Muhaidib to be the 2021 chair, vice chair, and treasurer, respectively. Thanks to the SGI board, SEG staff, and SEG Board for great effort, support, and leadership.

# FINANCIAL REPORTS



**SOCIETY OF EXPLORATION  
— GEOPHYSICISTS —**

**CONSOLIDATED FINANCIAL STATEMENTS**

**DECEMBER 31, 2020 and 2019**

**WITH**

**INDEPENDENT AUDITOR'S REPORT**



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## INDEPENDENT AUDITOR'S REPORT

To the Board of Directors  
Society of Exploration Geophysicists

We have audited the accompanying consolidated financial statements of the Society of Exploration Geophysicists and its affiliates (the Society), which comprise the consolidated statements of financial position as of December 31, 2020 and 2019, the related consolidated statements of activities, functional expenses and cash flows for the years then ended, and the related notes to the consolidated financial statements (collectively, the financial statements).

### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

### Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### Basis for Qualified Opinion

The Society is the sole corporate member of SEG Foundation (the Foundation) and as a result has a controlling financial interest in the Foundation. The Society does not include the accounts of the Foundation in these financial statements. Accounting principles generally accepted in the United States of America requires consolidation of an entity when the reporting entity has a controlling financial interest in that entity. If SEG Foundation were consolidated in these financial statements and intercompany accounts and transactions had been eliminated, assets, liabilities and net assets would increase by \$25,693,565, \$1,210 and

\$25,692,355, respectively as of December 31, 2020, and \$22,203,321, \$6,452 and \$22,196,869, respectively, as of December 31, 2019. Also, revenues, expenses and change in net assets would increase by \$3,616,939, \$121,453 and \$3,495,486, respectively, for the year ended December 31, 2020. Revenues, expenses and change in net assets would increase by \$2,594,695, \$418,395 and \$2,176,300, respectively, for the year ended December 31, 2019.

### **Qualified Opinion**

In our opinion, except for the effects on the financial statements of not consolidating the SEG Foundation as described in the Basis for Qualified Opinion paragraph, the financial statements referred to above present fairly, in all material respects, the financial position of the Society of Exploration Geophysicists and affiliates as of December 31, 2020 and 2019, and the changes in their net assets and their cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America.



Tulsa, Oklahoma  
June 2, 2021

**SOCIETY OF EXPLORATION GEOPHYSICISTS**  
**CONSOLIDATED STATEMENTS OF FINANCIAL POSITION**

**December 31, 2020 and 2019**

	2020	2019
<b>Assets</b>		
Current assets:		
Cash and cash equivalents	\$ 1,625,312	\$ 9,300,608
Accounts receivable, net	805,282	2,300,293
Accounts receivable, SEG Foundation	729,773	1,005,097
Inventories	260,325	280,044
Prepaid expenses	2,240,323	1,467,628
	5,661,015	14,353,670
Total current assets		
Investments	19,683,135	11,302,145
Property and equipment, net	476,297	682,069
Other long-term assets	250,000	250,000
	20,409,432	13,234,219
Total assets	\$ 26,070,447	\$ 26,587,884
<b>Liabilities and Net Assets</b>		
Current liabilities:		
Accounts payable and accrued liabilities	\$ 952,122	\$ 969,280
Current portion of capital lease obligation	172,967	170,653
Current portion of deferred revenue	1,620,461	2,769,826
	2,745,550	3,909,759
Total current liabilities		
Capital lease obligation, less current portion	174,639	380,030
Deferred revenue, less current portion	2,839,192	2,459,531
	3,013,831	2,839,561
Total liabilities	5,759,381	6,749,320
Net assets without donor restrictions	20,311,066	19,838,564
Total liabilities and net assets	\$ 26,070,447	\$ 26,587,884

See notes to consolidated financial statements on page 80

**SOCIETY OF EXPLORATION GEOPHYSICISTS**  
**CONSOLIDATED STATEMENTS OF ACTIVITIES**

**Years ended December 31, 2020 and 2019**

	2020	2019
Revenues:		
Membership dues	\$ 947,154	\$ 1,116,735
Conferences and meetings	2,113,389	9,088,140
Publication sales and advertising	2,517,235	2,757,255
Professional development	203,849	344,686
Research and data	32,449	4,150
Foundation support for programs	1,072,668	2,010,533
Investment income	4,095,151	1,775,360
	<u>10,981,895</u>	<u>17,096,859</u>
Total revenues		
Expenses:		
Program expenses:		
Community engagement	372,060	394,464
Meetings	1,525,060	3,735,000
Publications	2,341,703	2,560,044
Professional development	843,659	1,285,568
Students	610,749	1,204,103
Regional offices	964,458	1,416,967
Business development	1,232,812	999,902
Research and data	41,343	42,101
	<u>7,931,844</u>	<u>11,638,149</u>
Total program expenses		
Supporting services	<u>2,577,549</u>	<u>3,524,796</u>
Total expenses	<u>10,509,393</u>	<u>15,162,945</u>
Increase in net assets from continuing operations	472,502	1,933,914
Gain from discontinued operations	-	1,383,725
Change in net assets	<u>472,502</u>	<u>3,317,639</u>
Net assets, beginning of period	19,838,564	16,387,246
Cumulative adjustment for the adoption of ASC 606	-	133,679
Net assets, end of period	<u>\$ 20,311,066</u>	<u>\$ 19,838,564</u>

See notes to consolidated financial statements on page 80

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

**CONSOLIDATED STATEMENT OF FUNCTIONAL EXPENSES**

**Year ended December 31, 2020**

	Program Expenses									
	Community Engagement	Meetings	Publications	Professional Development	Students	Regional Offices	Business Development	Research and Data	Supporting Services	Total
Staffing	\$ 269,558	\$ 880,943	\$ 1,168,031	\$ 385,871	\$ 153,916	\$ 672,602	\$ 802,753	\$ -	\$ 2,273,847	\$ 6,607,521
Travel	1,677	28,104	1,971	32,636	893	29,772	6,156	877	27,396	129,482
Office	45,866	206,781	283,056	111,509	37,222	95,392	75,366	-	96,157	951,349
Program awards	-	-	-	5,760	407,275	-	180,758	-	6,705	600,498
Production	1,191	-	572,160	-	-	2,929	-	-	-	576,280
Postage	12,060	4,419	122,658	3,662	1,104	1,299	1,067	-	5,401	151,670
Commissions, honor and royalties	-	-	44,621	69,569	-	3,000	-	-	-	117,190
Cost of sales	-	-	38,108	1,577	-	-	4	-	-	39,689
Events	-	288,171	8,511	360	3,256	22,760	3,947	-	7,981	334,986
Promotion costs and other	1,998	26,320	10,658	2,749	-	9,926	843	-	12,309	64,803
Outside services	29,891	49,600	48,022	211,011	681	99,146	482	25,248	51,125	515,206
Other	13	226	(673)	1,288	-	15,041	143,341	15,218	19,871	194,325
Taxes	295	577	1,580	1,670	205	11,621	642	-	18,053	34,643
Depreciation and amortization	9,511	39,919	43,000	15,997	6,197	970	17,453	-	58,704	191,751
Foundation support costs	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>\$ 372,060</b>	<b>\$ 1,525,060</b>	<b>\$ 2,341,703</b>	<b>\$ 843,659</b>	<b>\$ 610,749</b>	<b>\$ 964,458</b>	<b>\$ 1,232,812</b>	<b>\$ 41,343</b>	<b>\$ 2,577,549</b>	<b>\$ 10,509,393</b>

See notes to consolidated financial statements on page 80

**SOCIETY OF EXPLORATION GEOPHYSICISTS**

**CONSOLIDATED STATEMENT OF FUNCTIONAL EXPENSES**

**Year ended December 31, 2019**

	Program Expenses									
	Community Engagement	Meetings	Publications	Professional Development	Students	Regional Offices	Business Development	Research and Data	Supporting Services	Total
Staffing	\$ 246,042	\$ 1,301,603	\$ 1,332,605	\$ 452,303	\$ 172,830	\$ 754,863	\$ 541,453	\$ -	\$ 2,708,876	\$ 7,510,575
Travel	13,164	224,821	42,974	244,947	15,369	138,473	38,661	11,179	191,992	921,580
Office	34,556	255,747	213,380	93,915	20,952	93,725	44,735	7,983	191,905	956,898
Program awards	-	3,911	-	47,457	882,390	-	167,744	-	4,096	1,105,598
Production	-	-	582,597	-	33	1,581	-	-	-	584,211
Postage	12,952	16,731	143,048	1,831	11,762	2,332	863	335	6,912	196,766
Commissions, honor and royalties	-	-	48,731	119,262	-	6,098	2,000	-	-	176,091
Cost of sales	93	-	55,151	946	-	-	-	-	56	56,246
Events	18,072	1,682,566	29,792	83,311	61,858	271,527	24,924	2,101	70,408	2,244,559
Promotion costs and other	16,419	65,744	27,347	1,678	246	19,973	6,889	201	7,942	146,439
Outside services	44,042	129,569	66,130	201,401	1,187	108,671	41,628	16,652	342,673	951,953
Other	-	(7,995)	(20,265)	4,459	-	3,103	116,406	-	(90,707)	5,001
Taxes	-	25,805	232	17,634	32,001	12,971	-	-	14,095	102,738
Depreciation and amortization	9,124	36,498	38,322	16,424	5,475	3,650	14,599	3,650	49,274	177,016
Foundation support costs	-	-	-	-	-	-	-	-	27,274	27,274
<b>Total</b>	<b>\$ 394,464</b>	<b>\$ 3,735,000</b>	<b>\$ 2,560,044</b>	<b>\$ 1,285,568</b>	<b>\$ 1,204,103</b>	<b>\$ 1,416,967</b>	<b>\$ 999,902</b>	<b>\$ 42,101</b>	<b>\$ 3,524,796</b>	<b>\$ 15,162,945</b>

See notes to consolidated financial statements on page 80

**SOCIETY OF EXPLORATION GEOPHYSICISTS**  
**CONSOLIDATED STATEMENTS OF CASH FLOWS**

**Years ended December 31, 2020 and 2019**

	2020	2019
<b>Cash Flows from Operating Activities</b>		
Increase in net assets from continuing operations	\$ 472,502	\$ 1,933,914
Adjustments to reconcile change in net assets to net cash provided by (used in) operating activities:		
Depreciation and amortization	191,751	177,016
Net realized/unrealized gain on investments	(3,858,615)	(1,545,551)
Change in operating assets and liabilities:		
Accounts receivable , net	1,495,011	94,212
Accounts receivable, SEG Foundation	275,324	(83,531)
Inventories	19,719	37,462
Prepaid expenses	(772,695)	(862,428)
Accounts payable and accrued liabilities	(17,158)	(968,868)
Deferred revenue	(769,704)	1,398,317
Net operating cash flows from continuing operations	(2,963,865)	180,543
Net operating cash flows from discontinued operations	-	617,027
Net cash provided by (used in) operating activities	(2,963,865)	797,570
<b>Cash Flows from Investing Activities</b>		
Purchases of property and equipment	(24,006)	(85,076)
Purchases of investments	(14,912,182)	(9,510,918)
Proceeds from sale of investments	10,389,807	8,244,003
Net investing cash flows from continuing operations	(4,546,381)	(1,351,991)
Net investing cash flows from discontinued operations	-	24,611,368
Net cash provided by (used in) investing activities	(4,546,381)	23,259,377
<b>Cash Flow from Financing Activities</b>		
Payments on capital lease obligations	(165,050)	(140,483)
Net financing cash flows from continuing operations	(165,050)	(140,483)
Net financing cash flows from discontinued operations	-	(18,126,005)
Net cash used in financing activities	(165,050)	(18,266,488)
Net change in cash	(7,675,296)	5,790,459
Cash, beginning of period	9,300,608	3,510,149
Cash, end of period	\$ 1,625,312	\$ 9,300,608
<b>Supplemental Cash Flow Disclosures</b>		
Interest paid	\$ 19,202	\$ 578,569
<b>Noncash Investing and Financing Activities</b>		
Pending trades to purchase investments	\$ -	\$ 769,729
Acquisition of equipment with capital lease	\$ -	\$ 307,608
Termination of capital lease	\$ 38,027	\$ -

See notes to consolidated financial statements on page 80

**SOCIETY OF EXPLORATION GEOPHYSICISTS**  
**NOTES TO CONSOLIDATED FINANCIAL STATEMENTS**

**December 31, 2020 and 2019**

**Note 1 – Summary of Significant Accounting Policies**

Nature of organization

The Society of Exploration of Geophysicists (the Society or SEG), was organized in 1930 as a not-for-profit organization. The objectives of the Society are to promote the science and common scientific interests of geophysicists, and to maintain a high professional standing among its members. The Society accomplishes these objectives by publishing scientific literature, conducting professional development and student programs, hosting technical meeting and conferences, and providing other informational services.

The Society maintains offices in the United States, United Arab Emirates, and China. The corporate headquarters are in Tulsa, Oklahoma.

Basis of presentation

The consolidated financial statements include the accounts of the Society and its subsidiaries, SEG Advanced Modeling Corporation (SEAM), SEG Real Estate Corp (REC), and SEG Global, Inc. All material intercompany balances and transactions have been eliminated in consolidation. As discussed further in Note 2, all of the land and buildings held within REC were sold in 2019 and there are no longer operations within this entity.

These consolidated financial statements do not include the SEG Foundation (the Foundation), an affiliated not-for-profit organization governed by a separate board of directors. The Foundation receives contributions to support scientific, educational, and charitable activities to benefit geophysicists and their professional community. The Society is the sole corporate member of the Foundation.

Cash and cash equivalents

Cash and cash equivalents include cash in banks and all highly liquid investments with an original maturity of three months or less. Accounts at each institution are insured by the Federal Deposit Insurance Corporation up to \$250,000. Typically, cash exceeds federally insured limits, but management believes any possible risk of loss is minimal. At December 31, 2020 and 2019, the Society and SEAM had deposits in excess of the federally insured limit.

Accounts receivable

Accounts receivable largely consists of uncollateralized billings for exhibit space, research completed and in progress, the Society's share of revenues related to collaborative conferences, advertising and page charges. Accounts receivable are stated at the amount billed, less an allowance for uncollectible accounts.

The Society provides for losses on receivables using the allowance method. The allowance is based on experience, terms of agreements, and other circumstances affecting the ability of customers to meet their obligations. Outstanding balances are written off when management determines that the receivables will not be collected. The Society provides for probable uncollectible amounts through a provision to bad debts

expense and a corresponding amount to the allowance based on management's assessment of the current status of individual accounts. Unpaid amounts that remain after management has pursued reasonable collection efforts are written off through a charge to the allowance for uncollectible accounts and a credit to accounts receivable. Interest is not charged on outstanding balances. At December 31, 2020 and 2019, management estimates that the allowance for uncollectible accounts of \$11,163 and \$17,307, respectively, is adequate to absorb losses arising from nonpayment.

### Inventories

Inventories of publications for resale are valued at the lower of cost, determined by the average method, or net realizable value.

### Investments

Investments in marketable securities are carried at estimated fair value as reported by the asset custodians. See Note 4 for description of the fair value inputs and methodologies utilized. Unrealized gains and losses are included in the statement of activities.

### Property and equipment

The Society capitalizes all expenditures for property and equipment in excess of \$1,000. Property and equipment are carried at cost. Depreciation is computed using the straight-line method based on the estimated useful lives of the assets. When assets are retired or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts, and any resulting gain or loss is included in the statement of activities. Expenditure for maintenance and repairs are charged to expense as incurred. Major improvements are capitalized. The lives used in computing depreciation are as follows: buildings range from 40 to 50 years; software, tenant improvements, furniture and equipment range from three to ten years.

The Society reviews the carrying value of property and equipment for impairment whenever events and circumstances indicate that the carrying values of long-lived assets may not be recoverable from the future cash flows expected to result from their use and ultimate disposition. In cases where the undiscounted expected future cash flows are less than the carrying values, an impairment loss is recognized equal to the amount by which the carrying value exceeds the fair value of each asset. The factors considered by the Society in performing an impairment assessment include current operating results, trends, and prospects, and the effects of obsolescence, demand, competition, and other economic factors. Based on these criteria, there was no impairment for the years ended December 31, 2020 and 2019.

### Net assets

Net assets and income, expenses, gains and losses are classified based on the existence or absence of donor-imposed restrictions. Accordingly, the Society's net assets and changes therein are classified and reported as follows:

*Without donor restrictions* – Net assets without donor restrictions represent those resources that are not restricted by donors.

*With donor restrictions* – Net assets with donor restrictions reflect donor-imposed restrictions that require the Society to utilize or expend the related assets as specified. The Society does not have any net assets with donor restrictions at December 31, 2020 or 2019.

## Contracts with customers

The Society adopted Accounting Standards Codification (ASC), *Revenue from Contracts with Customers* (ASC 606) effective January 1, 2019, for all revenue forms other than contributions, leasing or investment income, utilizing the modified retrospective approach. In determining the appropriate amount of revenue to recognize, the Society applies the following five-step model: (1) identify contracts with customers, (2) identify the performance obligations in the contract, (3) determine the transaction price, (4) allocate the transaction price to the performance obligations, and (5) recognize revenue as each performance obligation is completed. The Society accounts for a contract with a customer when it has approval, the contract is committed, the rights of the parties, including payment terms, are identified, the contract has commercial substance and consideration is probable of collection.

In accordance with ASC 606, the modified retrospective method was applied to those contracts which were not completed as of January 1, 2019.

Previously revenues were recorded as follows:

- For membership dues, revenue was recognized ratably over the membership term;
- For conferences and meetings, revenue was recognized when the event is held;
- For publication, sales and advertising revenue was recognized when the publication was issued and services were rendered to the customer; and
- For research and data, revenue was recognized as the related services were performed in accordance with the contracts.

Under the modified retrospective method, the cumulative effect of applying the standard is recognized at the date of initial application. The Society was required to recalculate the revenue earned on any contract-in-process at the implementation date and to restate the revenue and costs of services as if ASC 606 had been followed from the inception of the contract. In recalculating costs and revenue under ASC 606 guidelines, a cumulative effect adjustment of \$133,679, was recorded as an adjustment to opening net assets as of January 1, 2019. In addition, increases to accounts receivable of \$355,889, prepaid expenses of \$483,679 and deferred revenue of \$705,889 were recorded as of January 1, 2019. Results beginning after January 1, 2019, are presented under ASC 606.

The impact of adoption of ASC 606 on the consolidated statement of financial position as of December 31, 2019, includes an increase in prepaid expenses of \$508,556, accounts receivable of \$377,185 and deferred revenue of \$608,647.

The impact of adoption of ASC 606 on the accompanying consolidated statement of activities for the year ended December 31, 2019, was as follows:

	Recognition under previous guidance	Recognition ASC 606 (as shown on 2019 Statement of Activities)	Impact of adoption of ASC 606
Publication sales and advertising	\$ 355,889	\$ 377,165	\$ 21,276
Research and data revenue	612,797	4,150	(608,647)
Research and data program expenses	(550,657)	(42,101)	508,556
	<u>\$ 418,029</u>	<u>\$ 339,214</u>	<u>\$ (78,815)</u>

These adjustments were made based on the identification of the fulfillment of performance obligations for research and data contracts at a point in time rather recognition as the services were performed and the timing of recognition for certain publication royalty income.

*Contracts with customers* – A contract exists when services to be performed and products ordered are specified in a submitted and accepted membership application, written contract, purchase order or similar instrument.

*Performance obligations* – The Society's contracts may have a single or multiple performance obligations. For contracts with multiple performance obligations, the Society allocates the contract transaction price to each performance obligation using the estimated standalone selling price of each distinct good or service in the contract, generally equal to the prices specified in the contract. Membership terms include many benefits and discounts available to the member. The Society treats these as a single performance obligation, the availability of the benefits, resources and discounts, as the customer may not utilize all benefits and value is created to the member for the integration of these benefits. There is not a contribution component of the membership dues.

For membership dues and online publications, revenue is recognized ratably over the membership or subscription term as the customer receives and consumes the benefits. Revenue from each print publication is recognized in the month they are mailed to subscribers. Revenue from conferences, meetings and other events is recognized when the event is held, and services are rendered. Generally advertising revenue is recognized when the advertisement is delivered, either in publication or its display at an event. Research and data revenue is recognized upon completion of the project and the beginning of the customer's exclusivity period.

Payment terms for memberships and subscriptions are due when the contract is initiated. Payment terms for conferences, meetings and other events vary based on stated contract terms, but typically require an upfront deposit upon registration for the event and the remainder due shortly before the event occurs. Payment terms for research and data projects require payments according to contract milestones. These payment terms do not approximate timing of revenue recognition. Contracts typically do not contain variable-consideration, any consideration payable to the customer or any significant financing components.

*Contract modifications* – The Society considers contract modifications to exist when the modifications either create new or changes the existing enforceable rights and obligations. Most contract modifications are for goods or services that are not distinct from the existing performance obligation(s). The effect of a contract modification on the transaction price is recognized as an adjustment to revenue on a cumulative catchup basis.

The Society has adopted the following practical expedients and accounting policy elections:

*Incremental costs of obtaining a contract* – These costs are included in selling, general and administrative expenses as incurred when the amortization period is generally one year or less.

*Shipping activities* – The Society has elected to treat shipping and fulfillment activities as fulfillment costs rather than a separate performance obligation. As a result, any consideration received related to these activities will be included as a component of the overall transaction consideration and allocated to the performance obligations of the contract.

*Sales tax and other related taxes* – Sales and other tax amounts collected from customers for remittance to governmental authorities are excluded from revenue.

### Foundation support for programs

The Society recognizes foundation support revenue from the Foundation as it incurs expenses that the Foundation has agreed to reimburse.

### Functional expenses

The costs of providing various programs and supporting activities have been summarized on a functional basis in the consolidated statement of activities. The consolidated statement of functional expenses present expenses by function and natural classification. Expenses directly attributable to a specific functional area of the Society are reported as expenses of those functional areas while indirect costs, include salaries and benefits, that benefit multiple functional areas have been allocated among the various functions based on estimated cost attributable to each function.

### Income taxes

The Society is exempt from federal income tax under Section 501(c)(6) of the Internal Revenue Code. Income from its consolidated for-profit subsidiary is subject to income tax. Advertising income not directly related to the Society's tax-exempt purpose and income from debt-financed real estate are subject to taxation as unrelated business income. The Society did not incur any tax expenses associated with unrelated business income for the years ended December 31, 2020 or 2019.

### Use of estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ from those estimates.

### Accounting pronouncements not yet adopted

In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) No. 2016-02, *Leases (Topic 842)*, which amends the existing accounting standards for lease accounting, including requiring lessees to recognize most leases on their statement of financial position. ASU 2016-12 is effective for the Society for annual periods beginning January 1, 2020. The standard requires a modified retrospective transition approach for all leases existing at, or entered into after, the date of initial application, with an option to use certain transition relief. The primary impact of the adoption is that the Society will recognize right-of-use assets and offsetting lease liabilities for the present value of the future operating lease payments. In June 2020, the FASB issued ASU 2020-05 which defers the effective date of ASU 2016-02 one year, making it effective January 1, 2022. The Society will record a lease asset and liability equal to the present value of its future minimum lease payments on the statement of financial position and include additional disclosures on its leases in the footnotes to the financial statements.

### **Note 2 – Discontinued Operations**

During 2018, the Board of Directors made the decision to market the office buildings held by REC. The buildings were sold in October 2019. The Society sold these buildings to focus its operations on its core mission to advance the science of geophysics and the profession. The Society incurred intercompany lease expense for this office space of \$294,143, which was included in continuing operations, for the year ended December 31, 2019. Established lease terms between the Society and REC were continued with the new

owners. This lease requires monthly payments of approximately \$31,000 and expires in December 2022. All of the operations of REC have been reported as discontinued operations for the year ended December 31, 2019.

Discontinued operations were comprised of the following for the year ended December 31, 2019:

Building lease revenue	\$ 2,150,970
Gain on sale of real estate	2,731,927
Building lease operation expenses	(1,954,903)
Depreciation	(965,700)
Interest	(578,569)
	<u>                    </u>
Gain on discontinued operations	<u>\$ 1,383,725</u>

Operating cash flows from discontinued operations for the year ended December 31, 2019, are as follows:

Gain from discontinued operations	\$ 1,383,725
Adjustments to reconcile loss from discontinued operations to net cash provided by operating activities:	
Depreciation	965,700
Gain on sale of discontinued operations	(2,731,927)
Change in operating assets and liabilities:	
Accounts receivable	80,503
Prepaid expenses	31,654
Deferred leasing costs	821,228
Accounts payable and accrued liabilities	66,144
	<u>                    </u>
Net cash provided by operating activities of discontinued operations	<u>\$ 617,027</u>

### Note 3 – Financial Assets and Liquidity Resources

The Society's financial assets available for general expenditures within one year of the December 31, consolidated statement of financial position are as follows:

	<u>2020</u>	<u>2019</u>
Assets:		
Cash and cash equivalents	\$ 1,625,312	\$ 9,300,608
Accounts receivable, net	805,282	2,300,293
Accounts receivable, SEG Foundation	729,773	1,005,097
Investments	19,683,135	11,302,145
	<u>                    </u>	<u>                    </u>
Total financial assets available to management for general expenditures within one year	<u>\$ 22,843,502</u>	<u>\$ 23,908,143</u>

The Society maintains a policy of structuring its financial assets to be available as its general expenditures, liabilities and other obligations come due. The Society follows the practice of maintaining six months of budgeted operating expenses in reserve.

## Note 4 – Investments

### Fair value measurements

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Accounting Standards provide a consistent framework for measuring fair value and a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to measurements involving significant unobservable inputs (Level 3 measurements). The three levels of the fair value hierarchy are as follows:

- Level 1 – Quoted prices in active markets for identical securities
- Level 2 – Other significant observable inputs (including quoted prices for similar securities)
- Level 3 – Significant unobservable inputs

The level in the fair value hierarchy within which a fair measurement in its entirety is based on the lowest level input that is significant to the fair value measurement in its entirety. There were no investment transfers due to changes in the observability of significant inputs between Level 1, Level 2 and Level 3 assets during the years ended December 31, 2020 or 2019.

Investments measured at fair value on a recurring basis consisted of the following:

	Fair Value of Measurements as of December 31, 2020			
	Level 1	Level 2	Level 3	Total
Mutual funds	\$ 4,692,166	\$ -	\$ -	\$ 4,692,166
Equity securities	12,521,716	-	-	12,521,716
Fixed income and preferred	-	903,984	-	903,984
Government and agency securities	946,198	619,071	-	1,565,269
Total investments at fair value	\$ 18,160,080	\$ 1,523,055	\$ -	\$ 19,683,135

	Fair Value of Measurements as of December 31, 2019			
	Level 1	Level 2	Level 3	Total
Mutual funds	\$ 2,461,409	\$ -	\$ -	\$ 2,461,409
Equity securities	7,373,164	-	-	7,373,164
Fixed income and preferred	-	511,583	-	511,583
Government and agency securities	349,224	606,765	-	955,989
Total investments at fair value	\$ 10,183,797	\$ 1,118,348	\$ -	\$ 11,302,145

Investment income consists of the following at December 31:

	2020	2019
Interest and dividend income	\$ 355,407	\$ 312,088
Realized/unrealized gain on investments	3,858,615	1,545,551
Investment fees	(118,871)	(82,279)
	\$ 4,095,151	\$ 1,775,360

## Note 5 – Property and Equipment

Property and equipment consist of the following at December 31, 2020 and 2019:

	2020	2019
Building and leasehold improvements	\$ 104,065	\$ 83,768
Application development	594,362	594,362
Furniture, fixtures, and equipment	597,286	591,474
Capital lease equipment	680,036	722,069
	1,975,749	1,991,673
Less accumulated depreciation and amortization	(1,499,452)	(1,309,604)
Property and equipment, net	<u>\$ 476,297</u>	<u>\$ 682,069</u>

Depreciation and amortization expense (including \$965,700 classified as part of the gain from discontinued operations for the year ended December 31, 2019) totaled \$191,751 and \$1,142,716 for the years ended December 31, 2020 and 2019, respectively.

## Note 6 – Related Party Transactions

The Society and Foundation support each other with contributions, and the Society provides services to the Foundation, some of which are reimbursed by the Foundation. Those transactions for the years ended December 31, are as follows:

	2020	2019
Foundation support for the program activities	\$ 1,072,668	\$ 2,010,533
Reimbursement from the Foundation for direct fundraising and administrative services	200,193	146,586
Reimbursement from the Foundation for indirect administrative services	143,341	92,972
	<u>\$ 1,416,202</u>	<u>\$ 2,250,091</u>

The Foundation began reimbursing the Society on January 1, 2016, for 20% of allocated indirect costs. An additional 20% requirement was added each year, and in 2020, the Foundation is fully reimbursing the Society for allocated indirect costs. In-kind contributions to the Foundation for the portion of allocation of indirect costs not required to be reimbursed totaled \$27,274 for the year ended December 31, 2019.

## Note 7 – Retirement Plan

The Society sponsors a defined contribution plan. The plan is nondiscriminatory and covers all SEG employees who are foreign nationals or legal residents of the United States and have attained the age of 21. The Society's contributions to this plan are computed based on a safe-harbor nonelective 3% of salaries and a one-for-one safe-harbor matching contribution of employees' contributions, up to a maximum of 3% of salaries. In addition, a discretionary profit-sharing contribution can be made after reaching the end of the plan year. The discretionary contribution, if any, will be determined from year-to-year.

For the years ended December 31, 2020 and 2019, the Society's expense for the safe-harbor match and safe-harbor nonelective contributions was \$161,860 and \$403,979, respectively. The Society did not make discretionary contributions to the plan in 2020 or 2019.

#### Note 8 – Deferred Revenue

Deferred revenue consists of the following:

	2020	2019
Dues	\$ 520,019	\$ 637,796
Subscriptions	359,305	432,160
Meetings	773,075	1,771,847
Research and data projects	2,807,254	2,387,554
	<u>\$ 4,459,653</u>	<u>\$ 5,229,357</u>

#### Note 9 – Capital Leases

The Society leases certain equipment under a capital lease and has recorded an outstanding obligation and related lease assets. Capital lease assets of \$346,462 and \$535,232 (amount net accumulated amortization of \$333,575 and \$186,837) as of December 31, 2020 and 2019, respectively, is included in property and equipment. Amortization of the leased property is included in depreciation and amortization expense.

The following is a schedule of future minimum lease payments under capital leases as of December 31, 2020:

2021	\$ 175,255
2022	121,969
2023	58,057
2024	<u>11,624</u>
Total minimum lease payment	366,905
Less interest	<u>(19,299)</u>
Total present value	347,606
Less current portion	<u>(172,967)</u>
Capital lease, net of current portion	<u>\$ 174,639</u>

Interest expense on the capital lease obligation was \$19,202 and \$23,424 for the years ended December 31, 2020 and 2019, respectively.

#### Note 10 – Operating Leases

The Society leases certain offices and equipment under noncancelable operating leases. Rental expense for the years ended December 31, 2020 and 2019, totaled \$456,171 and \$107,441, respectively.

Future minimum rental payments are as follows at December 31, 2020:

2021	\$ 421,592
2022	400,186
2023	8,916
2024	<u>7,430</u>
Total	<u>\$ 838,124</u>

In March 2021, the Society amended its office lease in Oklahoma, reducing the square footage and monthly rental payments as well as extending the new terms through 2026. The Society also executed a new office lease in Houston, Texas that expires in 2024. Subsequent to these lease changes, the Society's minimum lease payments are as follows:

2021	\$ 283,611
2022	204,325
2023	196,174
2024	170,148
2025	113,638
Thereafter	<u>28,410</u>
Total	<u>\$ 996,306</u>

#### **Note 11 – Concentrations**

All of the Society's customers are companies and professionals in the oil and gas industry both within the United States and internationally.

The Society has significant investments in equity and debt securities and is therefore subject to concentrations of credit risk. Investment advisors who are supervised by the Finance Committee manage investments. Market value of investments is subject to fluctuations on a year-to-year basis; however, the Finance Committee believes the investment policy is prudent for the long-term welfare of the Society.

#### **Note 12 – Subsequent Events**

Management has evaluated subsequent events through June 2, 2021, the date the financial statements were available to be issued.

On March 27, 2020, the Coronavirus Aid, Relief and Economic Security Act was signed into law. On December 27, the President signed into law the Consolidated Appropriations Act, 2021 to include 501(c)(6) nonprofit organizations that meet certain requirements as eligible for the Paycheck Protection Program (PPP). On February 3, 2021, the Society received a PPP loan in the amount of \$1,067,738. The Society anticipates using all of the proceeds to make eligible payments and, therefore, expects substantially all of the loan will be forgiven. However, the loan forgiveness cannot be assured.

In May 2021, the Society and American Association of Petroleum Geologists entered into an agreement for an integrated annual meeting joint venture. The Society does not know the full impact of the joint venture, but anticipates strong synergies, reduced expenses and more engaged community for the event.