Letter from the Chair

Dear members of SEG Near Surface,

Summer is here, field crews are busy, and there is once again much to report to the SEG NS membership. In fact, there is so much happening that in order to keep this letter reasonably short, I encourage you to read the SEG NS semi-annual activities report that is included in this issue of Near-Surface Views. A lot has happened over the last year!

That said, I would like to highlight several recent developments of particular importance to the membership regarding the NS endowment, intersociety cooperation, a new student chapter article award, and the results of the membership election for the leadership position of Chair-elect.

1) The SEG Near Surface Geophysical Research Award Endowment is now ‘live’. The first student research grants will be awarded at the SEG Annual Meeting in 2016. Application instructions will be completed soon and announced in an upcoming issue of Near-Surface Views. In order to maximize the number of available awards, our goal is to grow the endowment from the current $25,000 level to at least $100,000. Contributions to the endowment can be made by clicking Here. Select the SEG Programs box, and then choose SEG Near Surface Geophysical Research Award Endowment from the drop down box under “Gift Information.” Companies interested in contributing to the endowment should contact Seth Haines (sshaines@gmail.com).

Become a founding donor - contribute to the NS Geophysical Research Award Endowment today!

2) Representatives from AGU, EAGE, EEGS, and SEG have begun discussions on a Joint Spring Meeting. SEG NS is represented by Kristina Keating and Rob Stewart, supported by Laurie Whitesell, our SEG Near Surface Geophysics Program Manager and Melanie McGuire from the SEG Meetings department. More details to follow in the months ahead as the negotiations move forward.

3) This issue of Near Surface Views includes an article submitted by Sarah Morton from the SEG Student chapter at Kansas University reporting on NS geophysics research at KU. In order to encourage submissions from the other 300 or so SEG student chapters across the globe, I am pleased to announce a $250 prize for the best student chapter article, to be awarded annually at the SEG NS business meeting.

Finally, voting for the position of SEG NS Chair-elect closed on 1 July. The results are in, and on behalf of the executive committee, I am pleased to announce the election of Dr. Steve Sloan to the position of Chair-elect by the SEG NS membership. Congratulations Steve, we look forward to working with you in the years ahead!

Sincerely,
John W. Lane, PhD
Chair, SEG Near Surface
Overview of This Issue of the NS Views

- Feature Article: 2015 International Conference on Engineering Geophysics (ICEG)
- Student Chapter Highlight: University of Kansas SEG Student Chapter
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- Student Chapter Invitation
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- Call for SAGEEP 2016 Organizing Committee
- SEG Near Surface Honorary Lecturer 2015
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- Geophysics: Special Issue on Nuclear Magnetic Resonance for Near-surface Applications
- Calendar of Upcoming Events:
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  - Society of Exploration Geophysicists 85th Annual Meeting
  - International Symposium on Non-Destructive Testing in Civil Engineering NDTCE 2015
  - 3rd International Conference on Engineering Geophysics (ICEG) 2015
  - American Geophysical Union - Fall Meeting
  - 2nd SEG/DGS Workshop Near Surface Modeling and Imaging
- Job Postings
This will be the 3rd ICEG, all hosted by the United Arab Emirates University (UAEU) and Al Ain City Municipality, but this will be the first choreographed in partnership with SEG. The Conference will be held in Al Ain from November 15 - 18, 2015. Having attended the 2nd ICEG, I can say without hesitation that the venue is not only appealing to the eye but extremely conducive to professional collaboration and interaction. During my first ICEG in 2013, I was truly impressed with the diversity of attendees and the size and breathe of the conference. One, of many observations that has stuck with me from that 2013 conference was how successful this region and these hosts were in bringing together a mix of near surface researchers and practitioners as well as customers/users and geoprofessionals in search of geophysical solutions for near surface problems.

My experiences at the 2013 ICEG rank it prominently in the top 5 all time in my professional meetings category. I view that as a nontrivial ranking considering I have attended better than a hundred meetings in my more than 30 years as a near surface geophysicist. Not a single convenience is overlooked by these hosts. Delegates are provided the total package throughout the entire event, from meals to entertainment. You are free to strike out on your own or participate in a nonstop schedule of activities and events that deliver a taste of this colorful region. With shuttle buses linking conference hotels to the Conference Auditorium of the Crescent Building on the campus of UAEU and each evening’s social activities, delegates can focus on discussing the technology on display in the exhibition hall and papers presented in technical sessions, rather than the logistics of local travel and unwise experiments with local eateries. A truly conducive environment for forming lasting professional ties devoid of concerns about an unfamiliar city or region.

Setting the tone and a measure of the impact of any technical conference are the line-up of keynote speakers. From an innovation, technical stature, and professional accomplishments perspective the keynote speakers presenting at ICEG 2015 make the conference one that no near surface geophysicists can afford to miss. Each day starts off with a keynote presentation that will provide both technical insights and a very forward looking perspective that only true leaders and visionaries in the field can provide.

Our keynote speakers in order of presentation include:

- Dr John Bradford, Professor Boise State University & President-Elect of SEG,
- Dr. Alastair Ruffell, Professor Queens University Belfast,
- Dr. Oz Yilmaz, Founder Anatolian Geophysical and Chief Tech Officer GeoTomo,
- Dr. Peter Annan, Founder and CEO Sensors and Software.

The upcoming 2015 ICEG has a technical program that includes over 110 presentations in 17 oral and 3 poster sessions submitted by speakers visiting from more than 30 countries. Sessions are diverse and focused on both methods and applications. Sessions range from engineering applications-to-advances in multi-method integration-to-forensics (interesting note: the forensics session I attended in 2013 had more law enforcement personnel in the audience than a biker gathering in Waco, Texas. Not a normal sight at a geophysics conference). As a Co-Technical Chair, I have read all the expanded abstracts scheduled to be presented at the conference and, from my experience; they are technical works of uniformly high quality. Dr. Haydar Baker, the lead Technical Co-Chair has done a masterful job of assembling an excellent Technical Committee and it is that group who have collectively solicited what is shaping up to be one the best technical programs I have seen recently.
New at the 2015 ICEG will be special sessions that put the ‘best of ICEEG’ on display, a forum on Women in Geoscience, and an opportunity to attend Dr. Oz Yilmaz’s SEG DISC Course. The organizers of the International Conference on Engineering and Environmental Geophysics (ICEEG), held in different cities throughout China every other year since 2004 have collaborated with the Technical Committee of the ICEG to form two sessions highlighting the very best from the most recent ICEEGs. By partnering with geophysical societies throughout Asia, Australia, and North Africa opportunities arise for cross-pollination and a focusing of efforts by the near surface community to provide fewer but higher quality forums for displaying cutting edge science and technology with applications that have both regional and global significance. As the evolving geosciences workforce adapts to the changing demands and challenges of our science and cultures it is critical that underutilized components or traits of individuals or groups within our geo-community be identified, cultivated, and leverage to address global needs and advance discovery. To that end a ‘Women in Geoscience’ panel will broadly discuss in a moderated forum the benefits of and considerations for leadership development and product enrichment through diversification and nontraditional growth within the workforce. Equally exciting will be the pre-conference Distinguished Instructor Short Course—Engineering Seismology with Applications to Geotechnical Engineering presented by Oz Yilmaz. Oz will be teaching from his newly released book of the same title.

From my sampling, the exhibition floor was as active throughout the 2013 ICEG conference as coffee pots during breaks between technical sessions. The region is rich with opportunities for collaboration and interaction offering some of the most challenging problems in civil engineering and groundwater. The collegial environment that was shared among the exhibitors, contractors, and academics was both refreshing and inviting. Representing SEG and the near surface community during my inaugural SEG Honorary Lecture in 2012 was an honor and extremely enlightening. That tour brought me in contact with near surface geophysicists from around the globe in a fashion that reading journal articles or corresponding through email just can’t accomplish. Near surface geophysics is clearly moving into a very exciting time of growth and discovery. With broader application of our science and a greater understanding and appreciation for its products and potential have come interests from a wider community of engineers and geoscientists. The strong intrigue shown by the geo-community in near surface geophysics has ushered in global growth in our discipline and a greater appreciation for the potential of geophysics to shed light on unsolved mysteries in the near surface. Our science focuses on the segment of the earth that has the broadest impact on the human element. As we continue to witness cycles of boom and bust in the oil and gas industry and the unpredictable swings between feast and famine in mining geophysics, near surface geophysical applications to engineering as well as to the environment and groundwater continue to steam along at a steady pace, with an upward trajectory that is healthy and sustainable for the long haul.

For a more complete overview and a range of details:

http://www.seg.org/events/upcoming-seg-meetings/2015/iceg-uae-15
http://www.seg.org/professional-development/courses/disc
Like many universities, every student that passes through the Geology Department at the University of Kansas (KU) has the ability to experiment in and outside of the classroom. Within the department at KU, students are fortunate to have prestigious and engaging faculty that supplement their courses with a field component. Whether it is a final assignment that requires students to conduct their own field experiments or bringing students along on their own research projects, students are able to engage with professors and gain hands on experience with different geophysical techniques.

One of these courses, Environmental Geophysics, is an upper level course that builds a foundation of several near-surface techniques while exposing them to the equipment. Some of these methods include seismic, ground penetrating radar (GPR), electromagnetic, gravity (Figure 1a), magnetic gradient (Figure 1b), and electrical resistivity (Figure 1c). The curriculum focuses on real world applications and environmental issues such that students can learn how to evaluate, mitigate, and potentially prevent future problems.

Another course on GPR, taught by Dr. George Tsoflias, allows students to use the available antennae and receivers to conduct a survey of their choice as their final project. Topics in the past have included field surveys to observe unexploded ordinances, vadose zone saturation, and fractured foundation sections as well as synthetic modeling to detect survivor detection within collapsed structures. Beyond this advanced geophysics course, graduate students have built upon the knowledge they acquired in class and used it to create their own thesis projects. One project utilized parallel antennas to image subsurface fractures (Figure 2). Although the fractures were outside the instruments’ resolvable limit, they introduced a stepped saline concentration that changed the reflection amplitude and phase of the recorded signal, allowing the fracture apertures to be mapped at depth. Other research efforts have taken students internationally places such as to Spain and Greenland. The glaciers in Greenland provided a cold, but great opportunities for GPR to quantify the orientation of ice crystal’s major axis, archeological and paleontological remains, and how varying instrument response effects the quantitative analysis of data.

Figure 1 Students enrolled in Environmental Geophysics performed (a) gravity, (b) magnetic gradient, and (c) electrical resistivity surveys to enhance the regular lecture material.

Figure 2 On the search for subsurface fractures, a student created a pseudo-circularly polarized survey to reduce the polarization effect of the antenna.
The Geology Department welcomed new geophysics faculty, Dr. Chi Zhang, last semester whose interests focus on the use of nuclear magnetic resonance (NMR) and complex resistivity methods to better understand tightly coupled chemical, physical, and biological subsurface properties. With this new and exciting addition to the department, the university also constructed a laboratory that houses an NMR system (Figure 3) along with a portable spectral induced polarization (PSIP) unit that can be transported for field experimentation.

Before the dust settled in this new facility, graduate students eagerly developed research projects involving the use of the new equipment. Dr. Zhang’s first student has already been trained on the instruments and received a departmental grant to conduct his thesis research throughout the summer. This project bridges the student’s interests in organic chemistry and geophysics in order to identify and quantify hydrocarbon contaminants. Future efforts include NMR experiments to determine the porosity of bones discovered during archeological investigations.

To build comradery and promote geophysics education, the KU SEG student chapter has continued to help those interested in geophysics find a common place to meet and support each other. A majority of the members are graduate students, each specializing in a different subdiscipline of geophysics, which in turn creates a well-rounded basis of knowledge within the chapter. This broad foundation enables the chapter to participate in more outreach activities. Some recent events include speaking at two local elementary schools (Figure 4) and participating in the Topeka Science Café, a monthly event held in Topeka, KS, that hosts speakers from various science fields. In the spring, members of the chapter were invited to give a presentation titled, “Taking an X-ray of the Earth,” which focused on explaining how physics is applied to geological and archeological problems.

These outreach opportunities help students become more confident speaking to large groups of people who may or may not have a strong understanding of the topic being presented. These experiences benefit students who later present at national conferences such as the SEG Annual Meeting. Fortunately for students, the department greatly supports the chapter by covering a percentage of the registration fees, hotel costs, and allowing them to use department vehicles to travel to and from the meeting each year. As a result, any student interested, even if they are not presenting, is able to attend at a small cost to them.

As Kansas’ flagship research university, KU encourages collaborations with its associated research institutions. This bridge opens opportunities for geophysics students to work with well-known research scientists at the Kansas Geological Survey (KGS). The geophysics section of the KGS or Exploration Services, is known for its shallow seismic field methods including reflection and the multichannel analysis of surface waves (MASW) partnered with drilling projects across the country. The section is managed by Dr. Rick Miller who advises several graduate students in addition to the seven other full-time staff.
members. Currently, the research group is composed of six students, each working on individual projects within the seismic reflection and surface wave spectrum. With the unofficial rule that no student graduates until they have spent a day in the field, one can guarantee that each of Miller’s students will gain ample field experience throughout their degrees.

As a graduate research assistant at the survey, you are exposed to all aspects of a project including proposal writing, field survey layout and design, data acquisition, processing, and report writing. Although each student within Miller’s group may specialize in a different seismic method, some projects call “all hands on deck” giving every student the chance to work as a cohesive team to collectively produce the necessary deliverables. This gives students the opportunity to not only learn new techniques, but teach each other about some of their own research methods while working towards one goal, fostering situations students may encounter when they enter the workforce after earning their degrees.

Recently, the section has been performing several site characterizations with major projects in the southwestern United States and South-Central Kansas. In the Santa Susana Mountains outside of Los Angeles, students assisted with geophysical surveys in support of an ongoing hydrological site investigation. For this project, both P-wave and S-wave seismic reflection surveys were deployed over a few miles using a Vibroseis source and 480 geophones. Figure 5 shows a student in the seismic “control center,” known as the Gator, checking the incoming data with each sweep during a P-wave reflection survey. Other methods used at this site include MASW with a landstreamer and weight drop source (Figure 6), downhole seismic, and ground penetrating radar (GPR). The data collected as this site has spurred many research ideas for students by reason of the site’s complex geologic environment, which is comprised of unconsolidated alluvium and fractured turbidite sandstone within the Chatsworth Formation. The dipping beds and fractured media as seen in Figure 1 provided many processing challenges that tested the knowledge and skills of the students involved allowing them to gain an advanced level of training.

To fit the needs of a given project, staff and students of Exploration Services are encouraged to enhance pre-existing methods to simplify data acquisition. This becomes especially important for surveys that require hundreds of sledgehammer swings in areas where summer temperatures can rise over 120°F. To account for these high temperatures and relieve students and staff from excessive hammer throwing, a sledgehammer source was constructed to combine both vertically- and horizontally- oriented shots for a downhole seismic survey (Figure 7). Constructed on site, this source utilized a rotating arm to alter the polarization of the horizontal shots. The vertical shots are created using a fixed arm attached by a hinge at the base to induce vertical seismic motion. Downhole surveys were used throughout California, Arizona, New Mexico, and Texas to determine elastic material properties of the subsurface.

For those with an interest in computer science, students are able to get their hands dirty digging into the proprietary software packages developed at the KGS. Students outside of Geoscience can work to maintain and even improve pre-existing source codes to gain programming experience outside or their normal coursework. Geophysics students are also encouraged to take computer science classes to gain a better understanding of the programs and algorithms they use every day. Although some are more resistant than others, software development is slowly becoming a component of each student’s research to reduce their dependency on other students. Aside from writing code, students assist Dr. Julian Ivanov with the
SurfSeis short courses that are offered throughout the year. This allows students the opportunity to not only network with attendees, but furthermore solidify their understanding of the software and refresh their surface wave theory.

A temporary seismic network has been established by the KGS throughout parts of south-central Kansas to develop a local archive of the current seismic activity and potentially increase our understanding of the region’s subsurface geology. Figure 8a shows two research scientists and KU alumni installing one of these stations, which is powered by a solar panel (Figure 8b). Several students have been involved in maintaining the stations and analyzing incoming data by observing first arrivals with the intent to detect the origin of the recorded events. This network has also created several thesis project opportunities for students outside of the typical work conducted by the Exploration Services with collaborations expanding across different sections within the KGS and with other KU faculty.

Thanks to the Kansas Geological Survey in conjunction with the University of Kansas, undergraduate and graduate students are able to participate in research projects where they are exposed to various near-surface geophysical field techniques. Each student that passes through the KU Geology Department gains valuable experience that prepares them for their post-graduate careers in academia and industry.

Acknowledgements:

The author would like to thank Dr. George Tsoflias, Dr. Chi Zhang, and the KGS for providing photos to supplement the content of this article as well as their continued mentoring, support, and research opportunities they offer students throughout their degrees at the University of Kansas and beyond.
SEG Near Surface

Where Students Are Welcome!

Dear Students,

Welcome to the all-new SEG Near Surface (NS), which became a technical section of SEG this past fall.

Are you a member of SEG? If so, join us – membership in the SEG NS is free!

The near-surface geophysics community does its work at the complex and dynamic interface linking the earth’s crust with the atmosphere and hydrosphere, where the needs of a growing human population are acutely felt and the impacts of natural and human-driven changes to earth systems are readily observed. Our field continues to rapidly grow and evolve, developing new applications and ever-more sophisticated methodologies. Our membership is likewise diverse, drawn from virtually every discipline in the geosciences and fields of engineering.

Near surface geophysicists are engaged in mining and oil and gas exploration, are helping to protect the environment by solving hydrogeophysical problems, and are exploring our cultural history and helping to preserve our civil infrastructure through a broad range of archeological, engineering and geotechnical activities.

Near Surface geophysicists can do it all, from project conceptualization through planning, implementation and completion. If you like to solve problems and are interested in learning how to manage the project cycle, then near surface geophysics is for you, and SEG Near Surface can help you get where you want to go.

SEG Near Surface encourages all students to join and grow with us! There are no fees to join the SEG Near Surface, you just have to be a member of SEG, and remember SEG student membership is free for students!

To become part of the SEG Near Surface, please email Laurie Whitesell at lwhitesell@seg.org and she will assist you.

With warm regards,

John W. Lane
Chair SEG Near Surface
Dear SEG Student Chapter Officers and Faculty Advisors,

Each quarter the SEG Near Surface constructs and disperses a newsletter that presents near-surface geophysical activities, and news. We also like to highlight the activities of a SEG Student Chapter’s near-surface geophysical research and other related activities. It is a great way highlight your program and have all SEG student chapters and near surface members read about the excellent near-surface geophysics research that is going on at your university!

Please accept this as our personal invitation for your student chapter to submit an article about near surface geophysics at your university.

SEG Near Surface encourages all students to join and grow with us! There are no fees to join the SEG Near Surface, you just have to be a member of SEG, and remember a SEG student membership is free for students!

To become part of the SEG Near Surface, please email Laurie Whitesell at whitesell@seg.org and she will assist you.

With warm regards,

John W. Lane
Chair SEG Near Surface

The best Student Chapter of the year will be awarded with $250 US. Good Luck!
Call for Photos for NS Webpage and NS Print Advertisements

Dear Members of the SEG NS, we need new photos for both the new NS webpage and NS print advertisements. Photos can be everything related to near surface from generic equipment, actual surveys, people in action, to students in the field.

The resolution of the photos for the webpage does not have to be too high, but for the print photos we need high resolution.

Thank you for your support!

Call for Near Surface Honorary Lecturer Nominees

The deadline is 27 July 2015.

The DL Committee is soliciting lecturer nominations for the following positions for 2016. Tours will take place in the fall 2016.

- 2016 Fall SEG-AAPG DL
- 2016 Central and South America HL
- 2016 Middle East and Africa HL
- 2016 North America HL
- 2016 Near Surface HL.

To make a nomination, please complete the DL nomination form and/or the HL nomination form, and submit it by 27 July 2015.

Call for SAGEEP 2016 organizing committee

SAGEEP 2016 organizing committee (John Stowell General Chair and Charles Stoyer technical chair) seek volunteers to serve on the technical committee as representatives from other near-surface organizations who will also serve on the EEGS intersociety committee. The ideal candidate will participate in technical program committee meetings, conference calls, would help develop/organize the technical program, and ideally serve as chair of a technical session to be identified with the participant’s home society. If you are interested in participating, please contact Bruce Smith at bsmith@usgs.gov, and copy John Stowell and Charles Stoyer at John.Stowell@mountsopris.com and charles@interpex.com, respectively.
Hansruedi Maurer
Touring August–December 2015
“*The curse of dimensionality in exploring the subsurface*”
Geographic tour focus: North America, Asia, and Australia
http://www.seg.org/education/lectures-courses/honorary-lecturers/2015/maurer

**Biography**
Hansruedi Maurer is professor for exploration and engineering geophysics at ETH Zürich, Switzerland. His research interests span from algorithmic developments for geophysical tomography to innovative field studies concerned with natural hazards, storage of dangerous waste, exploration of deep geothermal reservoirs, cryosphere research and several other areas, where geophysical techniques provide useful information. A key aspect of his research is the tight coupling of latest developments in numerical modelling and inversion theory with the solution of problems that arise in field applications of magnetic, geoelectric, inductive electromagnetic, ground-penetrating radar and seismic methods. Moreover, he is one of the leading scientists in geophysical experimental design. His contributions in this relatively new research discipline were awarded with the Best Poster Award at the 1997 SEG annual meeting and the 2004 Best Paper Award in Geophysics. He has served as an Editor for Geophysics, and he is an active member of several national and international scientific boards.

**Abstract**
The term “curse of dimensionality” refers to increases in the dimensionality of model spaces that result in undesirable increases in data sparsity, such that model parameters are no longer sufficiently constrained by the data. Although the term is usually employed in combinatorics, machine learning, and data mining, it is also directly relevant for many problems in exploration geophysics. The most obvious applications are 3D tomographic inversions, which typically include very large numbers of unknowns. There is a further “curse of dimensionality” and related data sparsity that may impede many geophysical investigations: 3D surveys typically involve the acquisition of data using only a 2D array of sensors distributed across the Earth’s surface. As a consequence, procedures for imaging the subsurface are missing data recorded in the third dimension, depth. Similar problems affect 2D inversions of (1D) profile data. Computational problems that need to be overcome in large-scale tomographic inversions are additional issues associated with the “curse of dimensionality.” In particular, the rapidly emerging field of realistic 3D full-waveform inversions of elastic and anisotropic data is hitting the limits of current computer facilities. Seemingly ever increasing computing power will undoubtedly be beneficial for such endeavors. Nevertheless, suitable model parameterizations that offer appropriate spatial resolution while keeping the inversion problem computationally tractable will continue to be critical elements of any high dimension inversion endeavor. Because of the large computational costs and the difficulties to cover extensive areas with geophysical sensors in complicated terrain, many land surveys continue to involve data acquisition along profiles. Such surveys will play a significant role for the foreseeable future. When solving the associated 2D inversion problems, the “curse of dimensionality” strikes again. The underlying 2D assumption that subsurface properties and topography do not change in the third dimension, that is, perpendicular to the tomographic plane, is often unjustified. The problem of data sparsity can be partially alleviated by employing optimized experimental design and optimized data parameterization approaches. These techniques identify experimental configurations and data representations that optimize data information content and resultant models in a cost-effective manner. In this lecture, I will illustrate the “curse of dimensionality” by means of several examples from near-surface geophysics. I will present a variety of options for addressing the related problems, including experimental design techniques and optimized model parameterization strategies. I will also discuss problems and remedies related to out-of-plane features in 2D elastic full-waveform inversions.
Jean Virieux
Université Joseph Fourier, Grenoble, France
Touring Spring
“Hierarchical seismic imaging: A multiscale approach”
http://www.seg.org/education/lectures-courses/distinguished-lecturers/spring2015/virieux-abstract

Biography
Jean Virieux, fellow of Ecole Normale Supérieure (Ulm), professor at the Université Joseph Fourier-Grenoble, and member of the Institut Universitaire de France, is a seismologist working at the Institut des Sciences de la Terre (ISTerre). He earned his PhD in “Earthquakes: rupture and waves” in 1986 at the University Denis Diderot-Paris under the supervision of Pr. R. Madariaga. He received the EAGE Cagniard Medal in 2006, the SEG Best Paper award in 2008 and a Bright Spots in 2009 with his coworkers, the Jaffé Grand Award of Académie des Sciences in 2009, the Barrabé Award of the Société Géologique de France, the Adion Medal of the Observatoire de la Côte d’Azur in 2012, and the EAGE Erasmus Award in 2013. Virieux’s research is oriented to seismic-wave propagation modeling through field experiments and theoretical modeling in heterogeneous media. Traveltime tomographies based on ray theory or full-waveform inversion based on volumetric numerical methods solving elastodynamic equations allow high-resolution imaging of crustal structures (Mt. Vesuve/Italy; Corinth Gulf/Greece; Valhall/Norway). Multiparametric reconstruction of the earth at various scales from 3D important databases is the current challenge of engineers and researchers in the framework of the consortium SEISCOPE supported by many industrial enterprises led in part by Virieux. Seismic dynamic-rupture imaging related to earthquakes has also attracted his attention (because he completed his thesis on this topic) through international collaborations and national support from the Agence Nationale de la Recherche.

Abstract
Different challenges of resources discovery and management, better mitigation of natural hazards, and acute understanding of the earth’s system require high-resolution imaging of the earth in more complex regions at various scales. Dense multicomponent surveys with a broad range of frequencies have been deployed by the industrial and academic communities for targeting these different scales, from global earth to near surfaces, through lithospheric and crustal zones. The dramatic exponential increase of the seismic data, both in volume and quality, has pushed limits in our imaging capacities to unrevealing spatial resolution. These new data sets provide the basis for breaking new ground in the extraction of the full information content of seismic traces by the quantitative reconstruction of different subsurface parameters such as the P- and S-velocities, the density, the attenuation factors, as well as anisotropic parameters. The current way to proceed is through linearized optimization because the relation between subsurface parameters and traces is nonlinear. This approach has been promoted as full-waveform inversion (FWI), and we face several problems from high-performance computing to data-mining issues. Because of the huge quantities of data, the optimization for reducing the misfit function between observed and synthetic traces is based on the efficient local Newton method. Gradient operator of the misfit function and the Hessian operator must be estimated efficiently and accurately. Embedded into these operators’ estimation, the forward problem is the linear partial differential equation (PDE) related to wave propagation. Different modeling engines might be used depending on the case study at hand. Designing efficient and flexible algorithms of wave propagation is mandatory and should be thought of in the perspective of computing gradient and Hessian operators. Strategies based on symmetric forms of the wave equation are introduced to achieve this goal. The Hessian has a key role because it may partially scale the parameter updates, correct cross-talks between parameters of different nature, and compensate for variable illumination resulting from the acquisition geometry and the medium heterogeneities. Adjoint and second-order adjoint methods allow matrix-free conjugate gradient solution of the Newton system. Fast asymptotic analysis of the Hessian structure opens possible roads for specific localized amplification of small energy zones in the data space for improved projection of the data information into the model space (especially in shadow zones) using the full-wave equation. For linearized data-fitting procedures, designing a pertinent initial subsurface model is a key issue to alleviate secondary minima in our local search of the solution. Subdata sets can be presented progressively to the optimization engine to overcome this intrinsic difficulty of multiple minima. For example, we may consider different frequency bands from low to high, different component or parameter selections during the inversion procedure, as well as different transformations. When different phases (such as direct/diving/refraction phases, reflected phases, and surface phases) are identified, we may adapt the model description accordingly. They can be manipulated separately for partial reconstruction with specific misfit functionals in order to take advantage of the properties of these phases: dispersion for surface waves, and localized impedance contrast for reflection waves. Ultimately, one may consider them together near the final solution. More often than we think, we may say something about the subsurface to be reconstructed as previous depth migration/imaging, well information, or from other data. Therefore, in our fitting procedure, we may introduce prior model information and prior uncertainty estimation. This model component of the misfit function could overcome difficulties related to sparse or limited acquisition configuration. One may expect, in the future, that combining different remote-sensing observations takes the benefit of the different samplings of the Earth’s interior. Moving progressively to a multiscale reconstruction of our unique living planet is the dream of scientists collecting geophysical data.
Following the 2015 International Workshop on Magnetic Resonance of the Subsurface (MRS), SEG Near Surface is soliciting manuscripts for a special section in Geophysics focused on Nuclear magnetic resonance characterization of near-surface materials.

Nuclear magnetic resonance (NMR) is a promising method for investigating the properties of Earth materials, providing direct sensitivity to hydrogen bearing fluids and their interactions with the pore space. In near-surface geophysics, NMR is most commonly used to determine water content and to estimate hydrogeologic properties such as pore size and hydraulic conductivity.

The special section will highlight the recent advances in the NMR method as applied to the characterization of the near surface. We seek papers that address the state of NMR as a geophysical measurement for near-surface applications in the field (using surface, borehole, or direct push NMR) and in the laboratory, as well as papers that address integrating NMR datasets into hydrogeological models. We welcome the submission of papers that present novel applications and case studies of NMR, technical advances in the instrumentation, new data interpretation, advancements in data acquisition and signal processing, and new forward modeling and inversion approaches. Authors who did not present at the 2015 MRS workshop but whose research fits the theme of this call are also encouraged to submit papers.

Authors should first register their interest and prospective title with the special section editors by sending an email to MRS2015@au.dk with “Special Issue: <paper title>” in the subject. Please also indicate when the manuscript will be submitted. The deadline for submitting manuscripts to the special issue is 1 September 2015. All submissions will be made using the Geophysics online submission system (https://mc.manuscriptcentral.com/geophysics). Please indicate that the manuscript is intended for the MRS special section in the online submission system and in a cover letter to the editor. Manuscripts that are submitted to this special section will undergo the standard Geophysics review process. Authors will also be asked to contribute to the review process.

The submissions will be processed according to the following timeline:

Submission deadline: 1 September 2015
Peer review complete: 15 March 2016
All files submitted for production: 1 May 2016
Publication of issue: July-August 2016

Special section editors: Kristina Keating, Lin Jun, Mike Müller-Petke, Ahmad Behroozmand, Jean-Francois Girard
<table>
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<tr>
<th>Dates</th>
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<tr>
<td>Sep 6 - 10, 2015</td>
<td>EAGE Near Surface Geoscience 2015</td>
<td>Turin, Italy</td>
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<tr>
<td>Sep 15 - 17, 2015</td>
<td>International Symposium on Non-Destructive Testing in Civil Engineering NDTCE 2015</td>
<td>Berlin, Germany</td>
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<td>Dec 14 - 18, 2015</td>
<td>American Geophysical Union (AGU) - Fall Meeting</td>
<td>San Francisco, California, USA</td>
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<td>March 6 - 7, 2016</td>
<td>2nd SEG/DGS Workshop Near Surface Modeling and Imaging</td>
<td>Manama, Bahrain</td>
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near Surface Geoscientists 2015

Submission Deadline: 15 April 2015
Meeting Dates: 6 - 10 September 2015
Meeting Location: Turin, Italy

Near Surface Geoscience 2015 is actually three conferences in one! Participants can attend the 21st European Meeting of Environmental and Engineering Geophysics, the 1st Conference on Proximal Sensing Supporting Precision Agriculture, or the 1st European Airborne Electromagnetics Conference. In addition, there will be several workshops available on 6 September. [http://www.eage.org/event/index.php?eventid=1119](http://www.eage.org/event/index.php?eventid=1119)

Society of Exploration Geophysicists 85th Annual Meeting

Submission Deadline: closed
Meeting Dates: 18 - 23 October 2015
Meeting Location: New Orleans, LA


Near Surface Sessions:

Monday:
NS Poster session: Case Studies, Modeling, and More, chairs: Sarah Morton; Laurie Whitesell

Tuesday:
Oral Session: Surface Waves, chairs: Rick Miller and Barbara Luke

Wednesday:
E-Poster Session: Seismic Voids and Anomalies: Detection and Enhancement, Chairs: Steve Sloan and John Lane
Oral Standing Session: Hydrogeophysics, Chairs: Kristina Keating and other
E-Poster: Seismic Modeling and Processing, Chairs: Seth Haines and Julian Ivanov

Thursday:
Oral Session: Electrical, EM and GPR Methods, chairs: Louise Pellerin and John Lane
International Symposium on Non-Destructive Testing in Civil Engineering NDTCE 2015

Meeting Dates: 15.- 17. September 2015
Meeting Location: Berlin, Germany

The symposium will convene experts from all over the world, present the state of the art of NDTCE as well as new approaches and provide a forum for international exchange of knowledge and experience. The primary aim of this meeting is to document new developments for testing, monitoring and characterizing of materials, building components and structures. Combination of methods, data fusion, validation and standardization have gained high attention recently and require a discussion about their relevance for practical application. The symposium will continue the legend to be the event to intensify international cooperation in this important and growing field of civil engineering research.

It will provide interfaces to related disciplines as mathematics, physics, geophysics and classical NDT. It is directed to all institutions and experts engaged in nondestructive evaluation in research, administration and industry. The three day symposium will provide opportunity for discussion of technological trends, testing equipment and applications. It will also provide the latest information on research policies in different countries and help establish joint research projects.

Contributions to this symposium should focus on testing methods used in construction and for the condition assessment of buildings and other structures. Within this scope, the symposium will deal with both the development of new NDTCE methods and practical experience or applications in general. The objects of investigations should be building components, buildings, structures and in situ, nondestructive or quasi nondestructive material analysis and evaluation.


Session Topics:

- Ultrasonics
- Radar
- IR Thermography
- Combined Methods, Data Fusion, Data Analysis
- Case Studies, Bridges, Nuclear Containments
- Materials
- Moisture, Corrosion
- Foundations, Geotechnics
- Monitoring
- Validation, Training, Guidelines, Committees

3rd International Conference on Engineering Geophysics 2015

Meeting Location: Al Ain, United Arab Emirates

The success of the first and second ICEGs is reflected by the number of participants and the great interest and feedback from both local authorities and the international geo-community working with geophysical methods applied to engineering, environmental, archaeological, geotechnical, and forensic problems. Overwhelming encouragement from this community has led to the third in the series, and to the decision to extend the fields of interest to a wider range of near surface related specialties including groundwater, time-lapse, security, seismicity, and geothermal to name a few options. Beyond this 2015 event, this world class series will be broadened to allow sharing of the event with other regional partners with equivalent enthusiasm for the application of geophysics to near-surface problems. For more information and to access the online abstract submission site: [http://www.iceg.ae](http://www.iceg.ae)

The Technical Committee invites submissions via the SEG website of Extended Abstracts, four (4) pages in length (including figures and references) under the following topics:

- Engineering Geophysical Applications for Civil and Industrial Construction Domains
- Environmental Geophysics Applications and Natural Hazards
- Archeo-Geophysics
- Engineering Geophysics Application for the Energy Industry
- Hydrogeophysics - Groundwater and shallow water structures and characterization
- Engineering Geology - Ground stability, material properties, site response, coastal/sedimentation, weathered layer/stratigraphy/variability, etc.
- Airborne Geophysics
- New Approaches and Data Processing
- Near-Surface Geophysics for Forensic Applications
- Advanced Field Technologies
The AGU Fall Meeting brings together the entire Earth and space sciences community for discussions of emerging trends and the latest research. The technical program includes presentations on new and cutting-edge American Geophysical Union - Fall Meeting 2012 science, much of which has not yet been published, meaning you’ll return to work with knowledge you can’t get anywhere else. With more than 1700 sessions, the AGU Fall Meeting’s scientific program spans the Earth and space sciences, offering something for everyone no matter their scientific discipline. The meeting offers a unique mix of more than 23,000 oral and poster presentations, a broad range of general sessions, more than 50 formal and informal networking and career advancement opportunities, and an exhibit hall packed with nearly 300 exhibitors showcasing new and relevant research tools and services that could help scientists and researchers streamline their work.

Related Near Surface Geophysics session:

- Geophysical Methods for Groundwater Evaluation and Management: Convener: John W Lane Jr, USGS Office of Groundwater, Reston, VA, United States and Rosemary J Knight, Stanford University, Stanford, CA, United States
- Advances in Exploration Geophysics: Convener: Darcy McPhee, USGS, Menlo Park, CA, United States, Kennedy O Doro, University of Tübingen, Center for Applied Geosciences, Tübingen, Germany and Louise Pellerin, Green Geophysics, Berkeley, CA, United States
- Advances in Geophysical Studies at the Transition Between Land and Sea: Convener: Juan M Lorenzo, Louisiana State University, Baton Rouge, LA, United States, Bruce D Smith, U.S. Geological Survey, Lakewood, CO, United States and Sarah Kruse, University of South Florida Tampa, Tampa, FL, United States
- Applications of Near Surface Geophysics in Periglacial Regions: Convener: Martin A Briggs, USGS Office of Groundwater, Reston, VA, United States, Seth W Campbell, U.S. Army Cold Regions Research and Engineering Laboratory, Hanover, NH, United States; University of Maine, Orono, ME, United States and Reginald R Muskett, University of Alaska Fairbanks, Fairbanks, AK, United States
- Cosmic Ray Muons in Combination with Other Geophysical Data to Improve Resolution of Subsurface Imaging: Sensors, Analysis, Inversion and Applications from Tunnel to Mountain Scale: Convener: Charlotte A Rowe, Los Alamos National Laboratory, Earth and Environmental Sciences, Los Alamos, NM, United States, Alain Bonneville, Pacific Northwest National Laboratory, Richland, WA, United States and Andre Revil, Colorado School of Mines, Golden, CO, United States
- Current trends in high resolution subsurface imaging: Convener: Dimitrios Ntarlagiannis, Rutgers University, Newark, NJ, United States and Xavier Comas, Florida Atlantic University, Davie, FL, United States
- Joint inversion methods and other interpretation strategies to integrate multi-disciplinary geophysical data: Convener: Max Mooramp, University of Leicester, Leicester, LE1, United Kingdom, Niklas Linde, University of Lausanne, Lausanne, Switzerland, Peter G Lelievre, Memorial University of Newfoundland, St John's, NL, Canada and Amir Khan, ETH, Zurich, Switzerland
- Near Surface Geophysics General Contributions: Convener: Xavier Comas, Florida Atlantic University, Boca Raton, FL, United States and Bruce D Smith, U.S. Geological Survey, Lakewood, CO, United States
- The Curse of Dimensionality in the Age of Big Data: Challenges in Near Surface Geophysical Exploration: Convener: Frederick David Day-Lewis, USGS, Storrs, CT, United States and Georgios P Tsoflias, University of Kansas, Lawrence, KS, United States
- Advances in Petrophysics for Hydrogeophysics and Near Surface Geophysics: Convener: Damien Jougnot, University Pierre and Marie Curie Paris VI, Paris, France and Kristina Keating, Rutgers University Newark, Newark, NJ, United States
- Data Integration, Inverse Methods, and Data Valuation in Hydrogeophysics: Convener: Michael A Cardiff, University of Wisconsin-Madison, Geoscience, Madison, WI, United States, Abderrahim Jardani, University of Rouen, Mont-Saint-Aignan Cedex, France, Mine Dogan, University of Wyoming, Laramie, WY, United States and Joseph Doetsch, ETH Swiss Federal Institute of Technology Zurich, Zurich, Switzerland
- Hydrogeophysical Characterization of the Critical Zone: Convener: Baptiste Dafflon, Lawrence Berkeley National Laboratory, Berkeley, CA, United States, Hongsheng Lin, Pennsylvania State University Main Campus, University Park, PA, United States and Peter Dietrich, Helmholtz Centre for Environmental Research UFZ Leipzig, Leipzig, Germany
- Hydrogeophysics: From Pore-Scale Process Understanding to Catchment Scale Application: Convener: Anja Klotzsche, Agroscope Institute of Bio- and Geosciences IBG-3, Forschungszentrum Jülich, Jülich, Germany and David W Hyndman, Department of Geological Sciences, Michigan State University, East Lansing, MI, USA
- Understanding Hydrogeophysical States and Fluxes: Connecting Point Scale Information with Remote Sensing: Convener: Ryan D. Stewart, Virginia Polytechnic Institute and State University, Blacksburg, VA, United States, Trenton E Franz, University of Nebraska Lincoln, Lincoln, NE, United States, Majken Caroline Looms, Univ Copenhagen, Copenhagen K, Denmark and Chadi Sayde, Oregon State University, Corvallis, OR, United States
The first edition of the workshop held in 2014 was well attended by geoscientists from a wide geographic area including North America, Europe, Asia, Africa, and the Middle East. A broad range of near-surface disciplines was represented from academia and industry covering aspects of engineering and hydrocarbon exploration. The workshop led to a greater understanding of the importance of knowledge sharing among various disciplines in the modelling and imaging of the near surface. The workshop also explored emerging and underdeveloped techniques including ground-penetrating radar, full-waveform inversion, and surface waves. The need for further understanding of guided waves, anisotropy, velocity inversions, and the creation of an inclusive near-surface model was identified.

The objective of the upcoming 2016 workshop is to follow up on 2014 discussions and to share recent case studies and advancements in emerging technologies addressing the near surface modelling, imaging and characterization challenges.

This workshop is open for contributions in all subjects related to near-surface characterization, which can include:

- challenging case histories
- seismic methods (refraction, tomography, etc.)
- nonseismic methods
- surface-wave inversion
- extreme gradients and velocity inversion
- joint inversion of seismic and nonseismic data
- dynamic corrections, datuming, and imaging
- time versus depth imaging
- emerging technologies (FWI, interferometry, passive seismic, etc.)
- remote sensing
- refraction and reflection tomography: bridging the gap between shallow and deep
- forward modelling
- prospect-generation risk assessment
- geohazards

For more information and to access the online abstract submission site: [http://www.seg.org/events/upcoming-seg-meetings/2016/ns-modelling-imaging-2016](http://www.seg.org/events/upcoming-seg-meetings/2016/ns-modelling-imaging-2016)
Two PhD Student positions in Geophysics at KIT
Geophysical Institute, Karlsruhe Institute of Technology (KIT), Germany

Job Description
1. The Geophysical Institute, Faculty of Physics at KIT has an opening for a Ph.D. position. Funding is guaranteed for 4 years. Funding is provided by the Faculty of Physics for a teaching assistant. The focus of research of this position is the full waveform inversion (FWI) of seismic data for subsurface elastic properties. This position concentrates on the elastic FWI of shallow seismic surface waves to reconstruct the near surface elastic properties. The scientific work contributes to the Wave Inversion Technology consortium (WIT).

2. The Collaborative Research Center (CRC) 1173 “Wave phenomena - analysis and numerics” offers a PhD position for 3 years at the Geophysical Institute. This newly established CRC, which officially starts on July 1, 2015 is funded by the German Research Foundation (DFG). The focus of research of this position is also the full waveform inversion (FWI) of seismic data for subsurface elastic properties. The work within the CRC concentrates on the viscoelastic FWI of seismic wave attenuation.

Requirements:
For both positions a Master’s degree in geophysics or a related discipline is required at the time of the appointment. The ideal candidate should possess experience in one of these areas:
- seismic tomography
- reflection/refraction seismic imaging
- seismic monitoring
- inversion of geophysical observations.

Programming skills and experience with the modeling and inversion of seismic waveforms are a definite plus. Candidates are expected to assist during lectures and field courses within our Geophysics Bachelor and Master programs. The applicant should be open minded, active and have a good command of the English language. Questions can be addressed to Prof. Dr. Thomas Bohlen by e-mail (thomas.bohlen@kit.edu). Please submit your application no later than 15.08.2015 per e-mail as one pdf file to thomas.bohlen@kit.edu. The file should include: (1) cover letter, (2) curriculum vitae, (3) copies of academic degrees and transcript of records, (4) contact for one letter of recommendation, (5) list of publications. KIT aims to balance the number of female and male employees. Therefore, women are especially encouraged to apply. Applicants with disabilities will be preferred if equally qualified. Information about the Karlsruhe Institute of Technology, the Collaborative Research Center (CRC) 1173, the Wave Inversion Technology consortium (WIT), and the Geophysical Institute can be found here: www.kit.edu, www.waves.kit.edu, www.wit-consortium.de, and www.gpi.kit.edu, respectively.

Environmental Geophysicist Position at Lawrence Berkeley National Laboratory

The Earth and Environmental Science Area of Berkeley Lab, is seeking applications for a career track geological scientist specializing in environmental geophysics. Scientists in this Area conduct basic and applied research focused on hydrogeological, geochemical, and biological processes that are important for climate change, carbon cycling, environmental stewardship, and subsurface energy resources.

This career track environmental geophysics position is focused on developing new approaches to integrate diverse datasets (including geophysical data collected from surface and UAV-based platforms) and use of information to interpret complex terrestrial environment behavior. Essential for this position is demonstrated experience in the acquisition, inversion and integration of hydrogeophysical and remote sensing datasets and knowledge of terrestrial system processes that govern water flow and biogeochemical cycles.

To apply, please visit http://jobs.lbl.gov and reference the Job Number (81279)

Hydro-biogeophysical PhD Position at ENSEGID-Bordeaux INP (Bordeaux, France), collaborative with Lawrence Berkeley National Laboratory (Berkeley, CA)

A highly qualified and motivated PhD candidate is sought to develop and implement methodologies for characterizing the presence and mobility of metal contamination through terrestrial systems using geophysical (particularly electrical) methods. Lab/field experimental and numerical methods will be used to quantify copper contamination (present in industrial sites and vineyards), as well as controls on copper transport through soils and plants. The PhD candidate will work with a multi-disciplinary group of scientists at Bordeaux INP (The ENSEGID-Bordeaux INP -EA 4592 in Bordeaux, France) and in the Earth Sciences Division of Berkeley Lab (Berkeley, CA) to collect and integrate above and below ground hydrological, geochemical, vegetation and geophysical datasets, with a focus on (1) documenting the geophysical signature of relevant hydrogeochemical processes and (2) improving understanding of controls on copper mobility in managed ecosystems. The degree will be granted
from Bordeaux INP, and the candidate is expected to spend approximately half time at each partner institution. Applications are required by June 30th, 2015, with anticipated start date of October 1st, 2015.

Essential for this position is a Masters degree in geophysics or geosciences (French candidates must have scores above 14/20); a willingness to perform laboratory, field and numerical research; an ability to travel/live in Bordeaux and Berkeley; and an interest in working with a multi-disciplinary team to understand complex, near-surface processes. Knowledge in soil or environmental sciences, airborne imaging, geochemistry or electrical methods is desired. Ability to speak French is desired but not required.

The partner institutions are located in stimulating environments recognized for offering a high quality of life, excellent culinary opportunities and abundant natural and historical beauty. The EA 4592 "Géoressources and Environment" - thème 2 in Bordeaux has expertise in environmental issues and approaches, with a particular focus on processes and methods associated with contaminated sites and hydrogeology. More information is available at: [http://geoenv.ensegid.fr/index.php?page=themes](http://geoenv.ensegid.fr/index.php?page=themes). The Berkeley Lab Environmental Geophysics Group has expertise in a variety of methods and approaches, and works within a collaborative environment to tackle complex terrestrial system challenges that require coupling of geophysics, hydrology, geochemistry and biology. More information is available at: [http://esd.lbl.gov/departments/geophysics/core_capabilities/environmental_geophysics.html](http://esd.lbl.gov/departments/geophysics/core_capabilities/environmental_geophysics.html). To apply, please contact Myriam Schmutz ([myriam.schmutz@ensegid.fr](mailto:myriam.schmutz@ensegid.fr)).
To contribute material to the NS views send an Email to Anja Klotzsche (a.klotzsche@fz-juelich.de)

All members are welcome to submit content of interest to the Near Surface community. Please keep messages brief, provide contact information, and (if available) a web address for additional information.