



SAGEEP 2022

Denver | Colorado | March 20 - 24

34th Symposium on the
Application of Geophysics
to Engineering and
Environmental Problems

www.EEGS.org/SAGEEP2022

SAGEEP 2022 Conference
Program Sponsor



SAGEEP 2022 Schedule at a Glance



Sunday March 20

Short Course
8:00am-5:00pm

SC-1: Groundwater Mapping and Hydrogeological Models from Airborne Electromagnetic (AEM) Data
Instructor: Mats Gulbrandsen, I•GIS
Room: Matchless (Lower Level 1)

5:00-6:30pm

Ice Breaker - Exhibit Hall (Colorado E-F)

Monday March 21

8:40-10:00am

Opening Session: Awards and Keynote Presentation Speaker Georgette Hlepas, USACE (Colorado G-J)

10:00-10:20am

Coffee in Exhibit Hall (Colorado E-F)

Colorado A-B

Colorado C-D

10:20am-12:00pm

Dams and Levees

Groundwater Management (CGWA)

12:00-1:30pm

Geoscientists *without* Borders® Luncheon: Developing A Landslide Early Warning System in a Data Sparse Region: A Case Study from The Western Ghats, India - Vishnu Chakrapani Lekha (Colorado G-J)

1:30-2:30pm

Geophysical Site Characterization

Groundwater Management (CGWA)

2:30-2:50pm

Coffee in Exhibit Hall (Colorado E-F)

2:50-4:10pm

Seismic Methods and Applications

Groundwater Dynamics

4:30-5:30pm

Outdoor Equipment Demonstration - Benedict Fountain Park / Brewpub Fundraiser immediately following

Tuesday March 22

8:20-10:00am

Surface Waves Methods and Applications

Munitions Response

10:00-10:20am

Coffee in Exhibit Hall (Colorado E-F)

10:20am-12:00pm

Infrastructure and Geotechnical Geophysics

Munitions Response

12:00-1:30pm

EEGS Luncheon/Annual Meeting Speaker: Kari Meier, USACE (Colorado G-J)

1:30-2:30pm

Groundwater Management (CGWA)

Panel Session: Unmanned Aerial Vehicles (UAV)

2:30-2:50pm

Coffee in Exhibit Hall (Colorado E-F)

2:50-4:30pm

Panel Session: Sustainable Engineering and Climate Change

Unmanned Aerial Vehicles (UAVs)

Panel Session: Sustainable Engineering and Climate Change

Unmanned Aerial Vehicles (UAVs)

5:00-6:30pm

GeOpen House, Networking and SAGEEP Conference Evening in the Exhibit Hall (Colorado E-F) ticketed event

Wednesday March 23

8:40-10:00am

Best of Near Surface Bordeaux 2021 (Colorado A-B)

10:00-10:20am

Posters and Coffee in Exhibit Hall (Colorado E-F)

10:20am-12:00pm

Electromagnetics

Geophysical Site Characterization

12:00-1:30pm

Lunch On Own

1:30-2:30pm

Methodology Development

Ground Penetrating Radar

2:30-2:50 pm

Coffee in Exhibit Hall (Colorado E-F)

2:50-3:50pm

Seismic Methods and Applications

Ground Penetrating Radar

Thursday March 24

Short Course
8:00am-12:00pm

SC-2: Ground Penetrating Radar - Principles, (Virtual) Practice and Processing
Instructor: Greg Johnston, Sensors & Software, Inc. Room: Independence

Short Course
1:00-5:00pm

SC-3: The Future of GPR Processing in the Cloud
Instructors: Jan Francke and Lisandro Martinez, Geolitix Inc Room: Independence

Short Course
8:00am-5:00pm

SC-4: Practical MASW Methods: Basic to Cutting Edge
Instructor: Julian Ivanov, Kansas Geological Survey Room: Mattie Silks

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Registration

The SAGEEP REGISTRATION DESK will be open in the registration area during the following hours:

Sunday, March 20	10:00 am – 6:30 pm
Monday, March 21	7:00 am – 4:30 pm
Tuesday, March 22	7:00 am – 6:30 pm
Wednesday, March 23	7:00 am – 4:30 pm
Thursday, March 24	7:00 am – 9:00 am (outside the Short Course meeting rooms, Independence and Mattie Silks for on-site registrations)

Emergency Procedures

Should an emergency arise while at SAGEEP, please go to the SAGEEP registration counter or contact the hotel operator at the nearest telephone.

Name Badges

Name badges are your admittance to any part of the Conference and Exhibits and some social events. Attendees without a badge will be asked to confirm their registration and be issued another badge at a charge of \$20. There will be no exceptions. Exhibitor personnel badges are restricted to use in the Exhibition Hall only. **PLEASE BE SURE TO WEAR YOUR BADGE AT ALL TIMES.**

Speaker Information

Keynote, Featured and Luncheon speakers are encouraged to check in at the SAGEEP registration desk and their presentation room 30 minutes prior to their scheduled speaking engagement. Please visit the SAGEEP registration counter to request further assistance.

Proceedings

Symposium Proceedings will be made available to participants post conference. SAGEEP registrants will be given instructions about online access at the conclusion of the conference.

Job Posting Board

The job posting board, located in the registration area outside the Exhibit Hall, is available to all attendees who want to advertise a job opening or post resumes for review.

EEGS Information

At the registration desk, you will see our Bookstore area where you can purchase or order for EEGS merchandise, books, past SAGEEP Proceedings, and copies of the Journal of Environmental & Engineering Geophysics. Other EEGS information such as membership forms will be available as well.

Evaluation Forms

Your evaluation of both the oral and poster presentations is important. Please make certain that you take a moment to fill out the forms. Evaluation boxes will be available outside each session room, in the exhibition hall and at the registration counter. Student Volunteers will also be available during the sessions to

collect your completed evaluations.

Special Meetings EEGS Board Meeting

Sunday, March 20	8:00 am – 5:00 pm (Continental Breakfast 7 am) Location: Penrose I Chair: Bart Hoekstra, President
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Corporate Members

The following organizations generously support EEGS and its programs through their corporate membership. We wish to extend our gratitude for their support.

Aarhus Geosoftware (<https://www.aarhusgeosoftware.dk/>)

Advanced Geosciences, Inc. (<https://www.agiusa.com/>)

Exploration Instruments LLC (<http://www.exiusa.com/>)

Fugro (<https://www.fugro.com/>)

Geogiga Technology Corporation (<https://www.geogiga.com/en/index.php>)

Geometrics, Inc. (<https://www.geometrics.com/>)

Geonics Limited (<http://www.geonics.com/>)

GeoVista (<http://geovista.co.uk/>)

HydroGeoLogic, Inc. (HGL) (<https://www.hgl.com/>)

I*GIS (<https://geoscene3d.com/>)

ImpulseRADAR (<https://impulseradargpr.com/>)

Intelligent Resources, Inc. (<https://www.rayfract.com/>)

IRIS Instruments (<http://www.iris-instruments.com/>)

Mount Sopris Instrument Company, Inc. (<https://mountsopris.com/>)

MPT-IRIS (<https://www.mptech3d.com/>)

Quality Geosciences Company LLC (<https://www.quality-geophysics.com/>)

Seequent (<https://www.seequent.com/products-solutions/geosoft-software/>)

Sensors & Software, Inc. (<https://www.sensoft.ca/>)

Silixa LLC (<https://silixa.com/>)

Spotlight Geophysical Services (<http://www.spotlightgeo.com/>)

The R.T. Clark Companies Inc. (<https://www.rtclark.com/>)

Vista Clara, Inc. (<https://www.vista-clara.com/>)

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SAGEEP 2022 SESSION CHAIRS

Micki Allen, Esther Bloem	Best of Bordeaux EAGE Near-Surface
John Jansen, Jared Abraham, Clinton Meyer	Groundwater Management
Moira Poje, Mike Law	Geophysical Site Characterization
Scot Ikard, Dan Glaser	Groundwater Dynamics
John Jackson, Jeffrey Leberfinger	Munitions Response
Jacob Sheehan, Julian Ivanov	Seismic Methods and Applications
Trever Ensele, Mehrez Elwaseif	Geotech, Infrastructure, Dams, and Levees
Katherine Grote, Michele Maxson	Unmanned Aerial Vehicles
Andy Kass, Dan Glaser	Electromagnetics
Dimitrios Ntarlagiannis, Andy Kass	Geophysical Methodology Development
Alastair McClymont, Greg Johnston	Ground-penetrating Radar



Welcome to SAGEEP 2022

On behalf of EEGS, it is our pleasure to welcome you to SAGEEP 2022, the 34th Symposium on the Application of Geophysics to Engineering and Environmental Problems!

After a tumultuous couple years, it is wonderful to finally share the excitement of this one-of-a-kind event together and in person. We know that each of you has faced a range of challenges to be here today. To our attendees, presenters, exhibitors, sponsors, staff, and volunteers, we deeply appreciate having you here and your contribution to making this a successful and memorable SAGEEP.

As folks ease back to in-person, we'll have a smaller crowd this year, but there is no shortage of excitement in the technical and social program. We appreciate collaboration in technical planning from the Colorado Groundwater Association and the US Army Corps of Engineers. In addition to a strong core of oral presentations and posters, there are two unique panel sessions focused on Drone Geophysics and Engineering for Climate Change. Both panel sessions take place Tuesday afternoon as part of the GeOpen House, a new

initiative to ramp up engagement with professionals and students across the broader geoscience and engineering communities.

The GeOpen House culminates at the Conference Evening and Geoprofessional Networking Event, which brings opportunities to make new connections, and of course, reconnect with old friends. Be sure to have a ticket and complete your "Speed Networking" profile by the deadline (see instructions) to be automatically matched to attendees with complementary interests. Speaking of tickets, don't miss the Luncheons Monday and Tuesday! Our Invited Luncheon and Keynote Speakers are superb highlights within the program, and we hope you will have an opportunity to connect with the speakers themselves. Check with the registration desk for tickets to these events or to short courses if you haven't already signed up.

Our exhibitors and corporate sponsors are a central pillar, supporting SAGEEP both financially and technically. Be sure to visit the Exhibit Hall and learn about the newest products and services in geophysics. You'll want to attend the Outdoor



Demo on Monday afternoon, where you can see these technologies shine in the field at Benedict Fountain Park. From the park, after the demo, it's only a two-block walk to join the Brewpub "Field Trip" and Fundraiser, hosted by Woods Boss Brewing, with proceeds from each "pour" going to support the EEGS Foundation.

For now, we hope you are unpacking your bags before the icebreaker, planning a busy schedule of sessions, or maybe stepping into your first SAGEEP at the GeoOpen House. Have a wonderful time at the conference and thank you for being a part of the SAGEEP 2022 experience!



Darren Mortimer
General Chair



Elliot Grunewald
Supporting Co-Chair

POSTER PRESENTATION FORMAT

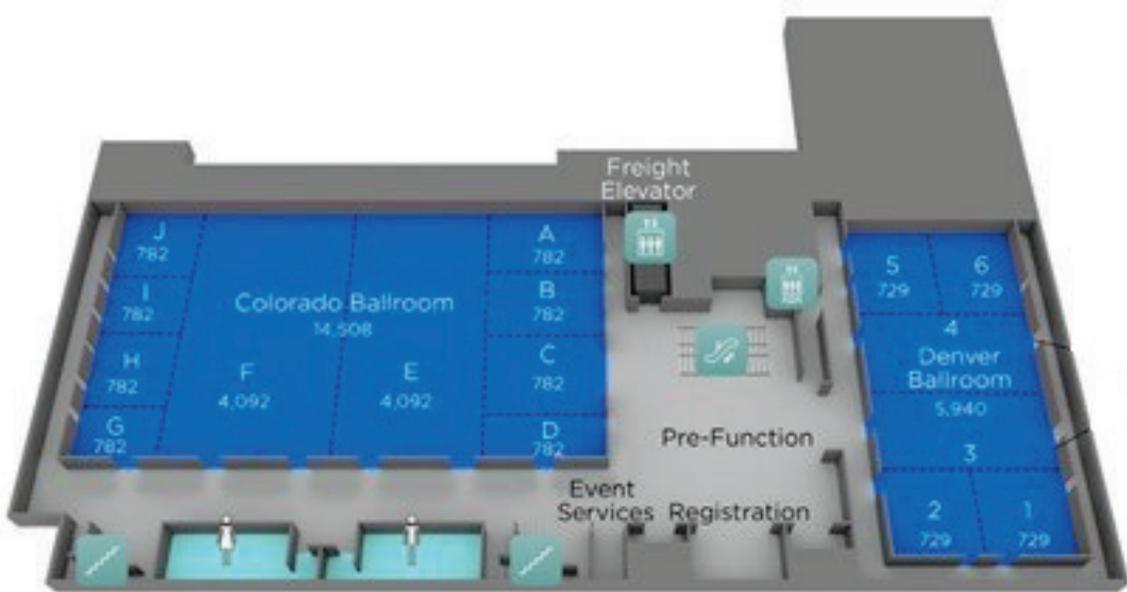
Posters contribute significantly to the Technical Program. For SAGEEP 2022, we are pleased to provide a poster presentation format designed to give posters maximum visibility and impact.

Please note Posters will be included in the SAGEEP Best Paper Evaluation process. Posters will be displayed in the pre-function area outside the Exhibit Hall for our GeOpen House/Networking and Conference Evening on Tuesday beginning after lunch to 6:30 p.m. and from 9:00 AM to 3:00 PM on Wednesday. On Wednesday, posters will also be available for viewing during the coffee breaks. Consult the schedule above for the listings of the poster titles. In addition, a form will be provided so that those wishing to contact presenters can provide their name, contact information, and time of a desired meeting to facilitate time with presenters.

VENUE FLOORPLAN



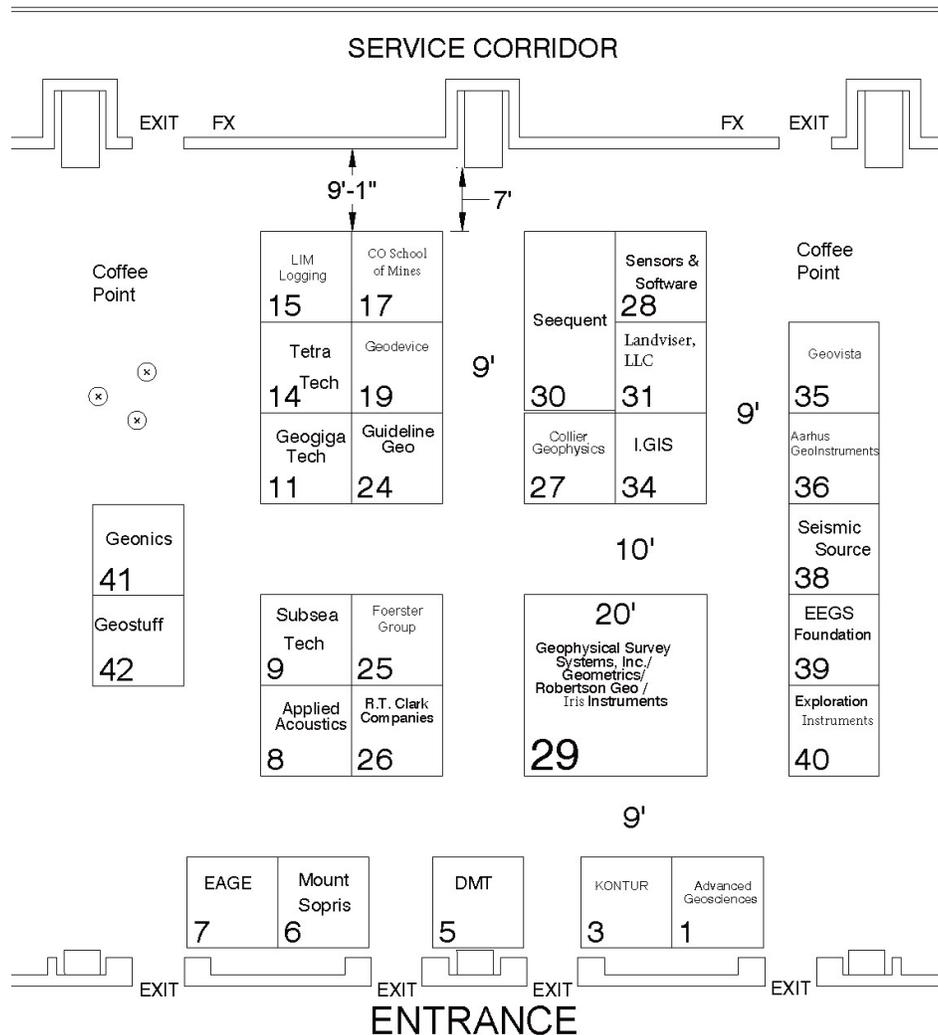
Lower Level 1



Lower Level 2

EXHIBITION FLOOR PLAN

COLORADO BALLROOM

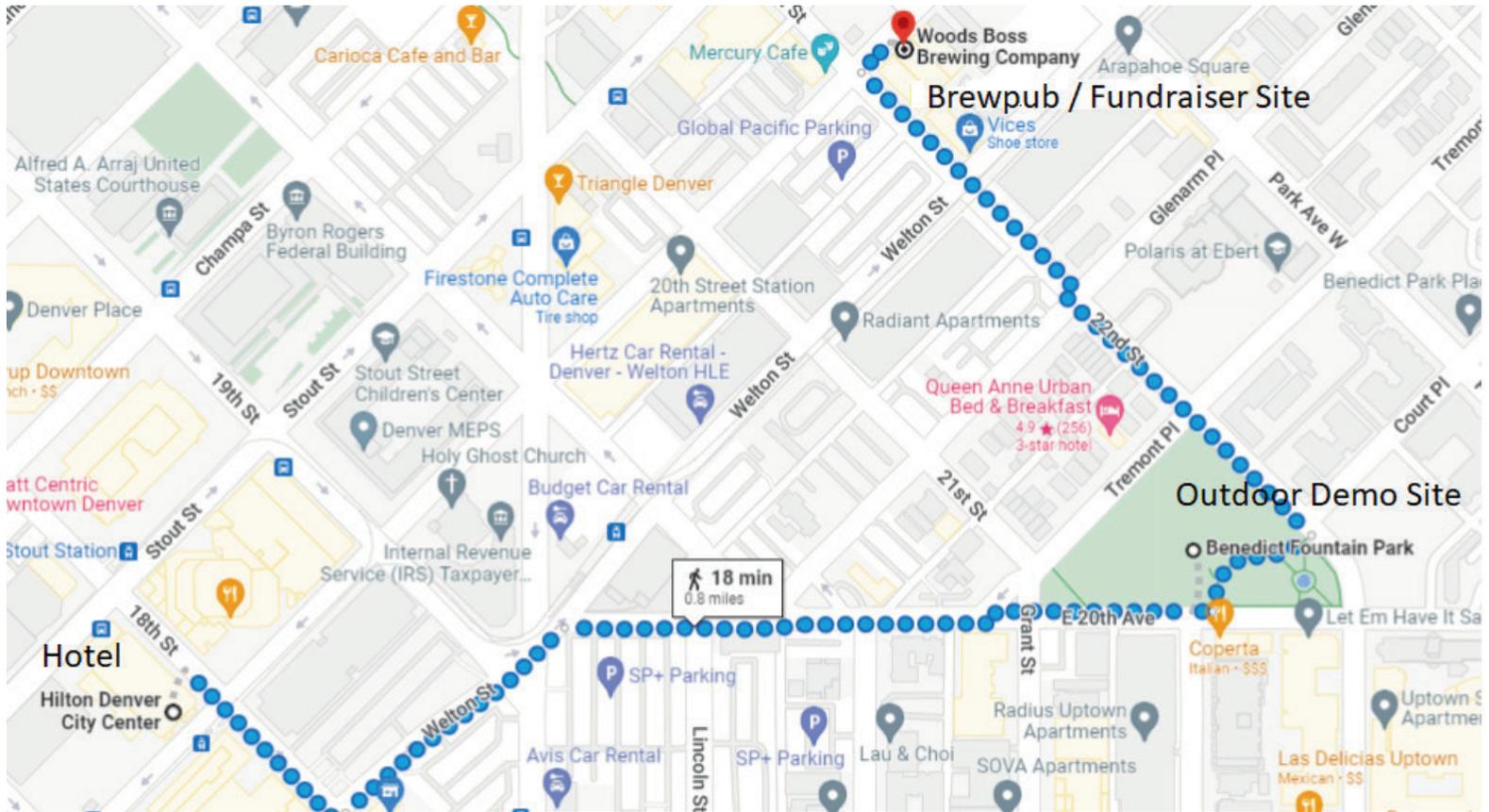


SAGEEP 2022 Exhibitor List

Exhibitors - Stand

Aarhus GeoInstruments	36	Geostuff	42
Advanced Geosciences, Inc.	1	GeoVista	35
Applied Acoustic Engineering, Ltd.	8	Guideline Geo Americas	24
Collier Geophysics	27	I•GIS	34
Colorado School of Mines	17	Kontur	3
DMT GmbH & Co. KG	5	Landviser	31
EEGS Foundation	39	LIM Logging	15
Exploration Instruments	40	Mount Sopris Instruments	6
European Association of Geoscientists & Engineers (EAGE)	7	Robertson Geologging (USA), Inc.	29
Foerster Instruments	25	The R.T. Clark Companies Inc.	26
Geodevice Inc.	19	Seequent	30
Geogiga Technology Corporation	11	Seismic Source	38
Geometrics, Inc.	29	Sensors & Software Inc.	28
Geonics Limited	41	Subsea Technologies, Inc.	9
Geophysical Survey Systems, Inc.	29	Tetra Tech	14

OUTDOOR DEMONSTRATION LOCATION



Exhibition Schedule

Sunday, March 20, 2022

5:00 – 6:30 pm	Ice Breaker in Exhibit Hall
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Monday, March 21, 2022

9:00 am	Exhibit Hall Opens
10:00 – 10:20 am	Morning Coffee Break
2:30 – 2:50 pm	Afternoon Coffee Break
4:00 pm	Exhibit Hall Closes

Tuesday, March 22, 2022

9:00 am	Exhibit Hall Opens
10:00 – 10:20 am	Morning Coffee Break
2:30 – 2:50 pm	Afternoon Coffee Break
4:00 pm	Exhibit Hall Closes

Wednesday, March 23, 2022

9:00 am	Exhibit Hall Opens
10:00 – 10:20 am	Morning Coffee Break
2:30 – 2:50 pm	Afternoon Coffee Break
3:00 pm	Exhibit Hall Closes
3:00 pm	Poster Viewing Area Closes
3:01 – 8:00 pm	Exhibit Hall and Poster Area Tear Down

EXHIBITORS OUTDOOR DEMONSTRATIONS

Monday, March 21, 4:30 - 5:30pm

401 E. 20th Avenue; Denver (bounded by 20th Avenue, Tremont Place and 22nd St.)

On Monday afternoon, March 21, participating exhibitors will demonstrate equipment at Benedict Fountain Park, within walking distance from the host hotel, Hilton Denver City Center Hotel.

FOERSTER INSTRUMENTS INC. 25

FOERSTER is known for FEREX 4.034 which is a fluxgate magnetometer based field computer designed for geophysical, military, and archeological use. Available with many options to enhance mapped data. Foerster now has a brand-new UAV based FEREX magnetometer. Information will be shared at this year's 2022 SAGEEP event.

GSSI 29

GSSI, the world leader in GPR, will produce demonstrations of our new GS Series 200 HS antenna. This digital, wireless antenna features a 200 MHz center frequency and employs GSSI's proprietary HyperStacking® technology. This technology improves signal to noise performance and increases depth penetration under all soil conditions.

GUIDELINE GEO AMERICAS 24

Come see Guideline Geo ABEM MALA demonstrate our newest utility locating designed ground penetrating radar (GPR), the MALA easy Locator (EL) Core. The MALA EL Core includes the best data quality and fastest workflow on the market, wireless data collection, and real-time interpretation through MALA AI.

LANDVISER, LLC 31

Landviser and Partners are Enlightening Research in Near Surface Geophysics and GIS Analytics. We develop and market ERT/IP/SP instruments (versatile compact LandMapper, expandable multi-channel SibER deep tomography sets), mobile EMI scanners (AEMP-14 and Geovizer), ride-on 3D GPR (TerraZond) – complete with software and training; conduct environmental, agricultural, and archaeological surveys worldwide.

MOUNT SOPRIS INSTRUMENT COMPANY, INC. 6

MSI will operate downhole viewers, digital camera and borehole magnetic resonance at the Outdoor Demo event.

SEISMIC SOURCE COMPANY 38

We will be demonstrating both the Seismic Source DX-6 seismograph and Geogiga's SurfaceRT software. This includes equipment deployment, SPAC data collection and generating dispersion curves in real time.

SENSORS & SOFTWARE, INC. 28

Please join Greg and Dave from Sensors & Software at the outdoor demonstration where we will be showing Noggin GPR technology. GPR images the subsurface and is used in many applications

including utility-locating, scanning structures such as bridges, roads and buildings, detecting USTs and voids, geological stratigraphy, archaeology and forensics.

PANEL SESSIONS AT SAGEEP 2022

Drones and Shallow Subsurface Characterization

Tuesday, March 22, 1:30 - 2:30 PM | Colorado C – D

Introduction by Moderator: Bill Barkhouse (Drone Geoscience)

Panelist 1: Jack Elston (Black Swift Technologies)

- UAS: An overview of the current state of the art of drone technology for collecting geoscientific data with specific focus on geophysical measurements applied to characterizing the near surface.

Panelist 2: Richard A. Krahenbul (Colorado School of Mines Department of Geophysics)

- Sensors: A review of the current state of the art of sensor technology for geophysical characterization of subsurface.

Panelist 3: Ron Bell (Drone Geoscience)

- Data: Issues and challenges using geophysical data collected via a drone including data management and the application of machine learning and artificial intelligence.

Panelist 4: Vic Moss (Drone Service Provider Alliance DSPA)

- Regulations: Recent and expected changes in FAA regulations governing the operation of small UAS with insights into the changes allowing beyond visual line of sight (BVLOS) flight operations.

Review and Q&A with Moderator: Tim Rathmann (Drone Geoscience)

Sustainable Engineering and Climate Change

Tuesday, March 22, 2:50 - 4:30 PM | Colorado A – B

Introduction by Moderator: Jeffrey Paine (Bureau of Economic Geology, UT Austin)

Panelist 1: Paul Chinowsky (University of Colorado, Director of Environmental Design Program)

- Impacts of climate change across US infrastructure – the challenge for engineers to redesign and reinforce critical infrastructure for reliable operation under new environmental conditions.

Panelist 2: Kari Meier (US Army Corps of Engineers, DoD Climate Action Team)

- The Department of Defense outlook on climate change risks, the engineering response, and pathways forward

Panelist 3: Paul Bauman (BGC Engineering, Principal Geophysicist)

- Climate change impacts across the developing world and remote communities – how geophysics can contribute to humanitarian response and engineering challenges.

Panelist 4:

- Outlook on opportunities and challenges for geothermal to contribute to the future of clean energy solutions and emissions reduction.

Discussion and Q&A facilitated by Moderator

Awards and Keynote Presentation

Opening Session

Keynote Speakers:

Georgette Hlepas

Monday, March 21, 2022 | 8:40 -10:00 am
Opening Session – Colorado G-J

"It's just a bunch of squiggly lines"

There are a lot of available tools in our tool boxes to understand the subsurface. There are some key considerations to ensure the right tools are selected to aid in guiding further investigation efforts. Upfront communication and setting expectations is critical to the success of any project. However, the work does not stop there. The resultant data is not always readily understood by non-geophysicists and is often perceived as "just a bunch of squiggly lines". To understand subsurface conditions and make data driven risk informed decisions, there needs to be good communication of the resultant data, often in the form of appropriate visualizations. This presentation is focused on the use of geophysics, remote sensing, along with other investigation tools to aid in understanding subsurface conditions and the need to manage and visualize the resultant data in geospatial models to help evaluation and communication efforts.



Dr. Georgette Hlepas is the Principal Geotechnical Engineer for the US Army Corps of Engineers and is the lead for the Geotechnical, Geology, and Materials Community of Practice. She is also the lead for the USACE Instrumentation and Performance Monitoring Community of Practice. She has ~15 years of experience in geotechnical engineering and instrumentation and has worked on a variety of geotechnical projects both nationally and internationally. She has a PhD in Civil and Materials Engineering from the University of Illinois at Chicago, a Master's Degree in Civil Engineering from Columbia University in New York, and is a licensed Professional Engineer in Illinois.

Awards

EEGS/SEG Near-Surface Geophysics Technical Section Frank Frischknecht Leadership Award
Monday, March 21, 2022 | 8:40 -10:00 am
Opening Session – Colorado G-J

Frank Frischknecht Leadership Award

Dr. Tim Johnson



Dr. Tim Johnson of Pacific Northwest National Laboratory (PNNL) is the sole inventor of E4D, a state-of-the-art geophysical modeling and inversion software that has profoundly advanced electrical imaging as a subsurface investigation and monitoring technology. His E4D code provides unique, next-generation imaging and monitoring capabilities that have addressed major environmental and engineering challenges being tackled by the national laboratories, federal agencies and academia. E4D represents

the first resistivity and induced polarization software developed from the ground up to address the computational demands of large-scale, time-lapse subsurface imaging problems by leveraging distributed memory computing resources. It is an open-source software available through the Pacific Northwest National Laboratory (PNNL) github site. As an open-source software, researchers, students and practitioners can investigate E4D's parallel algorithms and incorporate new functionality as needed. Certainly, the development and implementation of E4D captures the essence of the Frank Frischknecht Leadership Award by representing, "a unique innovation that transforms the nature and capabilities of near surface geophysics".

In parallel with developing E4D, Dr. Johnson has applied electrical resistivity imaging to improve understanding of a variety of complex subsurface environments of national concern, including those associated with the nuclear legacy of the cold war. His work on electrical imaging of high-level nuclear waste contaminant plumes at sites with extensive infrastructure is truly exceptional. His time-lapse studies, including the monitoring of surface water/groundwater interactions along major river corridors, represent some of the most impressive examples of the power of 4D resistivity monitoring datasets for understanding subsurface hydrological processes. Most recently, Dr. Johnson has explored time-lapse electrical imaging of stress evolution during high pressure injections into deep crystalline rock and imaging of rock damage and development of gas transport pathways resulting from small nuclear explosions.

Dr. Johnson has also pushed the boundaries of coupled inversion frameworks by coupling E4D to groundwater flow and reactive solute transport codes. He has developed novel hybrid deterministic/geostatistical inversion strategies for dealing with non-uniqueness and estimating uncertainty, thereby overcoming some of the major limitations of conventional inverse methods for electrical imaging. In summary, Dr. Johnson is a visionary geophysicist, having profoundly advanced 4D monitoring of the subsurface through a unique technological innovation that enables others to explore the cutting edge of electrical geophysical imaging.

The Frank Frischknecht Leadership Award is established to recognize an individual who shows extraordinary leadership in advancing the cause of near surface geophysics through long-term, tireless, and enthusiastic support of the environmental and engineering geophysics community. Such leadership is often boldly displayed by an invention, a new methodology or technique, a theoretical or conceptual advancement, or a unique innovation that transforms the nature and capabilities of near surface geophysics. The Frank Frischknecht Leadership Award is presented jointly by EEGS and the Society of Exploration Geophysicists, Near-Surface Geophysics Technical Section of the Society of Exploration Geophysicists.

SPECIAL EVENTS

Exhibitors' Equipment Outdoor Demonstration & Brewpub "Fieldtrip" and Fundraiser

Monday, March 21 | 4:30 – 5:30 PM | Benedict Fountain Park

Join fellow SAGEEP attendees on Monday, March 21 from 4:30 to 5:30 pm. at the Benedict Fountain Park in Denver to view the equipment demonstrations provided by the participating companies (see list on Exhibiting/Sponsorship Opportunities). Following the demonstrations, join colleagues and fellow Outdoor Demo attendees for the Brewpub "Fieldtrip" and Fundraiser at the nearby Woods Boss Brewing Company - Brewery and Taproom, from 6:30-8:00pm.. Woods Boss has transformed an early 1900 brick building into a beautiful brewery and tap room in Denver featuring 24 taps with 20 craft beers brewed in-house with a gluten-free option as well as root beer and kombucha. For every "pour", Wood Boss will donate \$2 to the EEGS Foundation. Located at 2210 California Street, it's walking distance from the Benedict Fountain Park.

GeOpen House and SAGEEP Conference Evening/Networking Event

Tuesday, March 22 | 5:00 – 6:30 PM | Colorado E-H

Come make new connections and new friends! Join delegates, exhibitors, and attendees of the GeOpen House for hors d'oeuvres, drinks, and conversation at the Conference Evening Networking Event. With an easy-to-use mobile app, you will be automatically matched with other attendees' complementary interests from jobs, to mentorship, professional experience, and more. Go to app.speednetworking.com and complete your brief networking profile now using event code NETWORK@SAGEEP22 – you must have a completed profile and ticket by 5pm Tuesday, March 22nd to receive network matching results.

LUNCHEONS

Geoscientists *without* Borders® (GWB) Luncheon



C. L. Vishnu, Ph.D. scholar, Geological and Mining Engineering and Sciences, Michigan Technological University

Monday, March 21 | 12:00 - 1:30 PM | Colorado I-J

"Developing A Landslide Early Warning System in a Data Sparse Region: A Case Study from The Western Ghats, India"

Description:

The GWB Luncheon presentation focuses on the development of an early warning system for rain-triggered landslides. Two major aspects must be considered in developing such a model:

- 1) Accurate rainfall measurements to model the rainfall pattern,
- 2) Accurate slope stability parameters to model slope susceptibility to failure.

The project's study area, Idukki, a district in Kerala, India, bordering the Western Ghats, has a history of extreme rainfall events followed by frequent and intense landslide activity, especially during the monsoon months. Figure 1 shows a glimpse of the landslide activity in the region. The year 2018 alone witnessed 2223 landslides in the monsoon months. As is evident from the figure, Idukki has a sparse rain gauge network that is hardly able to cover the spatial variations in rainfall over an area of about 4000 sq. km. Therefore, it was challenging to satisfy the first requirement of having accurate rainfall measurements for a landslide early warning system.

Vishnu Chakrapani Lekha is a Ph.D. scholar in Geological Engineering from Michigan Technological University. His research area includes landslide monitoring using remote sensing, geospatial analysis, and geophysics.

Proceeds from the luncheon supports GWB projects' providing humanitarian support to communities throughout the world using geophysics to find water, prevent landslides, and more.



Field work carried out by students of University of Kerala as part of a reconnaissance survey

EEGS Luncheon and Annual Meeting

The Environmental and Engineering Geophysical Society (EEGS) will hold its Annual Meeting at the EEGS luncheon. EEGS Executive Committee members will provide an update on the state of our society, the results of EEGS' election of Board members for 2022-2023, and recognition of our volunteers. Following will be a presentation by our featured speaker, Kari Meier, USACE.



Kari Meier, PhD

DoD Climate and Sustainability: Motivation, Considerations, and Direction for Implementation
Tuesday, March 22 | 12:00 - 1:30 PM | Colorado I-J

Dr. Meier's presentation will provide insight into the U.S. Department of Defense's (DoD) motivation for developing climate change strategy, with consideration of current and anticipated challenges. New directions are facilitated by recent executive orders

that emphasize the importance of greenhouse gas emissions and reporting, including disclosures for major federal vendors. This talk

will translate these directions to the Department's intent to account for GHG emissions in its supply chain, movement to encourage supply chain emissions reductions, and intent to define goals for reducing GHG in DoD's supply chain with an objective of net zero by 2050. The talk will close with considerations that relate the role of geophysics to DoD's sustainable initiatives.

Dr. Kari Meier supports the Office of the Deputy Assistant Secretary of Defense (Environmental and Energy Resilience) from her position with the US Army Corps of Engineers, Headquarters. She is the USACE Integrator for PFAS work and the Action Officer for Military Munition Support Services. She recently completed assignment with the DoD Climate Action Team, where she supported completion of DoD's Climate Adaptation Plan. She has continued her involvement with DoD's climate sustainability and mitigation initiatives with emphasis on greenhouse gases and sustainable chemistry, promotion of supply chain chemical transparency/disclosure, leveraging of purchasing power, and encouragement of advancements in sustainable procurement. She received her PhD in Atmospheric Chemistry from the Georgia Institute of Technology. Prior to joining USACE in 2006, she held positions as contract support and chemist to the U.S. Environmental Protection Agency.

SHORT COURSES AT SAGEEP 2022

EEGS is pleased to offer Short Courses on Sunday and Thursday, with the cooperation of the Course Presenters. We encourage you to consider updating your knowledge by attending one or more of the courses as part of your SAGEEP 2022 experience. Check at the registration desk for last-minute spots!

Short Course 1: Groundwater mapping and hydrogeological models from Airborne Electromagnetic (AEM) data

Sunday March 20, 2022, 8:00 AM - 5:00 PM Matchless Room

Instructor: Mats Gulbrandsen - I•GIS

Groundwater mapping and hydrogeological conceptual modelling using Airborne Electromagnetic (AEM) data is a "hot topic" – To mention one ongoing project, the Department of Water Resources in California is currently conducting AEM surveys throughout the state's groundwater basins to assist local water managers in implementing the Sustainable Groundwater Management Act (SGMA). The Geoscience team at I•GIS has for more than 15 years been part of the Danish suite of technical solution providers within the field of groundwater modeling and has extensive expertise and experience in this area.

This one day "hands-on" short course goes through the practicalities of building a 3D conceptual model from scratch using AEM data together with other geoscientific data types by combining cross-sections, GIS maps and 3D visualization in the interpretation process. The focus is how to get the most out of your AEM data. In addition to the traditional manual modeling techniques, we will introduce and go through examples on how to utilize Machine Learning tools in the modeling process – including clustering algorithms and the Smart Interpretation method. We will also work with statistical methods and tools to evaluate and quality check the interpreted model with respect to the available data.

The course will be a combination of short lectures and exercises, and at the end of the day the participants will have touched base with the main principles behind building a hydro stratigraphic conceptual model.

For the exercises in the course, we will use the GeoScene3D software package. To be able to carry out the exercises, the course participants will get free access to the software during the course. The participants are required to bring their own laptops with a reasonable graphics card, see more on <https://www.geoscene3d.com>.

Short Course 2: Ground Penetrating Radar - Principles, Practice and Processing

Thursday, March 24, 2022, 8:00 AM - 12:00 PM Independence Room

Instructor: Greg Johnston – Sensors & Software Inc.

Ground Penetrating Radar (GPR) is a non-invasive subsurface exploration technology that uses radio waves to image the subsurface, up to 100 meters in favorable conditions, to detect buried objects and boundaries. It has found widespread use in geology for mapping geological structure and stratigraphy as well as groundwater and mineral exploration. It is also commonly used for geotechnical surveys, environmental surveys, mine safety, forensics, archaeology, utility location, concrete inspection, snow thickness measurements and glaciology.

This course covers a bit of everything about ground-penetrating radar (GPR) including theory, GPR instrumentation, survey design, data collection, data processing and data interpretation. We discuss what causes GPR reflections and why some subsurface objects and boundaries are easy to detect while others are more difficult or impossible to detect with GPR.

We examine proper data collection techniques of Line Scans and Grids Scans and the value of collecting GPR data with an integrated GPS. Due to the short length of this course, Grid Scan data collection will be shown using short videos. Students will see GPR data plotted as cross sections, 2D depth slices, 3D volumes and displayed on Google Earth. During the software session, we will discuss the principles of interpreting GPR data and how to present GPR data effectively in scientific papers and reports. If time allows, we will finish with GPR case studies to expose students to data from other application areas.

Short Course 3: The Future of GPR Processing in the Cloud

Thursday, March 24, 2022, 1:00PM - 5:00 PM Independence Room

Instructors: Jan Francke and Lisandro Martinez, Geolitix Inc.

GPR processing means many things to its varied users. For utilities mappers, a can of spray paint to mark out hyperbolas in the field is all that is required. For archeologists and surveyors, RTK GNSS-tracked large GPR arrays with careful processing and interpretation to produce detailed CAD maps is required.

GPR software has a reputation of onerous learning curves and has been slow to handle the multi-gigabyte datasets generated by large surveys. New cloud-based GPR software harnesses the power of distributed computing to enable near-instantaneous production of results, be they DXF pipes or highly detailed depth slices. New AI-driven hyperbola and horizon-detection algorithms allow for a semi-automated approach to target identification. The significant advantage of speed using massively parallel processing enables the user to fine-tune processing parameters using interactive sliders and dials with the entire dataset processed en masse and the results displayed instantaneously.

This workshop will teach both the basics of GPR processing as well as more advanced methods of filtering to extract the most useful data from each project. The workshop will use cloud

computing software and attendees are asked to bring their own laptops to follow along with the provided datasets. We will also process and interpret any datasets provided by attendees. Addressed will be topics such as:

- types and pitfalls of GPR data positioning
- global coordinate systems and their hidden risks
- integration of air photos and other geophysical datasets
- basic and advanced GPR processing
- interpretation of discrete, areal and horizon type GPR reflections
- creation of 3D geological models
- creation of 3D depth slices
- production of final reports, CAD files, GoogleEarth models, etc.
- what should and should not be included in GPR survey reports

Short Course 4: Practical MASW Methods: Basic to Cutting Edge

Thursday, March 24, 2022, 8:00 AM - 5:00 PM Mattie Silks Room

Instructor: Julian Ivanov, Kansas Geological Survey

This one-day short course introduces the most important theoretical and practical aspects of the seismic multichannel analysis of surface waves (MASW) method by a principle from the research group that originally developed the methodology at the Kansas Geological Survey. Each student will be exposed to the most current approaches for using Rayleigh, Scholte, and Love surface waves for the estimations of 1D shear-wave velocity (V_s) vertical profiles to depths of a few tens of meters, extendable to 2D and 3D volumes. Various practical topics related to the MASW data acquisition and analysis will be covered, that can include the use of active and passive sources, optimum seismic-source distance and receiver spread-size determination for data acquisition and/or processing, dispersion-curve imaging using conventional and the high-resolution linear Radon transform (HRLRT), stitching/blending dispersion-curve images for optimizing horizontal resolution and maximum investigation depth fundamental- and higher- mode evaluations; inversion of surface-wave dispersion curves with the incorporation of 2D compressional-wave velocity (V_p), Poisson's

ratio, and density a-priori information; construction of 2D V_s and other-parameters images with topography and variable depth, etc. The use of V_s for earthquake-hazard site classification, V_s30 , and standard penetration test (SPT) N can be discussed. Attendees will be provided software with a temporary license to use on their laptops during the short course to experience and evaluate the MASW analysis in class and options for practice with, once back at their office. The goal of the short course is to develop an understanding of and skill sets with the method sufficient that participants can confidently incorporate the MASW method in their work.

Optional short-course materials designed to enhance attendees' experience in digital (\$25) or hard-copy (\$120) format can be obtained by pre-ordering at maryb@ku.edu. Only a digital version will be available for on-site or late registration at \$35 per registrant.

Short Course 5: Both SC-2 and SC-3 will be offered as a full day session (two half-day courses) for a single, reduced rate.



EXHIBITORS

EEGS wishes to acknowledge and extend its gratitude to the following companies and associations for exhibiting at SAGEEP 2022. It is through their support that we are able to keep the cost of attending SAGEEP affordable. We ask that you take a few moments and visit with each of the exhibitors listed below.



Aarhus Geoinstruments

Vester Søgaardsvej 22, Abyhøj

Denmark

E-mail: thue@aarhusgeoinstruments.dk

Website: www.aarhusgeoinstruments.dk

Aarhus Geoinstruments provides geophysical instrumentation for large scale subsurface imaging. Our vision is to seamlessly integrate hardware and software into one package for non-experts, and to create an easy to use tool for making images of the subsurface for mapping of groundwater resources, raw materials, pollution, geotechnical applications and more.



Advanced Geosciences, Inc.

2121 Geoscience Dr., Austin, TX 78726

United States

E-mail: markus@agiusa.com

Website: www.agiusa.com

Advanced Geosciences, established in 1989, is the manufacturer of the SuperSting WiFi® resistivity/IP/SP systems, the AGI EarthImager software suite, PowerSting and PowerSting Node high power systems and numerous other systems and accessories manufactured from the small component boards up to finished product in Austin, Texas USA.



Applied Acoustic Engineering, Ltd.

Marine House, Marine Park, Gapton Hall Room, Great Yarmouth, NR30 ONB

United Kingdom

E-mail: gavinwilloughby@appliedacoustics.com

Website: www.appliedacoustics.com

Applied Acoustics are the leaders in the design and production of shallow marine seismic survey systems. Based in the UK, the company specializes in the manufacture of UHD surface towed boomer and sparker systems, capable of generating high resolution geophysical datasets and used extensively in the offshore renewable energy industry and marine construction projects.



36 Collier Geophysics

590 East South Loop, Stephenville, Texas 76401

United States

E-mail: nathan@colliergeophysics.com

Website: www.colliergeophysics.com

Collier Geophysics is a Texas based firm, with offices in Colorado, Georgia, North Carolina, Tennessee, and Wisconsin, that provides competent, efficient and innovative geophysical services to the groundwater, engineering, energy, and mining markets. Collier is a Service-Disabled Veteran Owned. We work in all 50 states and on select international projects.

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1 Colorado School of Mines

2027 Infinity Circle Apt # 265, Golden, Colorado 80401

United States

E-mail: rkrahenb@mines.edu

Website: www.mines.edu

MINES Humanitarian Engineering & Science program focuses on sustainable community development by drawing on a unique mixture of faculty expertise in engineering, applied sciences (including geophysics), and social sciences. Students engage in direct research and outreach within and alongside the communities they seek to serve. Project experiences prepare graduates for careers in development, corporate responsibility, or further study.

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8 DMT GmbH & Co. KG

Industry Engineering Division, Am Technologiepark 1, 45307 Essen

Germany

Website: www.dmt-group.com

DMT provides geophysical services and is one of the leading geophysical instrument suppliers for exploration and monitoring. New: DMT Vib3D intelligent sensor for real-time vibration monitoring, evaluation and documentation. SUMMIT X One the world's most flexible wired seismic acquisition system. SUMMIT M Vipa vibration monitoring system for blast monitoring, infrastructure, engineering and micro-seismic applications.

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EEGS Foundation

1391 Speer Blvd., Suite 450, Denver, CO 80204

United States

E-mail: staff@eegsfoundation.org

Website: www.eegsfoundation.org

EEGS Foundation, (a 501(3)c charitable organization), founded 2007 encourages the use of geophysical technologies and to aid those who endeavor to learn more about them in order to meet the environmental and engineering challenges of the future. The Foundations programs include Endowment for SAGEEP, Scholarships for Students, Travel Grants for Students and Professors, Distinguished Regional Lecture Tours, Sponsorship for International 40 Conferences and Training Seminars. Be sure to stop by and inquire about our drawing this year.

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Geodevice Inc.

29 Auburn Springs Place SE, Calgary, Alberta T5J0N3

Canada

E-mail: ak@geodevice.cru

Website: www.geodevice.com

GEODEVICE develops, manufactures, supplies equipment and software for geophysical surveys on land, at sea, in boreholes and on rock samples. The key areas of our own developments are high and ultra-high resolution marine seismic, borehole seismic, DC and AC electrical prospecting, magnetic, and gamma radiation detection.

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Exploration Instruments

2808 Longhorn Blvd., Suite 304, Austin, TX 78758

United States dmills@expins.com

Website: www.exiusa.com

Exploration Instruments is the best-known geophysical equipment rental firm in North America specializing in near-surface applications. We maintain a diverse inventory including seismic, radar, EM, gravity, magnetics, resistivity, hydrologic, marine and drone tools. Offices in Austin, Texas and Harrisburg, PA are ideally situated to service your projects world-wide.

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Geogiga Technology Corporation

396 11th Ave, SW, Suite 1030, Calgary, Alberta T2R 0C5

Canada

Website: www.geogiga.com

Geogiga Technology Corp. produces user-friendly, full-featured, and high-performance software for near-surface geophysics. Our software is used by leading institutions and clientele from over 60 countries. Our main product is Seismic Pro, a comprehensive software package that handles the full range of seismic data, including:

- Reflection
- Refraction
- Surface Wave
- Borehole Seismic

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EUROPEAN
ASSOCIATION OF
GEOSCIENTISTS &
ENGINEERS

European Association of Geoscientists & Engineers (EAGE)

De Molen 42, Houten 3994 DB

The Netherlands

Website: www.eage.org

EAGE is a professional association for geoscientists and engineers with a worldwide membership of about 19,000, including industry professionals, academics and students. The association is truly multi-disciplinary and international in form and pursuits. In coordination with its Near Surface Geoscience Division, EAGE organizes an annual Near Surface Geoscience Conference & Exhibition.

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Geometrics, Inc.

2190 Fortune Dr., San Jose, California 95131-1815

United States

E-mail: gschmauder@geometrics.com

Website: www.geometrics.com

Geometrics Inc., a subsidiary of OYO Corporation, has over 50 years of experience in manufacturing magnetic, seismic and EM instruments for a variety applications. From our land-based geophysical systems to our UAV-mounted MagArrow magnetometer, we manufacture equipment to meet our clients' ever-changing needs. Ask us how to Simplify you search.

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Foerster Instruments

140 Industry Ave., Pittsburgh, PA 15275

United States

Website: www.foerstergroup.com

FOERSTER is known for FEREX 4.034 which is a fluxgate magnetometer based field computer designed for geophysical, military, and archeological use. Available with many options to enhance mapped data. Foerster now has a brand new UAV based FEREX magnetometer. Information will be shared at this year's 2022 SAGEEP event.

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Geonics Limited

1745 Meyerside Drive, Suite 8, Mississauga, Ontario L5T 1C6
Canada

E-mail: simon@geonics.com

Website: www.geonics.com/

Geonics Limited manufactures surface and downhole electromagnetic (EM) geophysical instrumentation. Recent additions to our product line include the EM38-4 for continuous multi-depth measurements of ground conductivity and susceptibility; the EM61Lite for UAV-based operations; the EM61-LX2 for surveys in magnetically challenging environments; and, the EM63Flex Array for cost-effective, high-volume data collection.

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Guideline Geo Americas

1120 Washington Avenue, Suite 200, Golden, Colorado 80401
United States

E-mail: perwestholm@guidelinegeo.com

Website: www.guidelinegeo.com

Guideline Geo is a world-leader in geophysics and geo-technology offering sensors, software, services and support necessary to map and visualize the subsurface. We provide complete solutions and applications expertise around the globe in four key growth areas: detecting and mapping groundwater, environmental and geological risk assessments, infrastructure site investigations and mineral exploration.

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Geophysical Survey Systems, Inc.

40 Simon St., Nashua, New Hampshire 03060
United States

E-mail: lighthallj@geophysical.com

Website: www.geophysical.com

GSSI is the world leader in the development, manufacture, and sale of ground penetrating radar (GPR) equipment. Our cutting-edge products are used all over the world to explore the subsurface of the earth. We created the first commercial GPR system over 50 years ago and continues to provide the widest range and highest quality systems available today.

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I•GIS

Voldbjergvej 14a, Risskov, 8240
Denmark

E-mail: mig@i-gis.dk

Website: www.geoscene3d.com

I•GIS is a specialized geoscience software and service provider developing solutions allowing our customers to work smart and effectively with their geo-data and -models. Our main products are the 3D geological modeling software, GeoScene3D, and the cloud-based geodata management system, GeoCloud, for storing and sharing of data and models.

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Geostuff

648 Linley Lane, Lincoln, CA
United States

E-mail: dcrice@geostuff.com

Website: www.geostuff.com

Geostuff manufactures exploration seismographs, land streamers, and wall-lock borehole geophones. The AnySeis is a cableless system that operates on 2-conductor speaker wire with any number of geophone stations at any interval. The land streamer is a well-designed system for use on dirt or pavement. The wall-lock borehole geophones operate to depths of hundreds of meters in cased or uncased holes.

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Iris Instruments

1 Avenue Buffon, Orleans, 45100
France

E-mail: sales@iris-instruments.com

Website: www.IRIS-instruments.com

IRIS Instruments is one of the world's leading geophysical equipment manufacturers with Resistivitymeters, Induced Polarization, ElectroMagnetic and Magnetic Resonance. We provide highly engineered solution for solving most critical challenges. Our instruments can be used in much contrasted environment, from low to high temperature, in wet or very dry climate.

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GeoVista

GeoVista

Unit 10, Cae Ffwyt Business Park, Glan Conwy LL28 5SP
United Kingdom

E-mail: mbarazi@geovista.co.uk

Website: <http://geovista.co.uk/>

GeoVista supply the most reliable Borehole Geophysical Logging, Surveying, Memory, Camera, Winches & TBL systems through state-of-the-art design and manufacturing. Our systems are used worldwide, and we are recognized as a reliable partner, supplying systems that simply work.

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Kontur

1 Pequot Ave., 2nd Floor, Port Washington, New York 11050
United States

E-mail: kmartin@3d-radar.com

Website: www.kontur.tech

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Landviser

828 David Rd., League City, Texas

United States

E-mail: larisa@landviser.com

Website: www.landviser.com

Landviser and Partners are Enlightening Research in Near Surface Geophysics and GIS Analytics. We develop and market ERT/IP/SP instruments (versatile compact LandMapper, expandable multi-channel SibER deep tomography sets), mobile EMI scanners (AEMP-14 and Geovizer), ride-on 3D GPR (TerraZond) – complete with software and training; conduct environmental, agricultural, and archaeological surveys worldwide.

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Robertson Geologging (USA), Inc.

1809 N. Helm Ave., Suite 4, Fresno, CA 93727

United States

E-mail: jlozano@robertson-geo.com

Website: www.robertson-geo.com

For over four decades Robertson Geo has pioneered the development of advanced wireline instrumentation for geophysical and petrophysical applications. Our ethos begins and ends with research and development - we listen and learn from our customers and develop better products suited for their specific applications. Integrity is at the heart of everything we do - many of our logging technologies are unique in the industry being calibrated, validated and manufactured under an ISO9001 manufacturing environment. As an end-user of our own technologies, the Robertson Geo engineering feedback loop from direct field experience fosters a continuous improvement culture driven by own use, leading to mature systems that are truly "industry hardened". All are widely recognized for their ingenuity, simplicity and effectiveness in ensuring that our customers reach their objectives efficiently and cost-effectively across diverse market.

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LIM Logging

1 rue de l'Industrie - BP 48, L-4801

Rodange, (Luxembourg)

E-mail: logging@lim.eu

Website: www.lim.eu

LIM Logging SA, located in Luxembourg and respected worldwide as a supplier of high quality geophysical logging probes, acquisition systems and accessory equipment, is represented in the Americas by LIM Technology.

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The R.T. Clark Companies Inc.

PO Box 20957, Oklahoma City, Oklahoma 73156-0957

United States

E-mail: rtclark@rtclark.com

Website: www.rtclark.com

For over 39 years, we are renowned as the largest international 2ND HAND Geophysical Equipment Broker. Services include sales, manufacturing and appraisals of New and Used Geophysical/Geotechnical equipment. Providing Recording Systems, Geophones, Cables, Energy Sources, Ground Penetrating Radar, Mags, Gravity, EM, and MORE for all Geophysical applications.

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Mount Sopris Instruments

4975 E. 41st Ave., Denver, Colorado 80216

United States

E-mail: jim.lococo@mountsopris.com

Website: www.mountsopris.com

Mount Sopris – ALT will demonstrate WellCAD new version 5.5 at SAGEEP. Our MSICAM360 digital camera running on single-conductor 1/8" diameter wireline will be displayed. The MSI-ALT BMR (Borehole Magnetic Resonance) rental geophysical logging truck and tours of our facility will also available to SAGEEP 2022 attendees.

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Seequent

207 Queens Quay West, Suite 810, Toronto, Ontario M5J 1A7

Canada

E-mail: Darren.mortimer@seequent.com

Website: seequent.com

Seequent are industry leaders in integrated earth modelling, geo-data management, and team collaboration software. Our software empowers customers to make better, more sustainable decisions about their earth, environment, and energy subsurface challenges. It's our mission to unite the insights of geotechnical, geology, geophysics, geochemistry, hydrogeology – and their stakeholders.

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Seismic Source

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2391 E. Coleman Rd., Ponca City

United States

E-mail: igiles@seismicsource.com

Website: www.seismicsource.com

We build hardware and software systems for near-seismic investigations and event/vibration monitoring. Hardware: DAQlink4 (a general-purpose seismograph); Sigma 3+ and 4+ (nodal digitizers); DX-6 (cabled seismograph); Force 3, BB3, and RTM3 (for source control). Software: Vscope (data acquisition); Event Monitor (attended monitoring) and Event Monitor Cloud (remote monitoring).



Tetra Tech

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1301 Automation Way, Ste. 600, Fort Collins, Colorado 80525

United States

E-mail: anna.vaughn@tetrattech.com

Website: www.tetrattech.com

Tetra Tech provides safe, innovative, and quality geophysical services worldwide to tackle our clients' most challenging problems. We offer terrestrial, airborne, and marine geophysical services in the munitions response, engineering, construction, mining, and environmental sectors to a diverse mix of commercial and Government clients.



Sensors & Software Inc.

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1040 Stacey Court, Mississauga, L4Z2X8

Canada

E-mail: cmoreno@senssoft.ca

Website: www.senssoft.ca

Sensors & Software is an innovative manufacturer of ground penetrating radar (GPR) instrumentation and software for many applications, including geotechnical and environmental investigations, geological mapping, pavement thickness, bridge deck deterioration, utility locating, concrete and structural assessment, sinkhole/void detection, unexploded ordnance detection, and ice thickness for winter road safety.



Subsea Technologies, Inc.

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1323 Price Plaza Drive, Katy, Texas 77499

United States

E-mail: sj@subseatechnologies.com

Website: www.subseatechnologies.com

Subsea Technologies, Inc. offers the latest in advanced underwater technology and GPS/GNSS positioning products. Based in Katy, Texas, Subsea Technologies provides equipment sales, rental, and service to the marine geophysical, oceanographic, hydrographic survey, diving, ROV, and offshore construction markets with products from Applied Acoustics, Hemisphere GNSS, AML Oceanographic, Handheld, Juniper, and Tritech.

Presentations - Monday March 21, 2022

	COLORADO A-B	COLORADO C-D
8:40 am	OPENING SESSION (Colorado G-J)	OPENING SESSION (Colorado G-J)
9:20 am	KEYNOTE	KEYNOTE
10:00 am	COFFEE - Exhibit Hall Colorado E-F	COFFEE - Exhibit Hall Colorado E-F
	DAMS & LEVEES	GROUNDWATER MANAGEMENT (Co-Sponsored by Colorado Groundwater Association)
10:20 am	RECONSTRUCTING FORMER LEVEE AND BACKCHANNEL LANDSCAPES IN URBAN SETTINGS - Mehrez Elwaseif, Jacobs, Pensacola, FL, USA	REPURPOSING PETROLEUM SEISMIC REFLECTION SURVEYS FOR GROUNDWATER STUDIES - John Jansen, Collier Geophysics, West Bend, WI
10:40 am	GEOPHYSICAL ASSESSMENT OF DEEP KARST UNDER AND EMBANKMENT IN DAM IN FLORIDA USING THE MULTI-ELECTRODE RESISTIVITY IMPLANT TECHNIQUE (MERIT) - David Harro, G3 Group	UTILIZING OIL AND GAS GEOPHYSICAL LOGS TO SUPPLEMENT GROUNDWATER AQUIFER CHARACTERIZATION IN COLORADO, USA - Clinton Meyer, LRE Water, Denver, CO, USA
11:00 am	UTILITY OF THE HVSR METHOD FOR DAM AND LEVEE ASSESSMENT - William Doll, Orise	PUBLIC ONLINE UPDATABLE HYDROSTRATIGRAPHIC GEOLOGICAL MODEL USED FOR GROUNDWATER ADMINISTRATION IN DENMARK: A ROAD TRIP AND LESSONS LEARNED - Tom Martlev Pallesen, I•GIS, Aarhus, Denmark
11:20 am	THRU-DAM SEISMIC TOMOGRAPHY: LEVERAGING GEOPHYSICAL TECHNIQUES FOR CONDITION ASSESSMENT OF A THIN ARCH CONCRETE DAM - Trever Ensele, Collier Geophysics	MULTIPLE POINT STATISTICS & HYDROGEOLOGICAL CASE STUDIES - Mats Lundh Gulbrandsen, I•GIS, Aarhus, Denmark WITHDRAWN
11:40 am	IMPROVING RISK ANALYSIS IN DAM SAFETY WITH DISTRIBUTED FIBER OPTIC SENSING FOR AUTONOMOUS, REAL-TIME MONITORING AND DATA ACQUISITION - Celia Kennedy, Silixa Ltd	STREAMING-POTENTIAL FOR IDENTIFYING SURFACE LOCATIONS ALLOWING INFILTRATION INTO AN UNDERLYING AQUIFER - Md Lal Mamud, National Center for Physical Acoustics (NCPA), University of Mississippi, Oxford, MS, USA
12:00 pm	GWB LUNCHEON Room: Colorado G-I	GWB LUNCHEON
	SITE CHARACTERIZATION	GROUNDWATER MANAGEMENT (Co-Sponsored by Colorado Groundwater Association)
1:30 pm	A PARAMETRIC STUDY TO DETERMINE THE ELECTRICAL RESISTIVITY OF BURIED REINFORCED CONCRETE TANKS AT THE HANFORD SITE - Dale Rucker, hydroGEOPHYSICS, Inc.	UNCOMPAGHRE ALLUVIAL AQUIFER GEOPHYSICAL AND AQUIFER YIELD EVALUATION - Allan Foster, LRE Water, Denver, CO, USA
1:50 pm	GPR, EM, AND BOREHOLE GEOPHYSICAL INVESTIGATIONS OF THE BEE CREEK FAULT ZONE, CENTRAL TEXAS - Jeffrey G. Paine, Bureau of Economic Geology, Austin, TX	MULTIPLE POINT STATISTICS AND NEW INVERSION METHODOLOGY USED TO FIND WITHDRAWN
2:10 pm	RESOLVING THE BASE OF PERMAFROST WITH ERT DEPTH ELECTRODES - Dan R. Glaser, US Army ERDC Cold Regions Research & Engineering Laboratory, Hanover, NH	A HYDRO STRUCTURAL MODELLING (HSM) CONCEPT: CREATE SEMI-AUTOMATED HYDROLOGICAL MODELS DERIVED FROM RESISTIVITY MODELS AND LITHOLOGY LOGS - Toke Højbjerg Søltøft, AGS/Seequent, Aarhus, Denmark
2:30 pm	COFFEE - Exhibit Hall Colorado E-F	COFFEE - Exhibit Hall Colorado E-F
	SEISMIC METHODS	GROUNDWATER DYNAMICS
2:50 pm	FIELD LAND-STREAMER VS. CONVENTIONAL SEISMIC DATA: ADVANTAGES AND DISADVANTAGES - Sherif M. Hanafy, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia	INVERSION OF WATERBORNE GRADIENT SELF-POTENTIAL (WASP) DATA FOR REGIONAL AND HYPORHEIC SURFACE- GROUNDWATER EXCHANGE PATTERNS IN A MEANDERING RIVER - Scott Ikard, U.S. Geological Survey, Austin, TX, USA
3:10 pm	DETECTION OF SOIL PIPES AND THEIR NETWORK BY ACOUSTIC EXCITATIONS - Md Abdus Samad, National Center for Physical Acoustics (NCPA), University of Mississippi, USA	INVESTIGATING COASTAL-POLLUTION USING FLOATING TRANSIENT ELECTROMAGNETIC (FLOATEM) COMBINED WITH GROUND-BASED SURVEYS - Pradij Maurya, Aarhus Univeristy, Denmark
3:30 pm	DETECTION OF SOIL PIPES USING REFRACTION SEISMICS - Md Abdus Samad, National Center for Physical Acoustics (NCPA), University of Mississippi, USA	GROUNDWATER STORAGE AND RECHARGE DISTRIBUTION OF A SUBALPINE MEADOW IN THE SIERRA NEVADA, CA - Denise Bragatt, Sonoma State University, Rohnert Park, CA, USA WITHDRAWN
4:30 pm	OUTDOOR EQUIPMENT DEMONSTRATIONS/BREW PUB "FIELDTRIP" AND FUNDRAISER	

Presentations - Tuesday March 22, 2022

	COLORADO A-B	COLORADO C-D
	SEISMIC METHODS	MUNITIONS RESPONSE
8:20 am		SOLVING COST ESTIMATION CHALLENGES AND ANOMALY DENSITY DISCREPANCIES - John Jackson, U.S. Army Corps of Engineers (USACE)
8:40 am	BEDROCK MAPPING USING MASW WITH INVERSION AND INTERPRETATION CONSTRAINTS FROM SEISMIC REFRACTION - Oluseun Sanuade, Oklahoma State University, Stillwater, OK	ULTRATEMA-4 MARINE DYNAMIC CLASSIFICATION SYSTEM FIELD TRIALS - T. Jeffrey Gamey, Tetra Tech, Oak Ridge, TN, USA
9:00 am	ACTIVE AND PASSIVE-SOURCE SURFACE WAVE INVESTIGATION TO CHARACTERIZE S-WAVE VELOCITY STRUCTURE OF DWELLING MOUNDS AND UNDERLYING GEOLOGIC STRATA IN THE GRONINGEN GAS FIELD, THE NETHERLANDS - Antony Martin, GEOVision Inc., Corona, CA	MAKING IT WORK. OVERCOMING THE BARRIERS OF DEPLOYING AGC TECHNOLOGIES IN CHALLENGING ENVIRONMENTS - J.R. Candlish, Weston Solutions, West Chester, PA, USA
9:20 am	A DEEP LEARNING ALGORITHM FOR MASW SOUNDINGS - Daniel Campos Halas, Geophysics GPR International, Montreal, QC Canada	AN AUTOMATED TOOL FOR PERFORMING QUALITY ASSURANCE OVERSIGHT OF ADVANCED GEOPHYSICAL CLASSIFICATION PROJECTS - Stuart Bancroft, Jacobs, Pensacola, FL, USA
9:40 am	THREE-DIMENSIONAL S-WAVE VELOCITY MODEL OF NAPRAWN A VALLEY OBTAINED FROM MICROTREMOR ARRAY MEASUREMENTS AND HORIZONTAL TO VERTICAL SPECTRAL RATIO - Bart Hoekstra, Geometrics USA	ADVANTAGES OF USING SLAM BASED TECHNOLOGIES IN THE WOODS FOR GLOBAL POSITION DATA - Dave Duggins, Kaarta, Inc, Pittsburgh, PA, USA
10:00 am	COFFEE - Exhibit Hall Colorado E-F	COFFEE - Exhibit Hall Colorado E-F
	GEOTECHNICAL ENGINEERING AND INFRASTRUCTURE	MUNITIONS RESPONSE
10:20 am	GPR WITH A BENCH MODEL EXPERIMENT TO MEASURE BATHYMETRY AND SEDIMENT ACCUMULATION OF FAYLOR LAKE, PA - Trey DuPont-Andrew, Susquehanna University, Selinsgrove, PA, USA	SERDP/ESTCP MUNITIONS RESPONSE PROGRAM OVERVIEW AND SOME RECENT TEST RESULTS - Dave Bradley
10:40 am	QUANTIFYING LAND SUBSIDENCE IN THE COASTAL BEND OF TEXAS USING TEMPORAL GRAVITY MEASUREMENTS - Amanda Beattie, Texas A&M University- Corpus Christi, Corpus Christi, TX, USA	2022 ADVANCED GEOPHYSICAL CLASSIFICATION (AGC) SENSOR UPDATE - Jeffrey Leberfinger, PIKA International, Harrisburg, PA USA
11:00 am	CONDITION ASSESSMENT OF AUGUST A. BUSCH BRIDGE DECK USING PORTABLE SEISMIC PROPERTY ANALYZER & GPR - Samie Hamad, Missouri University of Science and Technology, Rolla, MO, USA WITHDRAWN	DAGCAP- RECENT LESSONS LEARNED AND INTERESTING RCA - John Jackson, U.S. Army Corps of Engineers (USACE)
11:20 am	CONSTRUCTING A GEOPHYSICAL TEST SITE FOR RESEARCH AND EDUCATION ACTIVITIES: LESSONS LEARNED AND PRELIMINARY RESULTS - Mohamed Ahmed, Texas A&M University—Corpus Christi, Corpus Christi, TX, USA	REMEDICATION GOALS FOR FORMER CAMP S, A CASE STUDY IN WHAT WAS AND WHAT COULD HAVE BEEN - Andrew Schwartz, U.S. Army Corps of Engineers, Huntsville AL
11:40 am	MINING VOIDS DETECTION USING SEISMIC LAND STREAMER DATA AT THE TRI-STATE MINING DISTRICT IN NORTHEAST OKLAHOMA - Ahmed Ismail, Oklahoma State University, Stillwater, OK, USA	DETECTION, SCREENING, AND CLASSIFICATION OF UXO WITH THE ULTRATEM EMI SYSTEM: MARSHALL SPACE FLIGHT CENTER (MSFC-003) - Kevin Kingdon, Black Tusk Geophysics, Inc.
12:00 pm	EESG LUNCHEON (Room: Colorado G-I)	EESG LUNCHEON
	GROUNDWATER MANAGEMENT (Co-Sponsored by Colorado Groundwater Association)	PANEL SESSION: UNMANNED AERIAL VEHICLES (UAV)
1:30 pm	COMBINING ADVANCED GEOPHYSICAL LOGGING METHODS TO INCREASE RESOLUTION AND HYDROGEOLOGIC CHARACTERIZATION OF SAPROLITE AND THE BEDROCK TRANSITION ZONE - Ned Clayton, NMR Services, Tucson, AZ, USA	PANEL UAVs
1:50 pm	AIRBORNE EM FRAMEWORKS FOR MANAGED AQUIFER RECHARGE ALONG THE SOUTH PLATTE RIVER - Jared Abraham, Aqua Geo Frameworks, LLC., Fort Laramie, WY, USA	PANEL UAVs
2:10 pm	OVERCOMING CHALLENGES IN GROUNDWATER MANAGEMENT - Laura Quigley, Seequent, Vancouver, BC, CANADA	PANEL UAVs
2:30 pm	COFFEE - POSTERS (Exhibit Hall Colorado E-F)	COFFEE - POSTERS (Exhibit Hall Colorado E-F)
	PANEL: ENGINEERING AND CLIMATE CHANGE	PANEL SESSION: UNMANNED AERIAL VEHICLES (UAV)
2:50 pm	PANEL: SUSTAINABLE ENGINEERING AND CLIMATE CHANGE	OPTIMIZING MULTI-SENSOR GEOPHYSICAL OBSERVATIONS ON A UAV FOR UXO DETECTION - Heidi Myers, University of Maryland, College Park, MD, USA
3:10 pm	PANEL: SUSTAINABLE ENGINEERING AND CLIMATE CHANGE	PRELIMINARY DATA FROM THE IN-FLIGHT RAPID OBSERVATION & SURVEYING TOOL (IFROST) FOR EMI MAPPING PERMAFROST - Michele Maxson, U.S. Army ERDC CRREL, Hanover, NH, USA
3:30 pm	PANEL: SUSTAINABLE ENGINEERING AND CLIMATE CHANGE	CHARACTERIZING AGRICULTURAL SOILS USING MACHINE LEARNING WITH UAV AND GEOPHYSICAL TECHNIQUES - Katherine Grote, Missouri University of Science and Technology
3:50 pm	PANEL: SUSTAINABLE ENGINEERING AND CLIMATE CHANGE	DEVELOPMENT OF A DRONE-BASED GROUND-PENETRATING RADAR (GPR) SYSTEM TO MEASURE PIPELINE DEPTH OF COVER AT WATER CROSSINGS - Alastair McClymont, BGC Engineering, Calgary, AB, CANADA
4:10 pm	PANEL: SUSTAINABLE ENGINEERING AND CLIMATE CHANGE	DRONE ENABLED EM61 - Ron Bell, Drone Geoscience. LLC
5:00 pm	NETWORKING EVENT & CONFERENCE EVENING	

GEOPEN HOUSE ORAL AND POSTER PRESENTATIONS

	COLORADO A-B	COLORADO C-D
	BEST OF BORDEAUX EAGE NEAR SURFACE	BEST OF BORDEAUX EAGE NEAR SURFACE
8:40 am	GROUNDWATER DYNAMICS IN KARST HYDROSYSTEM UNSATURATED ZONE; EVIDENCES FROM A 2-YEARS SNMR MONITORING - Konstantinos Chalikakis, Avignon University, UMR 1114 EMMAH (INRAE-AU), FRANCE	
9:00 am	CROSS-BOREHOLE ELECTRICAL MONITORING IN GROUNDWATER REMEDIATION PROJECTS: UNDERSTANDING THE FLOW PATH OF REMEDIATION AGENTS - Léa Lévy, Lund University, Lund, SWEDEN	
9:20 am	RESOLVING HYDROGEOLOGICAL PARAMETERS THROUGH JOINT INVERSION OF SEISMIC AND ELECTRIC DATA CONSIDERING SURFACE CONDUCTIVITY - Matthias Steiner, TU Wien, Vienna, AUSTRIA	
9:40 am	CAPACITIVE ELECTRICAL RESISTIVITY: AN ALTERNATIVE NON-INVASIVE METHOD FOR PERMAFROST MONITORING - Sara Bazin, UiO/NGI, now at Institut Européen de la Mer, UBO, Brest, FRANCE	
10:00 am	COFFEE - POSTERS (Exhibit Hall Colorado E-F)	COFFEE - POSTERS (Exhibit Hall Colorado E-F)
	ELECTROMAGNETICS	GEOPHYSICAL SITE CHARACTERIZATION
10:20 am	TOWARDS A GREATER UNDERSTANDING OF INDUCED POLARIZATION EFFECTS ON TRANSIENT ELECTROMAGNETIC DATA AND INVERSION MODELS IN PERMAFROST ENVIRONMENTS - M. Andy Kass, HydroGeophysics Group, Aarhus University, Aarhus, Denmark	INVESTIGATING POTENTIAL BRINE PLUMES BY REINTERPRETING AEM DATA USING ERT AND BOREHOLE CONSTRAINED INVERSIONS - Landon Woods, BGC Engineering Inc., Kimberley, BC, CANADA
10:40 am	PROBABILISTIC INVERSION FOR GEOLOGICAL FEATURES DIRECTLY FROM AIRBORNE EM DATA - Thomas Mejer Hansen, Aarhus University, Denmark	GEOPHYSICAL INVESTIGATIONS FOR ENHANCEMENT OF SITE CHARACTERIZATION AND REMEDIATION PLANNING - Mike Law, DMT Geosciences Ltd, Calgary, AB, Canada
11:00 am	DEEP LEARNING BASED EXPERT SYSTEM TO AUTOMATE TIME-DOMAIN ELECTROMAGNETIC DATA PROCESSING - Muhammad Rizwan Asif, Department of Geoscience, Aarhus University, Aarhus, Denmark	SPATIO-TEMPORAL CHANGE OF RACCOURCI OLD RIVER: INSIGHTS FROM GEOPHYSICAL, HYDROLOGIC, AND GEOMORPHOLOGICAL DATA - Ryan Adams, U.S. Geological Survey, Nashville, TN, USA
11:20 am	CALIBRATING FREQUENCY DOMAIN ELECTROMAGNETIC INDUCTION INSTRUMENT WITH DC RESISTIVITY FOR FAST SOIL MAPPING - Larisa Golovko, Landviser LLC, Houston, TX	ARTIFICIAL INTELLIGENCE FOR EFFECTIVE MODELING OF GROUNDWATER PLUMES BASED ON LIMITED GEOLOGICAL AND GEOPHYSICAL DATA - Ahmed Ismail, Oklahoma State University, Stillwater, OK, USA
11:40 am	STANDOFF BROADBAND LOW-FREQUENCY EMI - Dan R. Glaser, US Army ERDC Cold Regions Research & Engineering Laboratory, Hanover, NH USA	SITE INVESTIGATION IN KARST TERRAIN ENVIRONMENT USING GEOPHYSICAL AND CONVENTIONAL TECHNIQUES - Abdullah Alhaj, Missouri University of Science and Technology, Rolla, MO, USA
12:00 pm	LUNCH ON OWN	LUNCH ON OWN
	METHODOLOGY DEVELOPMENT	GROUND PENETRATING RADAR
1:30 pm	A STEADY-STATE APPROACH TO SURFACE NUCLEAR MAGNETIC RESONANCE - M. Andy Kass, HydroGeophysics Group, Aarhus University, Aarhus, Denmark	ARCHAEO-GEOPHYSICAL PROSPECTION FOR A PRE-COLUMBIAN PRESENCE IN PUTUMAYO, COLOMBIA - Paul Bauman, BGC Engineering Inc., Calgary, Canada
1:50 pm	MUON TELESCOPE FOR ASSESSING ROCK INTEGRITY ON THE TOP OF A GIANT CLIFF – LA REUNION ISLAND - Catherine Truffert, IRIS Instruments, France	REVISITING THE OLD CITY CEMETERY: NEW DATA AND NEW INSIGHTS ON CEMETERY CHARACTERIZATION - Md. Iftekhar Alam, University of Tennessee, USA
2:10 pm	PROCESSING AND INTERPRETATION OF WATERBORNE ELECTRICAL RESISTIVITY IMAGING (ERI) - Dimitrios Ntarlagiannis, Rutgers, The State University of New Jersey, Newark, NJ, USA	ASSESSMENT OF OIL/DIESEL POLLUTION USING 2D/3D ELECTRICAL RESISTIVITY AND GPR AT A POWER PLANT, IBAFO, SOUTHWESTERN, NIGERIA - Elijah Ayolabi, Mountain Top University, Ibafo, Ogun, Nigeria
2:30 pm	COFFEE - POSTERS (Exhibit Hall Colorado E-F)	COFFEE - POSTERS (Exhibit Hall Colorado E-F)
	SEISMIC METHODS	GROUND PENETRATING RADAR
2:50 pm	USING MULTI-CHANNEL ANALYSIS OF SURFACE WAVES TO GUIDE, THEN EVALUATE THE RESULTS OF A ROAD STABILIZATION PROJECT IN A KARST SETTING - Jacob Sheehan, Schnabel Engineering, Chadds Ford, PA, USA	USING GEOPHYSICS AND LUMINESCENCE GEOCHRONOLOGY TO DETERMINE THE AGE AND EXTENT OF THE ADAMS MILL FAULT AT THE SMITHSONIAN NATIONAL ZOOLOGICAL PARK - Kristian Macias, University of Mississippi, Oxford, MS, USA
3:10 pm	APPLYING SEISMIC VELOCITY MAPPING FOR LANDSLIDE SHEAR-PLANE IDENTIFICATION, THEODORE ROOSEVELT NATIONAL PARK - Roy Bowling, Collier Geophysics, LLC	INSIGHTS FROM MAPPING OF BURIED PLASTIC PIPES WITH 2D ELECTRICAL RESISTIVITY AND 2D/3D GROUND PENETRATING RADAR - Elijah Ayolabi, Mountain Top University, Ibafo, Ogun, Nigeria
3:30 pm	UTILISATION OF GEOPHYSICAL METHOD FOR SOIL BEARING CAPACITY ESTIMATION - Ao Wang, Université Rouen Normandie, UMR 6143 M2C, Rouen, France	

Poster Presentations - Tuesday March 22 and Wednesday March 23, 2022

COLORADO EXHIBIT HALL PRE-FUNCTION AREA

Poster Session - Tuesday Afternoon and 8-5 pm Wednesday

TUNNEL CONCEALED KARST CAVE JOINT DETECTION BY TUNNEL SEISMIC AND TRANSIENT ELECTROMAGNETIC - Xinglin Lu Chongqing University
ROAD FAILURE CAUSED BY LANDSLIDE IN SOUTHWESTERN ETHIOPIA: A CASE STUDY FROM AMAYA ROAD SEGMENT - Yigrem Dingo Husky Engineering PIC
MULTIPHYSICS SIMULATION OF THE ELECTRICAL SIGNATURE OF DUAL-DOMAIN MASS TRANSFER AT THE PORE-SCALE - Charles Dorchester Colorado School of Mines
VERIFICATION OF THE VS30 AS A SITE AMPLIFICATION PROXY, CASE STUDY FROM THE WEST BOHEMIA SEISMIC NETWORK - Martin Mazanec Charles University
HYDROGEOLOGICAL HETEROGENEITY BY MEAN OF SRT, ERT AND DRILLING LOGS, AT CEER, SUSQUEHANNA UNIVERSITY, PA - Ahmed Lachhab Susquehanna University
MAPPING CLAY SOILS USING TIME-DOMAIN INDUCED POLARIZATION AND ELECTRICAL RESISTIVITY SURVEYS - Mehrez Elwaseif Jacobs
TOWED TRANSIENT ELECTROMAGNETIC SYSTEM USING REAL-TIME FIELD INVERSION RAPIDLY DELINIATES BRINE CONTAMINATION FROM AN ABANDONED GAS WELL NEAR FORT KNOX, KENTUCKY - Eric White U.S. Geological Survey
GEOPHYSICAL ANALYSIS OF PERMEABLE PAVEMENT INFILTRATION DURING SIMULATED RAINFALL EVENTS - Brett Trottier U.S. Geological Survey

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Tuesday Morning Coffee Break



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