Letter from the Chair

Dear SEG Near-Surface Geophysics Technical Section Members,

I would like to start by thanking all of you who very kindly contributed to the Near Surface technical program for San Antonio 2019. Your contributions were critical to the success of our technical program. At this time we have three special technical sessions: Geoscientists Without Borders® and Humanitarian Geophysics, SEG-AGU Hydrogeophysics and Surface Wave Method Applications.

For our general near-surface geophysics technical sessions, we were able to secure on the session planning meeting, five oral and three poster sessions.

- Oral: Dynamic Coastal Environment
- Oral: Engineering Geophysics
- Oral: Imaging and Modeling 1
- Oral: Imaging and Modeling 2
- Oral: Applications for Archaeology, Void and Target Detection.
- Poster: Machine Learning and Airborne Geophysics
- Poster: Novel Methods
- Poster: Seismic Processing and Applications

Thank you to all of the volunteers who helped to develop, and recruit papers for sessions, reviewed abstracts, and agreed to serve as session co-chairs. Your service is invaluable to us and we appreciate all of your time and efforts.

We will have two full day Summits on Thursday and one ½ day post-convention workshop on Friday each Summit will have separate registration and is not a free-flow post-convention workshop. All Summits have the same price as post-convention workshops, and is a particularly nice price structure for students. Please help spread the work about the Summits and our post-convention workshop.

- Summit on Near-Surface Geophysics for Archaeological and Forensic Applications. Participants will receive 0.75 CEUs upon completion of the summit.
- Summit on Advances in Unmanned Airborne systems (UAS) Geophysics

Post-convention workshop on Ambient Noise Imaging and Monitoring for High Resolution Spatial and Temporal Near-Surface Characterization and Exploration Seismology:
We will conduct our Near Surface Reception on Tuesday night from 7:00 to 10:00 PM at the **Iron Cactus** restaurant on the River Walk. It is not very far, by foot less than a mile from the convention center, and this year you also have the option to take a boat to the event. Please join us for a brief business meeting where our new leaders will take over their roles. We have a great selection of candidates for your NSTS leadership again this year. Please make sure that your dues are current and then cast your vote. The election timeframe is 1 June to 1 July. Please make your voices heard. Additionally, at the Near Surface reception we will present the Harold Mooney Award to the 2019 recipient, Jonathan Ajo-Franklin. Please join me in congratulations.

See you all in San Antonio!

José R. Arce  
Near-Surface Geophysics Technical Section Chair
Member News

Please join us in celebrating our members!

Dr. John Bradford has been named the new Vice Provost and Dean at Colorado School of Mines!

Dr. Rosemary Knight was the first Virtual Near Surface Global Lecturer!

The NSTS was featured in the Presidents Page of the June TLE 2019

Have exciting news about yourself, a student, or colleague? Email us to have it featured here!

Community News:

James Reilly, director of the USGS will give the SEG Annual Meeting 2019 Keynote Address

BAG plenary sessions are now open to all AM attendees

Overview of this Issue of the NS Views

P. 1 - Conference Highlight - 2019 PDAC Meeting
P. 2 - 2019 Near-Surface Research Award Winner - Patrick Duff
P. 4 - Research Highlight - Soil Nitrogen Supply Potential of a corn field from electromagnetic induction
P. 7 - Near Surface in The Leading Edge, June 2019
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  P. 17 - 2019 SEG Geophysics for Smart City Development Workshop
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This year’s PDAC (March 3-6, 2019) convention in Toronto was again rocked by The Retros during their yearly performance at the Steam Whistle Brewery in downtown Toronto. Just like every year, people enjoyed the music and danced into the late night with 80s music. Our friend, Jean Legault, plays the guitar and sings for the band along and his twin brother Marc. This party is a must every year during the PDAC. Rock on!

Top Photo: The Retros including Jean Legault on bass and Marc Legault on center guitar.

Photo Right: Jean Legault.
Biography
I am a fifth year Ph.D. student studying geology at the University of South Carolina, and specializing in the evolution of rifted continental margins. In pursuing my studies, I emphasize the integration of geological and geophysical data sets across spatial scales, as well as a balance between purely scientific and applied aspects. For example, I use geologic field mapping and potential field and seismic data sets to study how tectonic inheritance can drive rifted margin segmentation over 100s of kilometers, as well as using vibracores and GRP to study how the interplay of auto- and allochthonous sedimentary processes control facies heterogeneity in a single modern barrier island or strand-plain deposit. I am interested in patterns of rift-related mafic magmatism, but also in evaluating how mafic igneous rock bodies might serve as a reservoir for CO2 sequestration. I am also a strong believer in collaborative, multi-disciplinary research, and in inspiring a new diverse generation of earth scientists. When I am not working, I enjoy playing soccer and tennis, as well as vegetable gardening and cooking.

Project Abstract – Understanding shallow marine clastic reservoir heterogeneity from modern analogues resolved by GPR and drone imagery
Clastic deposition in the continental and near shore environment is widely recognized as complex, and is controlled by allochthonous processes such as eustasy and tectonics and autogenic processes influenced by fluvial discharge, and morphologic inheritance. The dynamic nature of the processes that drive fluvial to shallow marine deposition results in deposits that exhibit abrupt lateral and vertical discontinuities in facies that juxtapose porous and permeable units with impermeable ones. The complex geometries and stacking patterns that form the depositional architecture of preserved continental and near shore depositional systems represent significant obstacles to applying many of the conceptual and stochastic models utilized in exploration and reservoir modeling. Close examination of modern fluvial to shallow marine deposits of reservoir quality sand can assist in predicting the occurrence of these deposits in the subsurface, as well as understanding their internal structure.

To establish a proof of concept, a series of vibracore samples, GPR reflection lines, and a rotary-wing drone surveys will be acquired on the coastal plain of South Carolina to investigate the internal structure and stratigraphy of strand-plain/barrier-island sand deposits, to define the morphological expression of these features, and to estimate their reservoir characteristics. A 3D GPR reflection grid, as well as a common midpoint survey and borehole survey will be collected in 100 and 200 MHz within a paleo-shoreface deposit at the University of South Carolina’s Baruch Institute for coastal science research. These near surface geophysical data will be integrated with vibracore data and drone imagery to resolve the geometry and internal structure of the deposit, including bedform types and scales, as well as internal surfaces, such as unconformity, flooding, and accretionary surfaces. Stratigraphic units are differentiable on the basis of vibracores, as well as radar sections, with observed changes in radar velocity and facies correlative to structural and/or stratigraphic interfaces. Raw subsurface data will be processed to develop data products such as a depth converted GPR volume, a GPR velocity log for the borehole, digital core logs and photos for the continuous cored interval within the GPR volume, and a DEM and digital orthomosaic of the land surface. These data products will be used to construct a 3D near surface model of the deposit using Schlumberger Petrel software. The results will establish the suitability of the imaged deposit as a reservoir analogue for ancient equivalents. The high resolution imaging (centimeter scale) of modern deposits made possible by GPR and fixed-wing drones will allow the 3D near surface model to be used to condition subsurface reservoir models by defining internal geometries not imaged by seismic data and assisting the estimation of reservoir heterogeneity.
Selected Publications


Clendenin Jr., C. W., and Duff, P. D., 2015, Superimposed oblique extension on the South Georgia Rift, South Carolina Geology, 49, p. 25-36.
Nitrogen (N) is an important nutrient in corn (Zea mays L.) production with both N deficiency and excess N having negative effects for crop yield and quality, and/or environment. Improving N rate determination to avoid over- or under-fertilization requires knowledge of the soil N supply potential through mineralization (N_{soil}) of soil organic matter (SOM). The SOM content of soil is typically estimated by loss-on-ignition (LOI). This method does not take into account differences in N pools within SOM and it is thus not possible to accurately predict N_{soil} across soils. The Illinois soil nitrogen test (ISNT) [Khan et al., 2001] was shown to provide a more accurate estimation of N_{soil} for corn in New York [Klapwyk and Ketterings, 2006]. Testing for ISNT-N involves soil sampling and laboratory analyses that can be time-consuming, expensive, and limited in spatial resolution. Electromagnetic induction (EMI) has become increasingly popular in precision agriculture due to its ability to rapidly and inexpensively provide spatially continuous soil characterization. EMI can capture bulk soil properties, such as soil salinity, texture, cation exchange capacity, organic carbon, etc. [Corwin et al., 2003]. Hence, EMI may offer an opportunity to rapidly and inexpensively predict N_{soil} at high spatial resolution.

In a New York Farm Viability Institute (NYFVI) funded project, we aim to estimate N_{soil} from EMI soil characterization. Toward this end, we surveyed a corn field in Central NY using a Geonics EM38-MK2 instrument mounted in a custom-made cart (Figure 1) to measure soil apparent electrical conductivity (EC) and magnetic susceptibility (MS). The EM38-MK2 instrument has two receivers, the 0.5 and 1 m separation receivers, so at each measurement location, a set of two EC and MS were measured. For spatial cohesion in the observed EC and MS, we resampled the EMI data on a 10 x 10 m regular grid by assigning the average of all EMI measurements in a grid to that grid location. To obtain co-located EMI and ISNT-N measurements for the predictive modeling, we collected a total of 52 soil samples over a composite depth of 0-20 cm on a one acre regular grid. Samples were analyzed for ISNT-N and LOI at the Cornell University Nutrient Management Spear Program Laboratory. We performed correlation analyses of the co-located EMI and ISNT-N data and found the EC for the 0.5 m receiver and the MS for the 1 m receiver to have the highest correlation coefficients of 0.56 and -0.70 with ISNT-N, respectively. Figures 2A and 2B show, respectively, the EC and MS datasets with the highest correlations with ISNT-N used for the predictions. Ten of the 52 co-located data points were randomly selected for model validation (red star in Figure 2A) and the remaining 42 were used for the model calibration (black closed circles in Figure 2A).

We applied a linear mixed model (LMM) approach [e.g., Oliver, 2010] for the ISNT-N prediction. The LMM considers the prediction as a summation of two terms, the fixed and random effect terms. Specifically, the fixed effect term was modeled as a linear combination of the covariates (EC and MS) in a least-squares sense with parameters θ_{fx}. The random effect term was modeled as geostatistical random variables with parameters θ_{rnd},
which are simply the parameters of a variogram (correlation length, sill and nugget variances) [e.g., Deutsch and Journel, 1998]. We first performed exploratory multivariate regression analyses of the 42 model calibration data points to find an appropriate model structure (linear here) for the fixed effect term. We also performed exploratory variogram analyses to find an appropriate variogram model (exponential here) and appropriate ranges of \( \theta_{\text{rnd}} \). We then applied a Bayesian Markov chain Monte Carlo (Bayesian-McMC) sampling [e.g., Owari et al., 2019] for the model (\( \theta_{\text{fx}} \)) calibration. Precisely, for each Bayesian-McMC iteration, we sampled uniformly over the ranges of \( \theta_{\text{rnd}} \) to estimate a covariance matrix to weigh the least-squares estimation of \( \theta_{\text{fx}} \) to propose a model. We also considered measurement errors in the random effect term (covariance matrix). We ran the chain for 100,000 iterations and retained the last 50,000 models as posterior samples.

For the model prediction, we applied the EC and MS (Figures 2A and 2B) to estimate ISNT-N for the entire field. Particularly, we predicted ISNT-N for the entire field for each set of the 50,000 posterior samples of \( \theta_{\text{fx}} \). Figures 2C and 2D show, respectively, the posterior mean and standard deviations of the 50,000 ISNT-N predictions. Compared to the EC, the MS (Figure 2B) shows a stronger footprint on the spatial structure of the predicted mean ISNT-N, with negative MS values corresponding to high ISNT-N, and vice versa. Figure 2D shows the spatial distribution of uncertainty in the mean ISNT-N prediction, with mean and maximum uncertainty of 30 and 95 ppm, respectively. The model validation of the 10 independent ISNT-N measurements (Figure 2E) indicate that most of the validation data (orange cross marks in Figure 2E) were captured within the 95% confidence interval of the mean, which reposes confidence in the predicted ISNT-N for the entire field.

In summary, N fertilization guidelines for corn require knowledge of the amount of N that can be supplied by the soil, through soil mineralization. Knowing ISNT-N and LOI, can help identify where additional N is not needed. Here, we demonstrated the potential application of electromagnetic induction to rapidly and non-invasively estimate high resolution soil N supply potential. The results for the field in this study look promising. Data from additional fields are currently being evaluated. If EMI can accurately predict soil N supply potential at a much finer resolution and cheaper than can be done currently through analyses of soils for ISNT and LOI, it will have significant implications for guiding N use for corn.

**Figure 2:** Observed apparent electrical conductivity (A), observed magnetic susceptibility (B), posterior mean (C) and standard deviation (D) of ISNT; scatter plot of observed vs predicted ISNT (E). The black filled circles and red stars in A show locations of the model calibration and validation data points, respectively. The black filled circles in E define the 95% confidence interval of the mean. The orange cross marks represent the one-to-one plot of the observed ISNT-N.
References

To submit an article about a recent project for this new Research Highlight section, please send all contributions to ns@seg.org
Check your inboxes and mailboxes for this very special edition of The Leading Edge that features the Near-Surface Geophysics Technical Section and recent advances of the near-surface community.

Near-surface geophysics has been a part of SEG for decades, but it was not until the end of 2014 that a near-surface group was formally established within the Society. In the few years since then, this group, now known as the SEG Near-Surface Geophysics Technical Section (NSTS, https://www.seg.org/ns), has expanded its membership, broadened its activities, and positioned itself for continued global growth...
Near-Surface Geophysics Technical Section Elections

2019 Candidates for Chair-Elect

Jean Leguault

Catherine Truffert

2019 Candidate for Vice Chair

John Goff

Sarah Morton Rupert

2019 Candidate for Vice Chair of Committees
2019 Candidates for Global Chair

Sankhadip Bhattacharya  
Kennedy Doro  
Changchun Yin

Elections open June 1 and will close July 1.

An election survey will be sent to all members of the Near Surface Technical Session who have current SEG dues.

Click here to read candidate biographies.
Congratulations to the following SEG Near-Surface Technical Section members for your dedication to the Society of Exploration Geophysicists!

**SEG Tenure Milestones**

- Dr. Ted T. Wong 25 years - Silver
- Dr. Juan Lorenzo 25 years - Silver
- Dr. Partha S. Routh 25 years - Silver
- Mr. Dave Schieck 35 years
- Mr. Patrick Edward Hart 35 years
- Mr. Peter Kowalczyk 50 years - Gold
### Oral and Poster Technical Sessions and Panel Discussion

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<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Room</th>
<th>Session Title</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday 16 Sept</strong></td>
<td>1:50-5:10 PM</td>
<td>217C</td>
<td>NS 1: Dynamic Coastal Environment: Crossing the Land/Sea Interface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>303B</td>
<td>SS 2: Geoscientists Without Borders and Humanitarian Geophysics</td>
</tr>
<tr>
<td><strong>Tuesday 17 Sept</strong></td>
<td>8:30-11:50 AM</td>
<td>217C</td>
<td>NS 2: Engineering Geophysics</td>
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<tr>
<td></td>
<td></td>
<td>301B</td>
<td>SS 3: SEG/AGU Hydrogeophysics</td>
</tr>
<tr>
<td></td>
<td>9:20-11:50 AM</td>
<td>TBD</td>
<td>NS P1: Machine Learning and Airborne Geophysics</td>
</tr>
<tr>
<td></td>
<td>12:00 PM</td>
<td>TBD</td>
<td>Solving Near-Surface Problems with Geophysics and Engineering</td>
</tr>
<tr>
<td></td>
<td>1:50-5:10 PM</td>
<td>217C</td>
<td>NS 3: Imaging and Modeling 1</td>
</tr>
<tr>
<td><strong>Wednesday 17 Sept</strong></td>
<td>9:20-11:50 AM</td>
<td>TBD</td>
<td>NS P2: Novel Methods</td>
</tr>
<tr>
<td></td>
<td>1:50-5:10 PM</td>
<td>221C</td>
<td>NS 4: Applications for Archaeology, Void, and Target Detection</td>
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<tr>
<td></td>
<td></td>
<td>225C</td>
<td>NS 5: Imaging and Modeling 2</td>
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<td></td>
<td></td>
<td>304B</td>
<td>SS 8: Surface Wave Method Applications</td>
</tr>
<tr>
<td></td>
<td>1:50-4:20 PM</td>
<td>TBD</td>
<td>NS P3: Seismic Processing and Applications</td>
</tr>
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</table>

See the full technical program schedule [HERE](#).

### Near Surface Summits

**Thursday, 19 September**

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<tr>
<th>Time</th>
<th>Room</th>
<th>Session Title</th>
</tr>
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<tbody>
<tr>
<td>8:30 AM - 5:00 PM</td>
<td>Room 217A</td>
<td>Near-Surface Geophysics for Archeological and Forensic Applications</td>
</tr>
<tr>
<td>8:30 AM - 5:00 PM</td>
<td>Room 217D</td>
<td>Advances in Unmanned Airborne System (UAS) Geophysics 0.75 CEU</td>
</tr>
</tbody>
</table>

Registration increases July 31! Register early!
Solving Near-Surface Problems with Geophysics and Engineering
Please join the NSTS for a Panel Discussion on Tuesday, September 17, 2019 following the Engineering Geophysics Technical Session.

Description:
Engineers and geophysicists often focus on the same near-surface problems, and in some cases collaborate on the same projects, but information can sometimes get lost in translation. It is important that both professions utilize each other's expertise effectively so that these problems can be solved efficiently to reduce the opportunity for future failures. This panel aims to provide students and professionals with a better understanding of how the engineering and geophysical communities are working together and how they can work together better. Panelists will include engineering and geophysics faculty members as well as working professionals in the engineering sector to provide perspectives from research and development to practical applications.

Panelists:
Dr. Stacey Tucker-Kulesza, Kansas State University
Dr. Joseph Coe, Temple University
Dr. Mark Everett, Texas A&M University
Jacob Spinsby, Terracon
Sarah Morton Rupert, Kansas Geological Survey (Moderator)

Stay tuned for more information!
You’re invited!

Near Surface Geophysics Technical Section Evening Reception

**Date and Time:**
Tuesday 17 September
7:00 - 10:00 PM

**Location:**
Iron Cactus
200 River Walk Suit 100
San Antonio, TX 78205
SEG Student Scholarships:

<table>
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<tr>
<th>Award:</th>
<th>Award Amount</th>
<th>Deadline to Apply</th>
</tr>
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<tbody>
<tr>
<td>Near Surface Student Article Prize</td>
<td>$250</td>
<td>Rolling</td>
</tr>
<tr>
<td>SEG Field Camp Award</td>
<td>$1,000-20,000</td>
<td>Closed for 2019</td>
</tr>
<tr>
<td>SEG Student Scholarships</td>
<td>$500-10,000 per year</td>
<td>Closed for 2019</td>
</tr>
<tr>
<td>Near Surface Research Award</td>
<td>$1,000</td>
<td>Closed for 2019</td>
</tr>
<tr>
<td>SEG Student Education Program (SEP)</td>
<td>Program Acceptance, Possible Travel Grant to SEG 2019</td>
<td>Closed for 2019</td>
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<tr>
<td>SEG Student Leadership Symposium (SLS)</td>
<td>Program Acceptance and Travel Grant to SEG 2019</td>
<td>Closed for 2019</td>
</tr>
<tr>
<td>SEG Technical Program Travel Grant</td>
<td>Full expenses to Annual Meeting</td>
<td>Opening Summer 2019</td>
</tr>
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</table>

Other Student Opportunities:

The 16th Sinkhole Conference: Beck Student Scholarship Call for Applications - Due 14 October 2019
National Park Service: Geoscientists-in-the-Parks Internship - Due 17 June 2019
How to Video Series – Learn from the EAGE Experts:
- How to Get Published [Preview, Part 1, and Part 2]
- How to Present to a Live Audience [Preview, Preparation], and more

Skill-building and Career Advice:
- [How to take criticism well]
- [9 ways to say No to Busywork and Unrealistic Deadlines]
- [Overcoming the Ph.D. stereotype]
- [Being Foreign on the U.S. Academic Market]
- [The right way to network at each stage of your career]
- [Finding jobs in the Government]
- [How PhD students can find jobs outside academia]

Looking to make a contribution?

Go to: https://donate.seg.org/Near-Surface to donate today!
## Calendar of Upcoming Events

<table>
<thead>
<tr>
<th>Events</th>
<th>Location</th>
<th>Date(s)</th>
<th>Submissions</th>
<th>Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>81st EAGE</strong></td>
<td>London, UK</td>
<td>3-6 June 2019</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>AGU-SEG Airborne Geophysics Workshop</td>
<td>Davie, Florida</td>
<td>10-13 June 2019</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>SEG Geophysics for Smart City Development Workshop</td>
<td>Beijing, China</td>
<td>29-31 July 2019</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>Fifth ICEG</td>
<td>Al Ain, UAE</td>
<td>21-24 Oct 2019</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>SEG-EAGE Workshop: Geophysical Aspects of Smart Cities</td>
<td>Singapore</td>
<td>10-12 Dec 2019</td>
<td>5 Aug 2019</td>
<td>Opens 24 June</td>
</tr>
<tr>
<td>Geo-Congress 2020</td>
<td>Minneapolis, MN</td>
<td>25-28 Feb 2020</td>
<td>Closed</td>
<td>Opens 17 Oct</td>
</tr>
<tr>
<td><strong>2020 SAGEEP</strong></td>
<td>Denver, CO</td>
<td>29 March-2 April, 2020</td>
<td>TBA</td>
<td>TBA</td>
</tr>
<tr>
<td>The Sinkhole Conference</td>
<td>San Juan, Puerto Rico</td>
<td>20-24 April 2020</td>
<td>15 July 2019</td>
<td>Open</td>
</tr>
<tr>
<td><strong>2020 SEG Annual Meeting</strong></td>
<td>Houston, Texas</td>
<td>11-16 Oct 2020</td>
<td>1 April 2020</td>
<td>TBA</td>
</tr>
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Coming Soon:
- GPR 2020 at the Colorado School of Mines, Golden, CO
- GPR 2022 at Jilin University in China

## Upcoming Journal Submission Deadlines

<table>
<thead>
<tr>
<th>Journal</th>
<th>Issue</th>
<th>First Deadline</th>
<th>Publication Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>JEEG</td>
<td>Geophysics for urban underground space studies</td>
<td>Closed</td>
<td>June 2019</td>
</tr>
<tr>
<td>The Leading Edge</td>
<td>Near-surface geophysics</td>
<td>Closed</td>
<td>June 2019</td>
</tr>
<tr>
<td>The Leading Edge</td>
<td>Borehole geophysics</td>
<td>15 June 2019</td>
<td>Nov 2019</td>
</tr>
</tbody>
</table>
Call for Abstracts:
Closes 10 March 2019

Please email the abstract and the call for abstracts form to china@seg.org.

Registration:
Opens 10 February 2019
Register by 29 June 2019 and save!

Workshop Description
The aim of a smart city is to ensure economic and environmental stability and to provide its citizens with an improved quality of life. The critical components to this initiative are to understand subsurface geologic and hydrologic systems to minimize the cost of new infrastructure development, assess geohazards risk, and sustainably utilize natural resources. The goal of this workshop 2019 SEG Geophysics for Smart City Development Workshop is to bring together new initiatives, methodologies, imaging approaches, and case studies toward understanding soil, fluid and rock properties that lie within the subsurface urban economic zone. Geophysical approaches toward optimizing infrastructure development (tunnel, utility), resource management (groundwater quantity and quality), energy production or extraction (direct use geothermal, for space heating and/or heat pump), and hazard mitigation (landslide, earthquake, tsunami) are all welcome.

We encourage contributions that apply to both new smart city initiatives and to retrofitting existing urban centers that are looking to manage assets and resources more efficiently. Future directions will also be investigated, with the aim of improving the integration and understanding of subsurface properties, resources, and natural hazards for smart city development.

Important Dates:
Abstract Submission opens 10 January 2019
Abstract Submission closes 10 March 2019
Registration Opens 20 February 2019

Click HERE for more information.
Seismic Unix summer school in Pau

July 2019

Reflection imaging is the highest resolution geophysical tool used to investigate the subsurface. It's imaging concepts have been developed during the last decades for oil and gas seismic prospection but they are also relevant to GPR for very shallow surveys.

Seismic Unix has been developed during more than 30 years and is probably the most widespread free reflection imaging software.

SU is convenient to:

- teach seismics: SU uses simple elementary processing tools. The source code availability unveils the details of the processing
- process small to medium 2D marine or land surveys: SU cannot compete with industrial grade processing but it allows to process real world seismic data
- process GPR data
- provide SME and independant consultants with a cheap but efficient software

SU is not sold neither supported by a company. The users community has to:

- fix the bugs: like all other softwares, SU has bugs!
- enhance SU: SU has little support for 3D surveys, statics computations, parallel computing etc.
- write and publish more tutorials and documentation: necessary to attract new users
- elaborate a roadmap for the future of SU: where do we, users, want to go with SU?

SU summer school will try to adress these two topics by gathering users and developers, beginners and skilled people.

You want to work with Seismic Unix?

You want to work on Seismic Unix?

Join us in Pau (France) from July 8th to July 19th for the Seismic Unix summer school in Pau!

Don’t expect to stay sat in a room all the day long listening to a teacher! Most of the time will be devoted to hands on work!
Practical informations

SU summer school is targeted at advanced students and young professionals but experienced users are welcome. Application must contain a short resume showing skills and experience and a motivation letter to explain what you expect from your participation.

The summer school spans on two weeks. It is possible to attend only one. If you can’t come for two weeks, choose the first or the second one on the basis of your experience. The first week will be devoted to basic topics and the second one to more advanced matter.

Accommodation in university rooms or studios is for 2 weeks only. You can also register to the summer school without accommodation. Price includes lunches and coffee breaks and one dinner per week. Accommodation and travel grants will be available depending on the amount of sponsoring we can get.

Pau is located in southwestern France and is easily reached from Paris by plane (1h15), high speed train (4h30) or bus (longer, cheaper). There are low cost flights to Biarritz and Lourdes airports too. Toulouse and Bordeaux airports are within 2 hours of bus or train. Pau is located on the highway which links the Mediterranean Sea to the Atlantic Ocean, north of the Pyrenees mountains.

If you plan holidays in the area (before or after the SU summer school!), Pau is located 1h15 of driving from the Pyrenees mountains and from the Atlantic Ocean. Trains and buses are available.

Beginning of July weather in Pau is normally hot but is sometimes rainy and cool.

Prices (provisional):
- School fees: €120/week
- Accommodation: university room €163, studio €263 (for two weeks)

Su summer school is supported by E2S UPPA (https://e2s-uppa.eu/)

Contact: Dominique.rousset@univ-pau.fr
Olson Instruments is pleased to announce our eighth annual Training Seminar for users of Nondestructive Evaluation (NDE) and Geophysical Methods. This event is scheduled for October 1 - October 3, 2019 at our offices in Wheat Ridge, Colorado.

Training will include method presentations, questions/discussion sessions and hands-on demonstrations. Each day a total of 7.5 PDH certificate hours will be awarded, which can be used to meet continuing education requirements.

Classes start at 8:30 am and end at 5:00 pm, with continental breakfast and lunch provided by Olson. Coffee, drinks, and snacks provided daily.

Day 1 ( Tues, Oct. 1): Structures
Structural NDE Methods for Concrete, Masonry and Wood
Concrete Condition Assessment and Quality Assurance

Day 2 (Wed, Oct. 2): Foundations/Pavements
Quality Assurance and Forensic NDE Methods for Pavements and Foundations

Day 3 (Thurs, Oct. 3): Geophysics
Engineering and Environmental Geophysics

On Fri, Oct. 4: A free Troubleshooting/Repair Course will be offered for Dealer Reps and Clients who own Olson Equipment.

Use the link below to view the Syllabus for the NDE Users Seminar:


How to Register:

Use the link below to register by PayPal:

http://www.olsoninstruments.com/training_userSeminar.php

or contact Janet Shriner at 303.423.1212 or email: info@OlsonInstruments.com

Register Early - seating is limited!
Price: $350/day, per person
7.5 PDH's awarded/day

Olson Corporate Office
12401 W. 49th Avenue
Wheat Ridge, Colorado 80033

Can't attend this year? Make plans to attend next year, Oct. 6-8, 2020.
INTRODUCTION
Karstifiable terrains cover around 15% of the Earth’s continental surface and their aquifers are at least a partial source of drinking water supply of almost 25% of the world’s population. In Europe, for example, one third of its territory overlies karst aquifers and in some countries karst water resources mean more than half of the water supply. Overall, the hydrogeological behavior of karst aquifers shows heterogeneity in its processes and storage dynamics: 1) duality of infiltration and recharge mechanisms (diffuse and/or concentrated, allogenic vs autogenic), 2) spatial heterogeneity and marked anisotropy in the distribution of the characteristics hydraulic parameters, 3) duality of discharge conditions, from continuous discharge when the system is dominated by flow through the matrix and fissures to high discharge variability when flow through the conduits is dominant.

HYDROKARST 2019 is the 12th edition of a course given usually by researchers from the Partnership Association "Advanced Hydrogeological Studies", constituted of the Center of Hydrogeology of the University of Málaga (CEHIUMA) and the Spanish Geological Survey (IGME), on methods applied to hydrogeological research into carbonate aquifers. On the occasion of the 46th IAH Congress, also members of the IAH Commission on Karst Hydrogeology participate, in the framework of the KARMA project (Karst Aquifer Resources availability and quality in the Mediterranean Area). The course is an activity of the Spanish Group of the International Association of Hydrogeologists (IAH-GE) in collaboration with the International Hydrological Program of UNESCO. In this new edition of the HYDROKARST course, researchers will have the opportunity to learn the methods used to characterize the functioning of carbonate aquifers, as well as for the evaluation, protection and management of water resources in this type of medium.

PROGRAMME

Saturday, September 21

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30</td>
<td>Welcome, reception and opening of the course</td>
</tr>
<tr>
<td>09:00</td>
<td>Introduction to the study of karst aquifers. General concepts.</td>
</tr>
<tr>
<td></td>
<td>Juan José Durán [Spanish Geological Survey, SPAIN]</td>
</tr>
<tr>
<td>09:40</td>
<td>Sampling strategies, instrumentation and monitoring of natural</td>
</tr>
<tr>
<td></td>
<td>responses of karst aquifers. M. Mudarra [University of Málaga, SPAIN]</td>
</tr>
<tr>
<td>11:00</td>
<td>Coffee break</td>
</tr>
<tr>
<td>11:30</td>
<td>Hydrogeochemical tools applied to the study of carbonate aquifers.</td>
</tr>
<tr>
<td></td>
<td>Juan Antonio Barberá [University of Málaga, SPAIN]</td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>14:30</td>
<td>Use of isotopic techniques in karst hydrogeology.</td>
</tr>
<tr>
<td></td>
<td>Marco Pettini [Sapienza Università di Roma, ITALY]</td>
</tr>
<tr>
<td>16:00</td>
<td>Coffee break</td>
</tr>
<tr>
<td>16:30</td>
<td>From conceptual models to mathematical approaches in karst aquifers.</td>
</tr>
<tr>
<td></td>
<td>Bartolomé Andreo [University of Málaga, SPAIN]</td>
</tr>
</tbody>
</table>

Sunday, September 22

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Statistical methods for simulating karst aquifers.</td>
</tr>
<tr>
<td></td>
<td>Eulogio Pardo [Spanish Geological Survey, SPAIN]</td>
</tr>
<tr>
<td>10:30</td>
<td>Coffee break</td>
</tr>
<tr>
<td>11:00</td>
<td>Tracer techniques in karst hydrogeology.</td>
</tr>
<tr>
<td></td>
<td>Nico Goldscheider [Karlsruhe Institute of Technology, GERMANY]</td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch</td>
</tr>
<tr>
<td>14:30</td>
<td>Numerical modelling in karst hydrogeology.</td>
</tr>
<tr>
<td></td>
<td>Hervé Jourde [University of Montpellier I, FRANCE]</td>
</tr>
<tr>
<td>16:00</td>
<td>Coffee break</td>
</tr>
<tr>
<td>16:30</td>
<td>Numerical modelling in karst hydrogeology.</td>
</tr>
<tr>
<td></td>
<td>Andreas Hartmann [University of Freiburg, GERMANY]</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION

COORDINATORS
Bartolomé Andreo Navarro [University of Málaga]
Juan José Durán Valsero [Spanish Geological Survey]

SECRETARY
Matías Mudarra Martínez (mmudarra@uma.es) +34 951952961
[Center of Hydrogeology of University of Málaga (CEHIUMA)]

AVAILABILITY AND FEE
At least 20 inscriptions are necessary to organize the course. The reserve criteria will be in order of inscription arrival to the secretary email address. Course fee: 250 € (includes coffee breaks and lunches).

PAYMENT (by bank transfer in the following account):
Bank name: UNICAJA
Bank account: 2103 0146 96 0030028661
IBAN: ES 24
SWIFT: UCJAE52MXXX
Reference: HYDROKARST2019

HYDROKARST 2019 is a contribution to the Research Group RNM-308 founded by the Autonomous Government of Andalusia (Spain), and to the research projects CGL2015-65838 (General Office of Scientific and Technical Research of Spanish Government) and KARMA (PRIMA programme, European Commission)
Stay in Touch with SEG and the NSTS

Have you renewed for 2019? Member benefits ended FEBRUARY 1st! Renew today!

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How to OPT-IN:

Within My Account on https://seg.org, edit your email subscriptions by clicking My Communications on the left-hand side menu. From there, you can opt-in to receive this newsletter, Near-Surface Views, as well as the Near-Surface eTOC to stay up to date with the NSTS. We look forward to staying connected with you!
SEG and NSTS Member Benefits

Have you renewed your SEG Membership?

SEG Near-Surface Geophysics Technical Section Benefits:

1. Near-Surface Geophysics Technical Section elected leadership
2. Non-elected Near-Surface Geophysics Technical Section leadership positions open to students
3. Quarterly newsletter
4. Quarterly Electronic Table Of Contents
5. Quarterly TLE Near-Surface Geophysics non-technical focused article
6. Engineering and environmental geophysics competency management
7. SEG Near-Surface Student Research Award
8. Best Student Chapter Near-Surface newsletter Article Award
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10. Access to SEG journals and other publications online*

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*Check the SEG Dues Structure for more details on publications and information about due-paying assistance.

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The benefits enjoyed by Corporate Members include:

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2. Listing in the official Annual Meeting program
3. Special recognition at the Annual Meeting
4. Right to publish affiliation with SEG and use of SEG corporate logo
Research Funding Opportunities

The National Academies of Sciences • Engineering • Medicine

The National Academies of Sciences, Engineering, and Medicine sponsors awards for postdoctoral and senior researchers at participating federal laboratories and affiliated institutions. These awards include generous stipends ranging from $45,000 - $80,000 per year for recent Ph.D. recipients, and higher for additional experience. Limited graduate level awards are also available. These awards provide the opportunity for recipients to do independent research in some of the best-equipped and staffed laboratories in the U.S. Research opportunities are open to U.S. citizens, permanent residents, and for some of the laboratories, foreign nationals.

Four annual review cycles:

- August: Opens June 1; Closes August 1
- November: Opens September 1; Closes November 1
- February: Opens December 1; Closes February 1
- May: Opens March 1; Closes May 1

Applicants should contact prospective Research Adviser(s) at the lab(s) prior to the application deadline to discuss their research interests and funding opportunities.

For more information:

Phone: 202-334-2760
Email: rap@nas.edu
Web: www.nas.edu/rap
### Industry:
- Research Geophysicist at TGS
- Research Geophysicist at Sinopec Tech Houston
- Geophysicist at TerraSond
- Software Geophysicist at Schlumberger
- Marine Geophysicist at Tetra Tech
- Field Geophysicist at Parsons
- Geophysicist III at ION

### Government:
- Geophysicist (GS 12/13) at US Dept. of Commerce
- Geophysicist (GS 13) at US Dept. of the Interior
- Research Oceanographer at U.S. Geological Survey
- Geophysicist at University of Texas, Austin
- Asst. Research Professor at Penn State University
- Asst. Professor at University of Manitoba
- Tenure Track Asst. or Assoc. Researcher at University of Hawaii, Manoa

### Academic:
- Instructional Asst. Professor at Texas A&M University
- Geophysicist at University of Texas, Austin
- Geophysicist (Env. Science) at University of Texas, Austin

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**Looking for more job postings?**

**Check out these resources:**

- [SEG Career Center](#) | Job postings, Career Resources, Resume Review and more
- [AGU PathFinder Career Center](#) | Job Postings, Career Resources, and more

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**Looking for mentoring opportunities?**

[ Mentoring365 ](#) - As an SEG student member, you can participate in [Mentoring365](#), a joint program supported by AGU, SEG, AWG and others to quickly connect students with geoscientists across various institutions and disciplines. Sign up today here! Listen to the SEG Seismic Soundoff episode [here](#).
To contribute material to the NS views send an Email to Sarah Morton Rupert (smorton@kgs.ku.edu)

All members are welcome to submit content of interest to the Near Surface community. Note, that we have two new sections “What’s hot” where new methods, new developments, new technology, new equipment, or new NS event can be presented as well as “Member News and Updates” where we will highlight information about our membership including retirements, special publications, and awards.

Feel free to send articles for these new sections. Please keep messages brief, provide contact information, and (if available) a web address for additional information.

We are on Facebook! Like our page to stay up to date with all news SEG Near-Surface Geophysics!