FastTIMES

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www.eegs.org

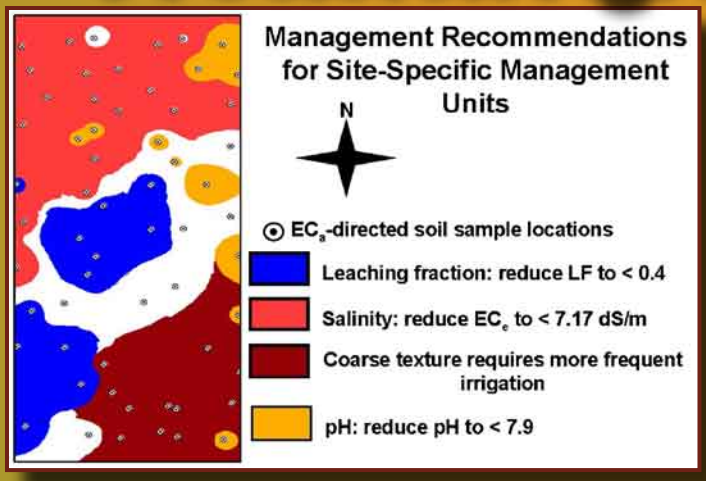
News for the Near-Surface Geophysical Sciences

Published by the Environmental & Engineering Geophysical Society

Four-electrode ER system

ER electrode close-up

Geophysics and Precision Agriculture



Electrical properties guide cropland management decisions

Recommendation map

Also in this issue . . .

- New Non-polarizing Electrodes
- SEG's Geoscientists without Borders
- Call for Abstracts, SAGEEP 2009 in Ft. Worth
- 2008 EEGS Award Winners and Election Results

. . . and more!

Non-polarizing electrode

Call for Abstracts

The Environmental and Engineering Geophysical Society (EEGS) invites you to **submit an abstract** for the Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) to be held in Ft. Worth, Texas, USA. Abstracts, not to exceed 200 words, are due no later than **September 19, 2008** and may be submitted electronically at www.eegs.org. Abstracts that focus on recent developments in near-surface geophysical methods, innovative uses of geophysics for challenging engineering and environmental problems and case histories are welcome. If accepted, full manuscripts will be due **December 12, 2008**.

For more **information about SAGEEP 2009**
or to **become involved**, contact:
SAGEEP 2009 General Chair Douglas E. Laymon, P.G.
Tetra Tech e-mail: Doug.Laymon@tetratech.com

For **abstract submissions**, please contact:
SAGEEP 2009 Technical Chair Dwain K. Butler, PhD, P.G.
Alion Science and Technology Corp. e-mail: Dwain.K.Butler@usace.army.mil

On the Cover

Center: Dennis Corwin (U.S. Salinity Laboratory) and Scott Lesch (University of California, Riverside) discuss the importance of geophysical measurements (using resistivity and electromagnetic induction methods) in precision agriculture applications. **Lower right**: New non-polarizing surface and borehole electrodes developed by Multi-Phase Technologies, Sparks, Nevada (borehole electrode shown).

What We Want From You

The ***FastTIMES*** editors appreciate most any geophysical contribution. There is no specific theme for the September 2008 issue, so please send us something on your favorite geophysical topic. We also always welcome photographs and brief noncommercial descriptions of new or innovative instruments with possible environmental or engineering applications, news from other geophysical or earth-science societies, notices of upcoming conferences, and brief reports from recent conferences. Please submit your items to a member of the ***FastTIMES*** editorial team by August 22, 2008 to ensure inclusion in the nesxt issue.

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Contents

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FastTIMES

FastTIMES is published by the Environmental and Engineering Geophysical Society (EEGS). It is available electronically (as a pdf document) from the EEGS website (www.eegs.org).

About EEGS

The Environmental and Engineering Geophysical Society (EEGS) is an applied scientific organization founded in 1992. Our mission:

"To promote the science of geophysics especially as it is applied to environmental and engineering problems; to foster common scientific interests of geophysicists and their colleagues in other related sciences and engineering; to maintain a high professional standing among its members; and to promote fellowship and cooperation among persons interested in the science."

We strive to accomplish this mission in many ways, including (1) holding the annual Symposium on the Application of Geophysics to Engineering and Environmental Problems (**SAGEEP**); (2) publishing the ***Journal of Environmental & Engineering Geophysics (JEEG)***, a peer-reviewed journal devoted to near-surface geophysics; (3) publishing ***FastTIMES***, our society newsletter, and (4) establishing and maintaining relationships with other professional societies relevant to near-surface geophysics.

Joining EEGS

EEGS welcomes membership applications from individuals (including students) and businesses. Annual dues are currently $90 for an individual membership, $50 for a student membership with a ***JEEG*** subscription ($20 without ***JEEG)***, and $650 to $3750 for various levels of corporate membership. The membership application is available at the back of this issue, from the EEGS office at the address given below, or online at www.eegs.org. See the back for an explanation of membership categories.

Board of Directors

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To advertise in ***FastTIMES***, contact:

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The next ***FastTIMES*** will be published in September 2008. Please send articles to a member of the editorial team by August 22. Advertisements are due to Jackie Jacoby by August 29.

Calendar

*Please send additions, errors, and omissions to a member of the **FastTIMES** editorial team.*

2008

September 14–17	*Near Surface 2008*: 14th European Meeting of Environmental and Engineering Geophysics, Krakow, Poland
September 19	SAGEEP 2009 abstract deadline
September 22–24	*4th International Symposium on Deformation Characteristics of Geomaterials*, Atlanta, Georgia
September 22–26	*11th Multidisciplinary Conference on Sinkholes & Engineering & Environmental Impacts of Karst*, Tallahassee, Florida
October 5–9	*2008 Joint Meeting* of The Geological Society of America, Houston, Texas
October 20–23	24th Annual International Conference on *Soils, Sediment, and Water*, Amherst, Massachusetts
November 9–14	*SEG International Exposition* and 78th Annual Meeting, Las Vegas, Nevada
November 14	*EEGS/SEG Induced Polarization Workshop*, Las Vegas, Nevada
December 1–4	*2008 Highway Geophysics–NDE Conference*, Charlotte, North Carolina
December 12	SAGEEP 2009 papers due
December 15–19	*AGU Fall Meeting*, San Francisco, California

2009

March 29–April 2	*22nd SAGEEP*, Fort Worth, Texas
April 19–23	*NGWA 2009 Ground Water Summit*, Tucson, Arizona
May 24–27	*2009 Joint Assembly*, Toronto, Ontario, Canada

President's Message: Spread the Word

Bill Brown, President *(bill.brown@aeroquest.ca)*

As members of EEGS and as professionals who spend our respective working lives applying geophysics to a wide variety of problems, we all recognize that geophysics has a wide variety of solutions for the environmental and engineering sectors. Those of us of a certain age know that this hasn't always been the case as geophysics was traditionally a mapping tool used almost exclusively by the mineral and hydrocarbon exploration industries. As the incoming President of EEGS I want to introduce myself to you and share with you what brought me to this industry and why I have become so involved in it.

In late 1997, and with no previous experience in geophysics, I joined an airborne geophysical company in a sales and marketing role. A few weeks after joining on, one of the world's largest mining scandals occurred – Bre-X Minerals Ltd was guilty of salting core samples. Investors lost billions and the mineral exploration industry collapsed almost overnight due to the lack of investor funding. I was responsible for the sales of the company and for keeping our capable (and worried) geophysical staff busy, but had few clients to call. My boss knew I had worked for several environmental engineering firms and suggested I go to a conference he had heard about – SAGEEP. So I attended my first SAGEEP, held in Chicago that year. At the Ice Breaker I initiated conversation with a fellow standing next to me, Dr. Melvin Best, and I couldn't have started with a better representative for the industry. Mel told me about some of the interesting work he was doing in hydrocarbons, but what intrigued me the most was what he had to say about geophysical applications for water and the environment. I spent the next three days speaking with delegates, speakers, and exhibitors and attending as many presentations as I could. I left SAGEEP revitalized and motivated and couldn't wait to begin selling airborne geophysics to these new markets. Of course it wasn't that simple; I still had a lot to learn and a few steep mountains to negotiate, but it was a life changing experience for me and one that I have not let go of to this day. Geophysics opened the door to new possibilities for me and I am proud and delighted to be associated with so many "first time" applications. I have been involved in geophysics for almost 12 years now and I intend to stay involved until I walk off into the sunset.

As your new President, and as someone who communicates geophysical solutions to the environmental and engineering sectors every day, I know very well that we have critical and yes, essential technologies to offer. Your society, EEGS, is recognized as the world's "premier society championing the development and appropriate use of environmental and engineering geophysics." (*www.eegs.org/about/vision.html*). The EEGS board and our WMR management team constantly look for new ways to provide more value with your EEGS membership. Examples are the peer-reviewed journal ***JEEG*** and our electronic newsmagazine ***FastTIMES***. SEG will soon be providing access to ***JEEG*** and SAGEEP papers online. We are increasing the number of professional societies with which we have relationships, such as SEG, AGU, EAGE, NGWA, and GSA, to help us spread the geophysical word worldwide. At this year's SEG meeting in Las Vegas, EEGS and SEG are offering a joint workshop – see the "Coming Events" section for details. We work to make attendance at SAGEEP a unique educational experience and a great place to do business, and we continue to attract influential speakers and substantial papers to SAGEEP. We continue to attract new members and we are pleased with the fact that our roster of international members is increasing quickly.

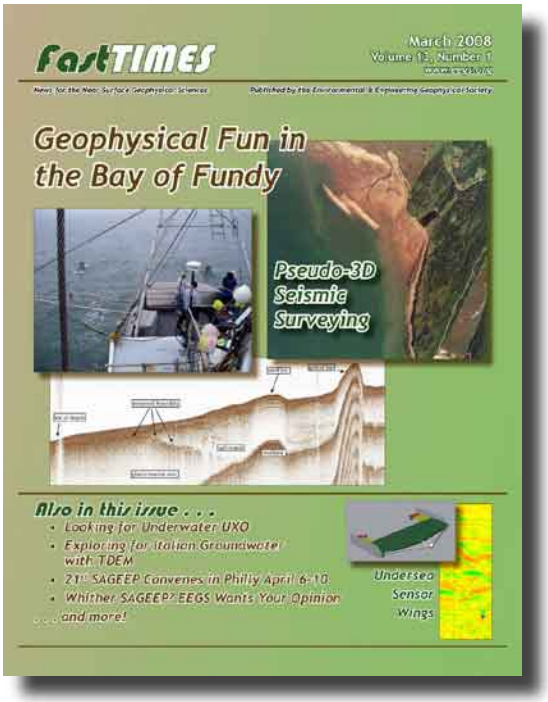
→

If you have any ideas or input on how EEGS can serve your needs better or assist you in the applications of these essential technologies, please let us know. One good way to get the most from our society is to become involved in it. We would welcome your involvement at the board level or as a volunteer to assist us with our efforts.

I want to ask one more thing from you before you go. I ask that you help us to spread the geophysical word – mention SAGEEP at client meetings and presentations and include a short note on SAGEEP (we can send you a suggestion) in your email signature. Mention SAGEEP field demos to people interested in learning more about the applications of geophysical instrumentation. Bring one new member to EEGS. We will all benefit from our combined efforts. As a famous Canadian, Red Green, said - "we're all in this together – and I'm pullin' for ya."

From the FastTIMES Editorial Team

FastTIMES is distributed as an electronic document (pdf) to all EEGS members, is sent by web link to several related professional societies, and is available to all for free download from the EEGS web site at www.eegs.org/fasttimes/latest_issue.cfm. The most recent issue (March 2008, cover image below) was downloaded more than 9000 times through June, and past issues of ***FastTIMES*** continually rank among the top downloads from the EEGS web site. Your articles, advertisements, and announcements receive a wide audience, both within and outside the geophysics community.



To keep the content of ***FastTIMES*** fresh, the editorial team strongly encourages submissions from researchers, instrument makers, software designers, practitioners, researchers, and consumers of geophysics—in short, everyone with an interest in near-surface geophysics, whether you are an EEGS member or not. We welcome summaries of recent conferences, notices of upcoming events, descriptions of new hardware or software developments, professional opportunities, problems needing solutions, advertisements for hardware, software, or staff positions, and short research articles or descriptions of geophysical successes and challenges. Contact a member of the editorial team to discuss your ideas!

The *FastTIMES* Editorial Team

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Roger Young *(ryoung@ou.edu)*

Brad Isbell *(bisbell@hgiworld.com)*

EEGS Foundation: A New Opportunity to Influence Our Future

by W. E. Doll and the EEGS Foundation Board of Directors (w.doll@eegsfoundation.org)

Since its inception, EEGS has been challenged with having a wealth of opportunities and enthusiasm for expanded application of our technologies while lacking the resources to effectively pursue many of those opportunities and channel the enthusiasm. Unlike geoscientists in the mineral and petroleum industries, many of our contributions, like bounding a landfill or locating DNAPL contaminants, do not add to the bottom line, but rather reduce profits of a client. Our services can be viewed as a draining expense, rather than an investment or a way of minimizing capital costs. Yet as practitioners, we always see the need for our capabilities and know that opportunities abound. As a professional society, EEGS has provided an effective framework for developing expanded opportunities in recent years, but more can be done.

During the Fall 2006 EEGS Board meeting, we agreed to pursue formation of a foundation, and shortly thereafter were fortunate to secure the involvement of former SEG President Bill Barkhouse in our venture. Bill is Vice-Chairman of the SEG Foundation, and has directed significant effort toward fundraising for SEG and other organizations in recent years. He has enthusiastically supported our effort, and his knowledge has probably cut the time for forming the EEGS Foundation by more than 50%. In January 2007, we formed a committee to develop the Foundation, and in the Fall 2007, we registered the Foundation with the State of Colorado.

Currently, the EEGS Foundation is completing paperwork and a waiting period with the Internal Revenue Service to be a 501c3 charitable organization. This process will be completed in 3 to 6 months. The management of the Foundation is being handled through Whiting Management Resources (WMR), the operator of the EEGS Business Office. More information is available on our web site, www.EEGSfoundation.org, including contact information for the Board of Directors, a Case for Support, and the Bylaws and Articles of the Foundation. We are currently developing a structure of funding options, to include both endowed and non-endowed funds, and funds for member contributions as well as corporate entities.

We welcome input and involvement from EEGS members as we refine the organizational structure and funding options. The Foundation is designed to serve the members of EEGS and the near-surface geophysical community at large. We actively seek your involvement because with that there can be new opportunities for us and for future generations of near-surface geophysicists.

2008 EEGS Board Elections

EEGS maintains a balance of experience and fresh ideas on its Board of Directors by having annual elections for roughly half of the positions, staggering multi-year terms, and having key positions serve an apprenticeship year in an "Elect" position. It is the responsibility of the recent past presidents to put together a list of qualified and willing candidates for each position up for election in any given year, including those of President Elect, Vice Presidents Elect for SAGEEP and Committees, and two of six Member-at-Large positions. The 2008 nomination committee, chaired by Past President John Clark, carried on the tradition of identifying highly qualified individuals who are willing to donate their time and effort to help EEGS continue moving forward.

Winners of the 2008 elections, held in January and February, are Jonathan E. Nyquist, President Elect; Charles H. Stoyer, Vice President Elect, SAGEEP; Bruce Smith, Vice President Elect, Committees; and Board Members-at-Large Khamis Haramy and Michael H. Powers. These newly elected Board members began their terms at the 2008 SAGEEP business meeting in Philadelphia in April.

Jon Nyquist,
President Elect

Charles Stoyer,
VP Elect SAGEEP

Bruce Smith,
VP Elect Committees

Khamis Haramy,
Member at Large

At the same meeting, Bill Brown became President, Susan Pullan assumed the duties of Vice President, SAGEEP, Jennifer Holt became Vice President, Committees, and Jeff Paine became Past President. Continuing their terms as Members-at-Large are Gregory S. Baker, Fred Boadu, William Doll, and Douglas La Brecque. Micki Allen continues in her *ex oficio* position as international society liaison. Concluding their terms on the EEGS board were John Clark, John Stowell, Dennis Mills, Dwain Butler, and Bruce Smith (who then rejoined the board as the new Vice President Elect, Committees!). On behalf of all EEGS members, these exceptional individuals have earned our heartfelt congratulations and an emphatic "Thank You!"

Michael Powers,
Member at Large

It is not too early to nominate yourself or some other qualified, positive, and enthusiastic member for the 2009 EEGS Board elections. You may send your nomination to Past President Jeffrey G. Paine, the current chair of the nominating committee, at *jeff.paine@beg.utexas.edu*.

Please visit the EEGS website (*www.eegs.org*), where you can choose the "About EEGS" tab to see the complete 2008–2009 Board of Directors.

2008 EEGS/SEG-NSG Frischknecht Award

About the Award

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

Kenneth H. Stokoe II, 2008 Awardee

Professor Kenneth H. Stokoe, II, a true pioneer in near-surface geophysics, was formally trained as an engineer. His research history, 40 years long and still in full swing, has been devoted to *in situ* seismic measurements, laboratory measurements of dynamic material properties, and dynamic soil-structure interaction. Professor Stokoe holds the Jennie C. and Milton T. Graves Chair in Engineering at University of Texas at Austin. He received B.S., M.S., and Ph.D. degrees from University of Michigan.

Dr. Stokoe was instrumental in developing the crosshole seismic method for shear wave velocity measurement to become the method that has been adopted as the standard by the American Society for Testing and Materials. He also developed a combined torsional shear/resonant column system to evaluate dynamic material properties in the laboratory that is now in use worldwide.

Dr. Stokoe and his colleagues developed the Spectral-Analysis-of-Surface-Waves (SASW) method for characterizing shear-wave velocities in the shallow subsurface. This method and its derivatives have revolutionized geotechnical site investigations for seismic site response. Dr. Stokoe has conducted major studies using the SASW method to evaluate earth dams, debris slides, and geologic nuclear-waste repositories for U.S. and foreign governments. He has extended the method to pavements, underground excavations, seafloors, and concrete structural elements.

Dr. Stokoe currently leads a major component of the National Science Foundation's Network for Earthquake Engineering Simulation (NEES) program to develop new seismic source equipment based on vibroseis technology for shallow-earth and earthquake engineering applications.

He is a dynamic teacher and dedicated mentor to students. Graduates who worked under his advisement number more than one hundred. Dr. Stokoe is an academic "grandfather" many times over. Many of his graduates have continued to explore and develop the field of soil dynamics in research and practice. Dr. Stokoe is a founding member of the Environmental and Engineering Geophysical Society and served on the original Board of Directors. He also belongs to the Society of Exploration Geophysicists, Seismological Society of America, Earthquake Engineering Research Institute, American Society of Civil Engineers, and more.

Dr. Stokoe is regularly called upon to give keynote and invited lectures for both engineers and geophysicists. He has received numerous honors and awards from fellow engineers, including election to the National Academy of Engineering in 1997. He has also been recognized for his accomplishments by geophysicists, most notably having received the Harold Mooney Award from the Society of Exploration Geophysicists "in recognition of scientific and technical excellence and innovation leading to the advancement of near-surface geophysics," in 2004.

2008 EEGS Gold Award

About the Award

The EEGS Gold Award was established to recognize an individual who is deserving of special recognition due to exceptional contributions made to the engineering and environmental geophysics community and to EEGS. Such contributions include development of educational tools or curricula, innovation in outreach efforts, or creating communication methods and opportunities with other professional disciplines that comprise potential geophysical end-users.

Micki Allen, 2008 Awardee

Micki Allen, the Gold Award recipient for 2008, is Director of Marac Enterprises of Markham, Ontario. She serves with the EEGS Board of Directors as International Liaison, and is a key principal in coordinating the "Best of Papers" exchange between EEGS and the EAGE. Micki voluntarily helps the exchange speakers make their trip to Europe or North America more pleasant and comfortable. She consistently provides a voice for EEGS with the European geophysical societies. Year in and year out, she has been a humble but key contributor to behind-the-scenes functionality of EEGS as a whole, and the annual meeting (SAGEEP) in particular. She serves as a determined representative of, and recognizable voice for, the geophysical test and equipment industry within EEGS. She administers the exhibitor and sponsor opportunities for SAGEEP, and is a leader of the Industrial Affairs Committee. She is always looking for constructive ways to improve SAGEEP for both exhibitors and delegates, and her contributions have helped EEGS develop a successful Corporate Membership Program. Micki attends numerous geophysical conferences each year, and in so doing is always a strong advocate for EEGS and SAGEEP.

EEGS recognizes Ms. Allen's cumulative and ongoing contribution to expand the visibility and accessibility of environmental and engineering geophysics to new users and seasoned practitioners alike.

2008 EEGS/Geonics Early Career Award

About the Award

The Early Career Award, sponsored by Geonics Limited and awarded by the Environmental and Engineering Geophysical Society, is intended to acknowledge academic excellence and encourage research in near-surface geophysics. The award, presented annually to a full-time faculty member who is within ten years following completion of the Ph.D., acknowledges significant and ongoing contributions to environmental and engineering geophysics. The inaugural award was presented at SAGEEP 2008 in Philadelphia.

Gregory S. Baker, 2008 Awardee

Professor Gregory S. Baker, the inaugural recipient of the EEGS/Geonics Early Career Award, received his Ph.D. fewer than 10 years ago, but has already had a major impact on the field of near-surface geophysics. Greg, who is the Jones/Bibee Endowed Associate Professor of Geophysics at the University of Tennessee, has published 23 refereed journal articles in 9 leading journals, including Nature, and has

served as major advisor for six Ph.D. students and 10 M.S. students. A majority of his published work is co-authored with others, which is an indication of his skill at team building.

Greg's research projects have spanned a wide range of geophysical exploration methods, and he has excelled, in particular, in ground-penetrating radar and near-surface seismology. He has taught both university courses and invited workshops for IRIS and the NSF in the demanding context of field-based geophysics and geology exercises. In 2001, Dr. Baker was the recipient of the Milton Plesur Excellence in Teaching Award from the University at Buffalo and from 2001–2005 he was selected to the College of Arts & Sciences Honor Roll of Top Teachers.

In his nomination of Greg for the Early Career Award, Don Steeples observed that during Greg's time at the University of Kansas he was a leader among students, and that he has continued this into his profession, having served as President of the Near-Surface Section of the SEG and presently as a Board Member-at-Large for EEGS. Greg has also been Associate Editor of Geophysics, and has instructed for three years in the NSF Research Experience for Undergraduates Program. Especially commendable is Professor Baker's outreach to high school students, a valuable service to the future health of our profession.

Sponsorship Opportunities

There are always sponsorship opportunities available for government agencies, corporations, and individuals who wish to help support EEGS's activities. Two specific opportunities are listed below.

Online Delivery of SAGEEP Papers

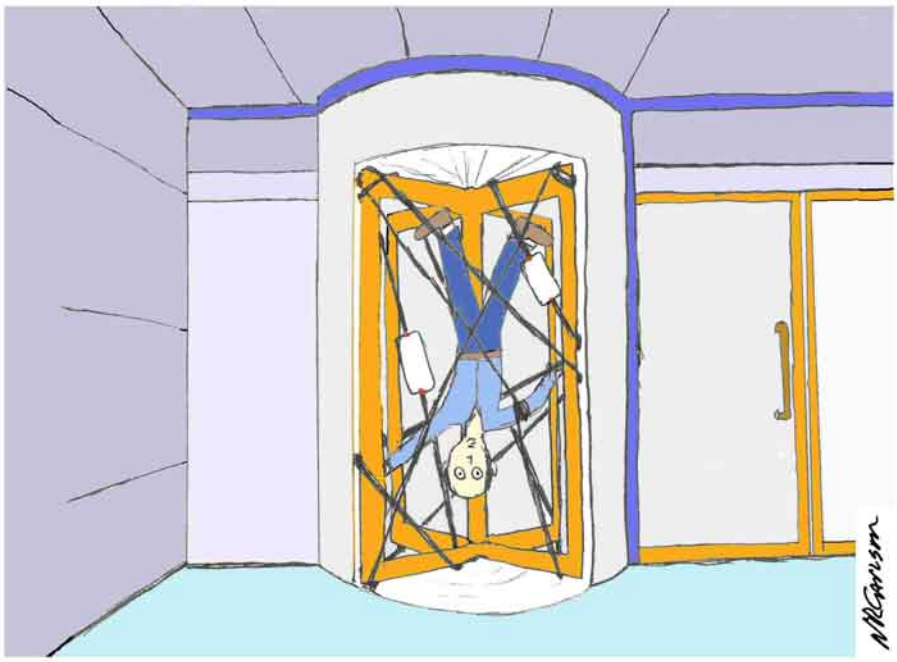
EEGS already has one founding sponsor (Exploration Instruments) supporting development of an online delivery system to enable SAGEEP papers to be served from the EEGS web site. We are seeking additional sponsors to support maintenance and annual updates. Contact Jeffrey G. Paine, EEGS President, if you are interested (*jeff.paine@beg.utexas.edu*).

SAGEEP 2009 Sponsorship

SAGEEP is heading to Fort Worth,Texas for 2009. SAGEEP would not be possible without the generous support of government and industry sponsors. Sponsorship opportunities for 2009 are available at all levels, including general conference, individual session, icebreaker, conference bag, speaker and session chair gifts, and the Environmental & Engineering Geophysical University sessions. Contact Micki Allen (*mickiallen@marac.com*; 905-474-9118) for more information.

Decaying Transients

by Norman Carlson (*norm@zonge.us*)
Zonge Engineering and Research Organization, Tucson, Arizona



EEGS Safety Tip # 42: Maintain a safe distance of at least one dipole from revolving doors when using an OhmMapper resistivity system near buildings.

The JEEG Pages

*The **Journal of Environmental & Engineering Geophysics (JEEG)**, published four times each year, is the EEGS peer-reviewed and Science Citation Index (SCI®)-listed journal dedicated to near-surface geophysics. It is available in print by subscription, and is one of a select group of journals available through GeoScienceWorld (www.geoscienceworld.org). **JEEG** is one of the major benefits of an EEGS membership. Information regarding preparing and submitting **JEEG** articles is available at http://jeeg.allentrack.net.*

Contents of the June Issue

Journal of Environmental & Engineering Geophysics
v. 13, no. 2, June 2008

Editor's Scratch

The June issue marks the completion of my first year as Editor-in-Chief of ***JEEG***. The experience has not been as painful as one might imagine, and I am actually enjoying it—most of the time. Of course, the efforts of the Associate Editors, reviewers, authors, EEGS staff, and publishing staff contribute to making my tasks easier. I want to thank them and you, the readers, for supporting ***JEEG***. Read below to see how publishing a manuscript just got a little easier.

A common response I receive from the publisher after submitting a manuscript for publication is that a figure has insufficient resolution. To keep an issue on schedule for publication, it is necessary to minimize the turn-around time between when the author receives the galley proof, sends corrections to the editor, and the editor returns the corrected galley proof to the publisher. Therefore, the galley proof stage is not the optimal time to ask an author to regenerate a figure at higher resolution, still not knowing if it has adequate resolution. BAM! The Allen Press staff had a moment of inspiration (or became totally frustrated with editors) and created veriFig™, a tool for determining whether art files and figures are correctly formatted and prepared according to digital specifications. A maximum of 10 images, not to exceed 200 Mb, can be uploaded at one time. Acceptable file types include EPS (.eps), TIFF (.tif), JPEG (.jpg), PDF (.pdf), and Adobe Photoshop (.psd).

veriFig™ is a web-based application available to editors and authors. A file containing a link to it is available through the EEGS homepage (*www.eegs.org*) under JEEG/Authors/Figure Specification Checker. It also can be accessed through the Allentrack system (*http://jeeg.allentrack.net*) under Author Instructions/Figure Specification Checker. I encourage all authors to use this wonderful tool prior to sending a final version of a manuscript to the editor.

Read on and write on!

Editor-in-Chief

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EAGE's Near Surface Geophysics Journal, June 2008

*As a courtesy to EAGE and the readers of **FastTIMES**, we reproduce the table of contents from the June issue of EAGE's **Near Surface Geophysics** journal. The journal is the continuation of the **European Journal of Environmental and Engineering Geophysics** published by the former Environmental and Engineering Geophysical Society — European Section.*

ALSO INTERESTING

Near Surface Geophysics

Volume 6 · Number 3 · June 2008

Content

Special Section on China Near-surface Geophysics

Regular articles

EAGE
EUROPEAN ASSOCIATION OF GEOSCIENTISTS & ENGINEERS

New Tools

*New tools, whatever the source, are one of the key ingredients to innovation in near-surface applications of geophysics. We continually solicit contributions describing new tools with near-surface promise and have highlighted several instruments in the last few issues. These entries are written by representatives of the companies that make the tools and have been only lightly edited. Of course, these descriptions are provided as a professional courtesy only and neither the **FastTIMES** editors nor EEGS have verified the information presented herein. The **FastTIMES** editors welcome new submittals, to be considered for publication in **FastTIMES** as space is available. We encourage short, noncommercial descriptions that focus on technical capabilities, specifications, and possible applications.*

New Non-Polarizing Electrodes for Resistivity and IP Measurements

by Douglas J. La Brecque, Ph.D., Multi-Phase Technologies, LLC, 420 South Rock Blvd., Sparks, Nevada 89431 USA
(dlabrecque@mpt3d.com)

Multi-Phase Technologies (www.mpt3d.com) has developed a new type of non-polarizing electrode (NPE) for resistivity and induced-polarization (IP) measurements. The electrode uses a new chemical formulation consisting of a tin metal electrode in an electrolyte of a chloride salt and an organic polymer. The physical construction of the electrode is also improved and uses a porous plastic infused with the chloride-polymer electrolyte. There are two versions: a surface electrode (NPE-SE) and a borehole electrode (NPE-BH) (Figure 1). The NPE-SE is approximately 7 inches long and 1 inch in diameter. At the top of the NPE-SE is a 5/16-inch hex-head, stainless-steel bolt that serves as the lead connection. The bottom of the NP-SE is a tough ultra-high molecular weight (UHMW) polyethylene cone tip that allows the NP-SE to be driven into the ground.

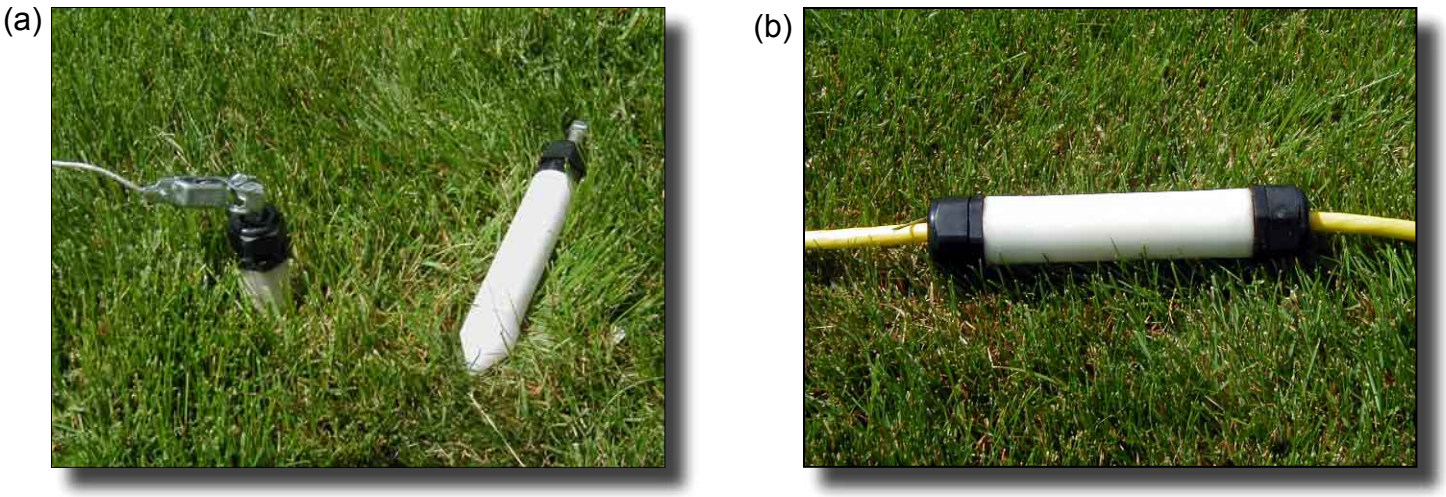

Figure 1. (a) Surface (NPE-SE) and (b) borehole (NPE-BH) versions of the new electrode.

The borehole version, the NPE-BH, is approximately 7 inches long and 1-3/8 inches in diameter, allowing it to be used in 2-inch diameter boreholes. Figure 1b shows the electrode on a 16-conductor, 20-gauge cable, but the NPE-BH can be adapted to fit various cable sizes.

In both versions of the electrode, the outside cylinder is made of porous polyethylene and has more surface area than standard non-polarizing electrodes which only have a porous ceramic tip. This allows a better connection between the fluid inside the tubing and the media outside the electrode. The electrode uses non-toxic materials, rather than the commonly used toxic formulations (copper/copper sulfate and lead/lead chloride). Because of this, these electrodes are better suited for environmental applications and for use in boreholes.

We conducted preliminary tests of the electrode in a laboratory sand tank. Ten surface electrodes were placed around the perimeter of the tank and a series of resistivity and IP measurements were taken. Measurements were made using the dipole-dipole array. Included were 35 "normal" and 35 "reciprocal" measurements for a total of 70 measurements. The series of 70 measurements was repeated ten times such that 700 IP measurements are available for each frequency. These 700 measurements were acquired at each of three primary waveform frequencies: 0.2 Hz, 1 Hz, and 5 Hz. Three cycles were stacked in each measurement. The source dipole drive voltage was 20 volts. In this case the electrodes were used as both transmitters and receivers. Figure 2 shows the RMS differences in millivolts per volt between forward and reciprocal measurements for the new electrodes and commercially available copper-copper sulfate electrodes. In the test, noise levels for the new electrodes were somewhat lower than those for the standard copper-copper sulfate electrodes, probably due to the lower contact impedance of the new electrodes.

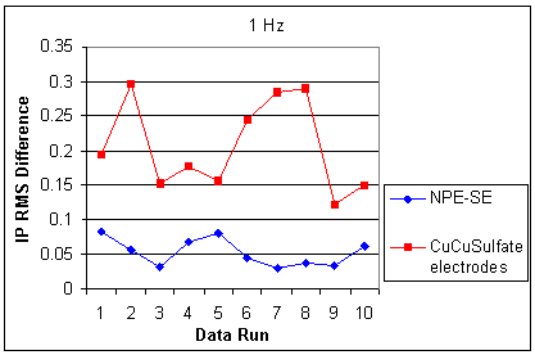

Figure 2. RMS difference for 10 reciprocal IP measurements taken for the NPE-SE and copper/copper sulfate half-cell electrodes in partially saturated sand.

Success with Geophysics: Stories from the Field

FastTIMES *welcomes short articles on applications of geophysics to near-surface engineering or environmental problems. In the article below, Dennis Corwin and Scott Lesch provide a glimpse into the world of precision agriculture, where differences in soil electrical properties can have significant implications for field management and crop yield.*

Application of Geo-referenced Geophysical Measurements to Precision Agriculture

by Dennis L. Corwin[1] and Scott M. Lesch[2]
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Introduction

Conventional agriculture treats an entire field uniformly with respect to the application of fertilizer, pesticides, soil amendments, and other inputs. However, soil is spatially heterogeneous, with most soil chemical and physical properties varying significantly within just a meter. Soil spatial heterogeneity is one of several factors that cause within-field variation in crop yield. Other spatially and/or temporally variable factors influencing within-field variation in crop yield include anthropogenic (for example, irrigation management and compaction due to equipment), biological (for example, disease and pests), meteorological (for example, humidity, rainfall, and wind), and topographical (for example, slope and aspect) factors. The inability of conventional farming to address within-field variations in these factors not only has a detrimental economic impact due to reduced yield in certain areas of a field, but also detrimentally impacts the environment due to over applications of agrochemicals and wastes finite resources, such as pesticides, fertilizers, and irrigation water.

Site-specific crop management refers to the application of precision agriculture to crop production. Site-specific crop management has been proposed as a means of managing the spatial variability of edaphic (soil related), anthropogenic, topographical, biological, and meteorological factors that influence crop yield with the aim of increasing profitability, increasing crop productivity, sustaining the soil-plant environment, optimizing inputs, and/or minimizing detrimental environmental impacts. A fundamental aspect of site-specific crop management is the delineation of site-specific management units (SSMUs), which are spatial domains of soil that can be managed similarly to optimize yield by accounting for spatial variability. The spatial variability of edaphic factors is a consequence of pedogenic and anthropogenic influences, which produce variation in soil physical and chemical properties within agricultural fields. A variety of soil physical and chemical properties are known to influence crop productivity, including plant-available water; infiltration; permeability; soil texture and structure; soil depth; restrictive soil layers; organic matter; chemical constituents such as fertilizers, pesticides, trace elements, and toxic ions; meteorology; and landscape features such as microelevation and topography (Black, 1968; Thornley and Johnson, 1990; Hanks and Ritchie, 1991; Tanji, 1996). In the arid southwestern USA the primary soil properties influencing crop yield are salinity, soil texture and structure, plant-available water, trace elements (particularly boron), nutrient deficiency, and ion toxicity from Na^+ and Cl^- (Tanji, 1996).

Bullock and Bullock (2000) indicate that efficient methods for accurately measuring within-field variations in soil physical and chemical properties are important for site-specific crop management. Because apparent soil electrical conductivity (EC_a) is influenced by a variety of soil physical and chemical properties (for example, salinity, water content, texture, bulk density, organic matter, and temperature) often related to yield and is a reliable easy-to-take measurement, geospatial measurements of EC_a have become one of the most frequently used measurements to characterize field variability for agricultural

applications (Corwin and Lesch, 2003). Spatial measurements of EC_a have been used to characterize soil salinity, nutrients (for example, NO_3^-), water content, texture, bulk density, leaching, and organic matter (see review paper by Corwin and Lesch, 2005a).

Geo-referenced EC_a measurements have been correlated to associated yield-monitoring data with mixed results (Jaynes and others, 1993; Sudduth and others, 1995; Kitchen and others, 1999; Johnson and others, 2003; Corwin and others, 2003). These mixed results are due, in part, to a misunderstanding of the relationship between EC_a measurements and variations in crop yield. As pointed out by Corwin and Lesch (2003), crop yield inconsistently correlates with EC_a due to the influence of soil properties (for example, salinity and water content) that are being measured by EC_a, which may or may not influence yield within a particular field, and because a temporal component of yield variability is poorly captured by a state variable such as EC_a.

Geospatial measurements of EC_a are a powerful tool in site-specific management when combined with GIS, spatial statistics, and crop-yield monitoring. It is hypothesized that in instances where EC_a correlates with crop yield, spatial EC_a information can be used to direct a soil sampling plan that identifies sites that adequately reflect the range and variability of various soil properties thought to influence crop yield. The objective is to integrate spatial statistics, GIS, EC_a-directed soil sampling, and a crop-yield response model (i) to identify edaphic properties that influence cotton yield and (ii) to use this spatial information to delineate SSMUs with associated management recommendations for irrigated cotton. This article summarizes the previous work conducted and published by Corwin and colleagues (Corwin and Lesch, 2003, 2005b; Corwin and others, 2003).

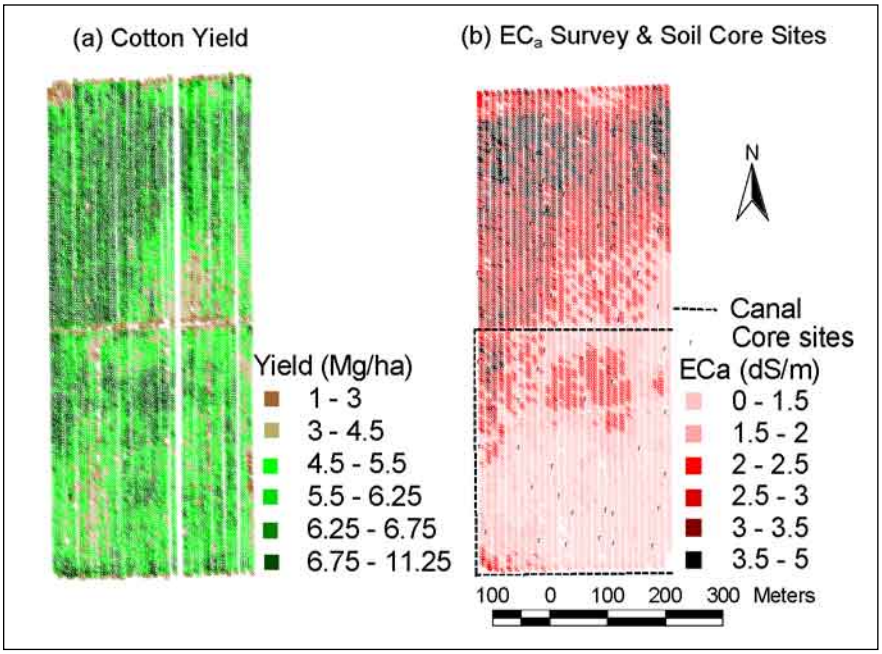


Figure 1. Maps of (a) cotton yield and (b) EC_a measurements including the locations of the 60 soil core sites. Modified from Corwin and others (2003), with permission.

Approach

A 32.4-ha field located in the Broadview Water District on the west side of California's San Joaquin Valley was used as the study site. Broadview Water District is located approximately 100 km west of Fresno, California. The soil at the site is slightly alkaline and has good surface and subsurface drainage (Harradine, 1950). The subsoil is thick, friable, calcareous, and easily penetrated by roots and water.

Spatial variation of cotton yield was measured at the study site in August 1999 using a four-row cotton picker equipped with a yield sensor and global positioning system (GPS). A total of 7706 cotton yield readings were collected (Figure 1a). Each

yield observation represented a total area of approximately 42 m^2. From August 1999 to April 2000 the field was fallow.

In March 2000 an intensive EC_a survey (Figure 1b) was collected using mobile fixed-array electrical resistivity (ER, Figure 2) and mobile electromagnetic induction (EMI, Figure 3) equipment developed by Rhoades and colleagues at the U. S. Salinity Laboratory (Rhoades, 1992a, 1992b; Carter and others, 1993).

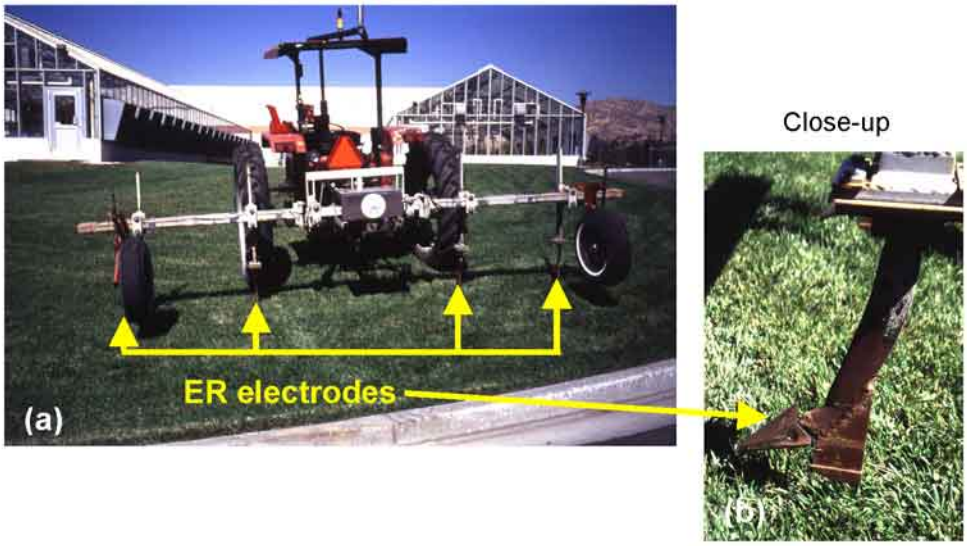


Figure 2. Mobile GPS-based electrical resistivity (ER) equipment showing (a) fixed-array tool bar holding four ER electrodes and (b) a close-up of one of the ER electrodes.

Figure 3. Mobile GPS-based electromagnetic induction (EMI) equipment showing (a) a side view of the entire rig and (b) a close-up of the sled holding the EMI unit.

The methods and materials used in the EC_a survey were those subsequently published as a set of guidelines and protocols by Corwin and Lesch (2003, 2005b). The fixed-array ER electrodes were spaced to measure EC_a to a depth of 1.5 m. Over 4000 EC_a measurements were collected (Figure 2b).

Following the EC_a survey, soil samples were collected at 60 locations. The data from the EC_a survey were used to direct the selection of soil sample sites. The ESAP-95 version 2.01 software package developed by Lesch and others (1995a, 1995b, 2000) at the U. S. Salinity Laboratory was used to establish the locations where soil cores were taken based on the EC_a survey data. The software used a model-based response-surface sampling strategy to locate the 60 sites. These sites reflected the observed spatial variability in EC_a while simultaneously maximizing the spatial uniformity of the sampling design across the study area. Figure 1b visually displays the distribution of EC_a survey data in relation to the locations of the 60 core sites. Soil core samples were taken at each site at 0.3-m increments to a depth of 1.8 m: 0-0.3, 0.3-0.6, 0.6-0.9, 0.9-1.2, 1.2-1.5, and 1.5-1.8 m. The soil samples were analyzed for pH, boron (B), nitrate nitrogen (NO_3-N), Cl^-, salinity (EC_e), leaching fraction (LF; defined as the fraction of applied water at the soil surface that drains beyond the root zone), gravimetric water content (θ_g), bulk density (ρ_b), % clay, and saturation percentage (SP). All samples were stored and analyzed for physical and chemical properties following the methods outlined in Agronomy Monograph No. 9 Part 1 (Blake and Hartage, 1986) and Part 2 (Page and others, 1982).

Statistical analyses were conducted using SAS software (SAS Institute, 1999). The statistical analyses consisted of three stages: (i) determination of the correlation between EC_a and cotton yield using data from the 60 sites, (ii) exploratory statistical analysis to identify the significant soil properties influencing cotton yield, and (iii) development of a crop-yield response model based on ordinary least squares regression adjusted for spatial autocorrelation with restricted maximum likelihood.

Because the location of EC_a and cotton yield measurements did not exactly overlap, ordinary kriging was used to determine the expected cotton yield at the 60 sites. The spatial correlation structure of yield was modeled with an isotropic variogram. The following fitted exponential variogram was used to describe the spatial structure at the study site:

$$v(\delta) = (0.76)^2 + (1.08)^2\,[1 - \exp(-D/109.3)] \qquad [1]$$

where D is the lag distance.

All spatial data were compiled, organized, manipulated, and displayed within a geographic information system (GIS). Kriging was selected as the preferred method of interpolation because in all cases it outperformed inverse distance weighting based on comparisons using jackknifing.

Correlation between Cotton Yield and EC_a

The fitted variogram model (Eq. [1]) was used in an ordinary kriging approach to estimate cotton yield at the 60 sites. The correlation of EC_a to yield at the 60 sites was 0.51. The moderate correlation between yield and EC_a suggests that some soil property(ies) influencing EC_a measurements also influence cotton yield making an EC_a-directed soil sampling strategy a viable approach at this site. The similarity of the spatial distributions of EC_a measurements and cotton yield in Figure 1 visually confirms the reasonably close relationship of EC_a to yield (R^2=0.51).

Exploratory Statistical Analysis

Exploratory statistical analysis was conducted to determine the significant soil properties influencing cotton yield and to establish the general form of the cotton yield response model. The exploratory statistical analysis consisted of three stages: (i) a preliminary multiple linear regression (MLR) analysis, (ii) a correlation analysis, and (iii) scatter plots of yield versus potentially significant soil properties. The preliminary multiple linear regression analysis and correlation analysis were used to establish the significant soil properties influencing cotton yield, while the scatter plots were used to formulate the general form of the cotton yield response model. Both preliminary MLR and correlation analysis showed that the 0-1.5 m depth increment resulted in the best correlations and best fit of the data; consequently, the 0-1.5 depth increment was considered to correspond to the active root zone.

The preliminary MLR analysis indicated that the following soil properties were most significantly related to cotton yield: EC_e, LF, pH, % clay, θ_g, and ρ_b. The correlation between cotton yield and soil properties indicated the highest correlation occurred with salinity (EC_e).

A scatter plot of ECe and yield indicates a quadratic relationship where yield increases up to a salinity of 7.17 dS/m and then decreases (Figure 4a). The scatter plot of LF and yield shows a negative, curvilinear relationship (Figure 4b). Yield shows a minimal response to LF below 0.4 and falls off rapidly for LF > 0.4. Clay percentage, pH, θ_g, and ρ_b appear to be linearly related to yield to various degrees (Figures 4c, 4d, 4e, and 4f, respectively). Even though there was clearly no correlation between yield and pH (r = -0.01; Figure 4d), pH became significant in the presence of the other variables, which became apparent in both the preliminary multiple linear regression analysis and in the final yield response model.

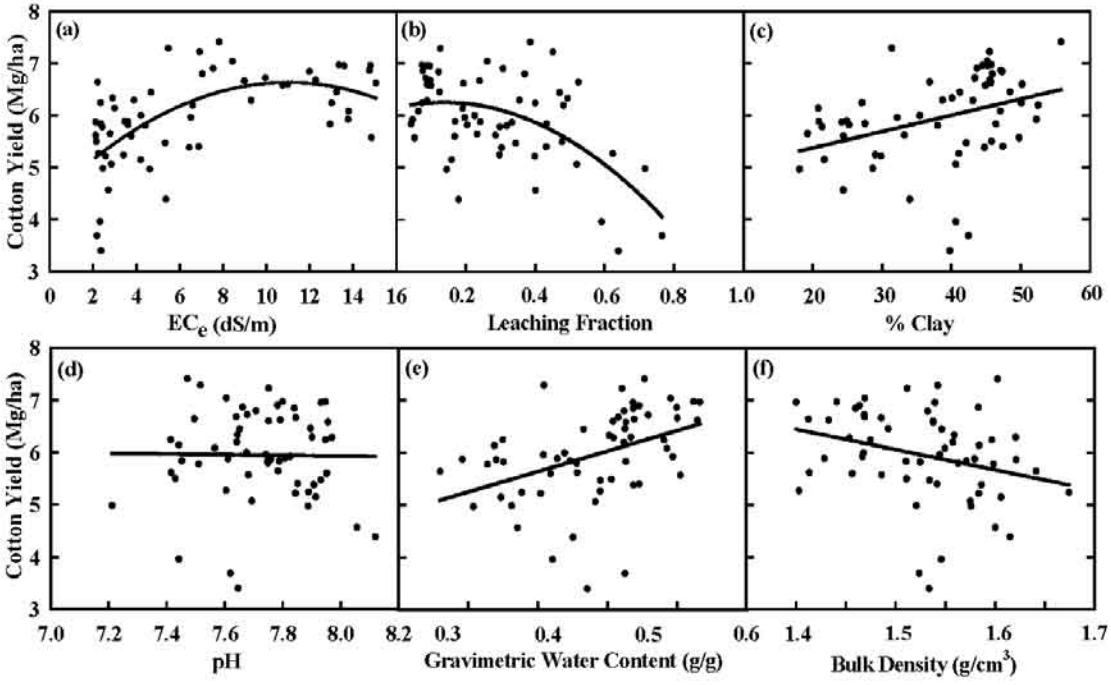


Figure 4. Scatter plots of soil properties and cotton yield: (a) electrical conductivity of the saturation extract (EC_e, dS/m), (b) leaching fraction, (c) percentage clay, (d) pH, (e) gravimetric water content, and (f) bulk density (Mg/m^3). From Corwin and others (2003), with permission.

Based on the exploratory statistical analysis it became evident that the general form of the cotton yield response model was:

$$Y = \beta_0 + \beta_1(EC_e) + \beta_2(EC_e)^2 + \beta_3(LF)^2 + \beta_4(pH) + \beta_5(\%\ clay) + \beta_6(\theta_g) + \beta_7(\rho_b) + \varepsilon \quad [2]$$

where, based on the scatter plots of Figure 4, the relationships between cotton yield (Y) and pH, percentage clay, θ_g, and ρ_b are assumed linear; the relationship between yield and EC_e is assumed to be quadratic; the relationship between yield and LF is assumed to be curvilinear; $ß_0$, $ß_1$, $ß_2$, . . . , $ß_7$ are the regression model parameters; and e represents the random error component.

Cotton Yield Response Model Development

Ordinary least squares regression based on Eq. [2] resulted in the following response model:

$$Y = 20.90 + 0.38(EC_e) - 0.02(EC_e)^2 - 3.51(LF)^2 - 2.22(pH) + 9.27(\theta_g) + \varepsilon \quad [3]$$

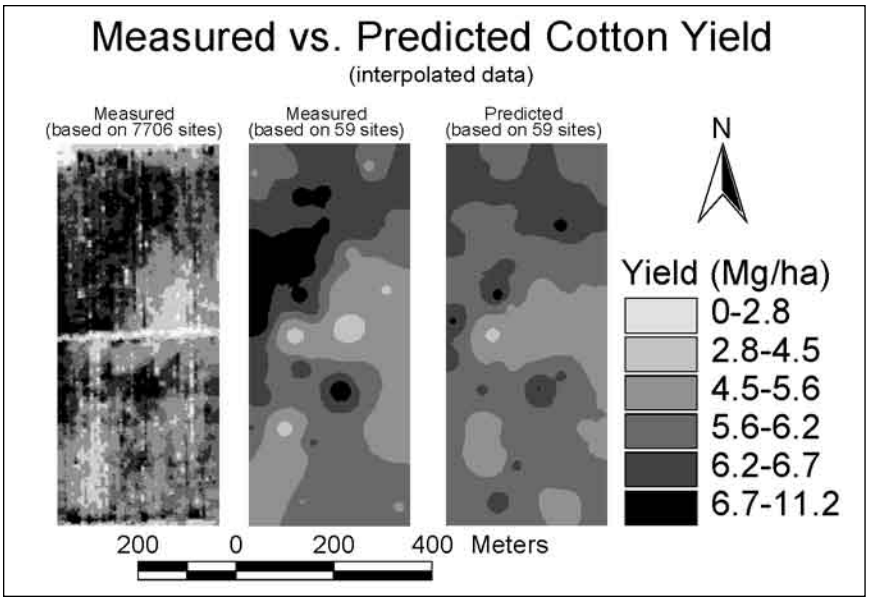
where the non-significant t test for % clay and ρ_b indicated that these soil properties did not contribute to the yield predictions in a statistically meaningful manner and dropped out of the regression model, while all other parameters were significant near or below the 0.05 level. The R^2 value for Eq. [3] is 0.61, indicating that 61% of the estimated spatial yield variation is successfully described by Eq. [3]. However, the residual variogram plot indicates that the errors are spatially correlated, which implies that Eq. [3] must be adjusted for spatial autocorrelation.

Using a restricted maximum likelihood approach to adjust for spatial autocorrelation, the most robust and parsimonious yield response model for cotton was Eq. (4):

$$Y = 19.28 + 0.22(EC_e) - 0.02(EC_e)^2 - 4.42(LF)^2 - 1.99(pH) + 6.93(\theta_g) + \varepsilon \quad [4]$$

A comparison of measured and simulated cotton yields at the locations where EC_a-directed soil samples were taken showed close agreement, with a slope of 1.13, y-intercept of -0.70, and R^2 value of 0.57.

A visual comparison of the measured and simulated spatial yield distributions of cotton shows a spatial association between interpolated measured (Figure 5b) and predicted (Figure 5c) maps.



Sensitivity analysis reveals that LF is the single most significant factor influencing cotton yield with the degree of predicted yield sensitivity to one standard deviation change resulting in a percentage yield reduction for ECe, LF, pH, and θ_g of 4.6%, 9.6%, 5.8%, and 5.1%, respectively.

Figure 5. Comparison of (a) measured cotton yield based on 7706 yield measurements, (b) kriged data at 59 sites for measured cotton yield, and (c) kriged data at 59 sites for predicted cotton yields based on Eq. [4]. From Corwin and others (2003), with permission.

Conclusions

Based on Eq. [4], Figure 4, and knowledge of the interaction of the significant factors influencing cotton yield in the Broadview Water District, four recommendations can be made to improve cotton productivity at the study site:

1. reduce the LF in highly leached areas (areas where LF > 0.5),
2. reduce salinity by increased leaching in areas where the average root zone (0-1.5 m) salinity is > 7.17 dS/m,
3. increase the plant-available water in coarse-texture areas by more frequent irrigation, and
4. reduce the pH where pH > 7.9.

Figure 6 indicates the areas pertaining to the above recommendations. All four recommendations can be accomplished by improving water application scheduling and distribution and by site-specific application of soil amendments. The use of variable-rate irrigation technology at this site would enable the site-specific application of irrigation water at the times and locations needed to optimize yield.

Hypothetically, when crop yield correlates with EC_a, then spatial distributions of EC_a provide a means of determining edaphic properties that influence yield. This hypothesis was evaluated and found to hold true. A yield map could potentially provide the same capability as an EC_a map, but an EC_a map provides information specific to the spatial distribution of edaphic properties, whereas a yield map reflects the influence of numerous additional factors.

Even though EC_a-directed soil sampling provides a viable means of identifying some soil properties that influence within-field variation of yield, it is only one piece of a complicated puzzle of interacting factors that result in observed within-field crop variation. Crop yield is influenced by complex interac-

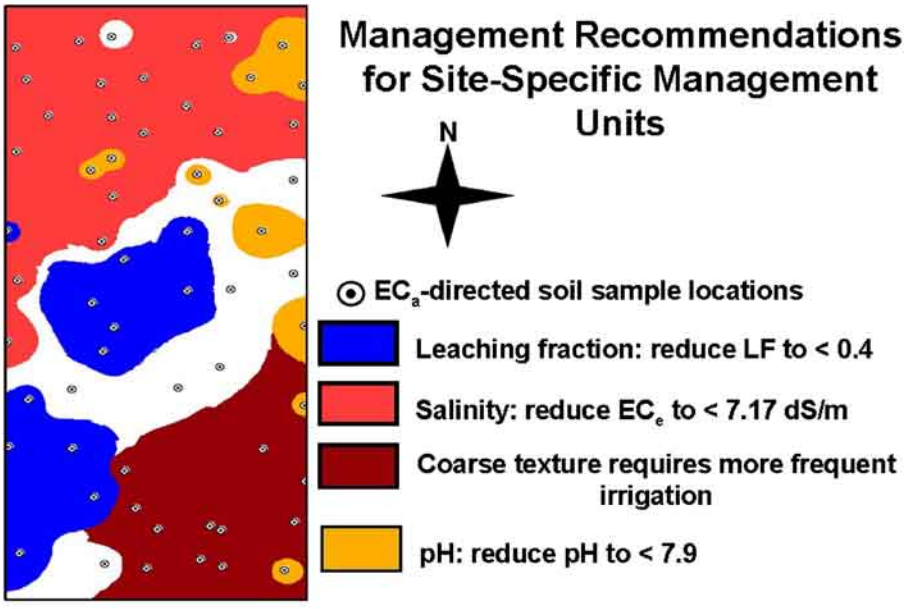


Figure 6. Site-specific management units for a 32.4-ha cotton field in the Broadview Water District of central California's San Joaquin Valley. Recommendations are associated with the SSMUs for (a) leaching fraction, (b) salinity, (c) texture, and (d) pH. From Corwin and Lesch (2005a), with permission.

tions of meteorological (for example, temperature, humidity, and wind), biological (for example, pests and earthworms), anthropogenic (management related), and edaphic (for example, salinity, soil pH, and water content) factors. Furthermore, precision agriculture requires more than just a myopic look at crop productivity. It must balance sustainability, profitability, crop productivity, optimization of inputs, and minimization of environmental impacts. Nevertheless, the presented approach is a step forward that provides valuable spatial information for use in site-specific crop management.

Acknowledgments

The authors acknowledge the assistance of Peter Shouse, Richard Soppe, and Jim Ayars. The authors also acknowledge the exemplary work of Jack Jobes and JoAn Fargerlund, who performed the field soil sample collection and laboratory analyses, respectively.

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Memorial — Robert F. (Bob) Ballard, 1935-2008

by Dwain Butler, Tom Dobecki, Don Steeples, Joe Savage, and Rick Miller

Robert F. (Bob) Ballard was a visionary near-surface geophysicist and a founding member of SEG's Engineering and Groundwater Geophysics Committee, serving as its President for two years. Bob was also instrumental in the formation of the Near-Surface Geophysics (NSG) Section, SEG's first non-geographic section. In recognition of his "long-term, tireless, and enthusiastic support of the near-surface community," Bob was the first recipient of the NSG's Frank Frischknecht Award in 1995.

Bob Ballard passed away on April 14, 2008. He was loved by many and will be missed greatly by his wife of 50 years, Pat Mason Ballard, and his three children. The near-surface geophysics community is saddened by the loss of a professional colleague and a friend. Bob is remembered as a splendid communicator, a true southern gentleman, a model railroad enthusiast and collector, and an entrepreneur and inventor.

Following graduation from Mississippi College, Clinton, Mississippi, with a BS in physics, and a short stint in the oil industry, Bob dedicated 42 years of service to the U. S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, as a research geophysicist. Throughout his career, Bob Ballard received many awards, including the Department of the Army Meritorious Civilian Service Award and the Director's Research and Development Achievement Award. On the occasion of his retirement, Bob was awarded the Silver Order of the De Fleury Medal, on behalf of the Engineer Regiment.

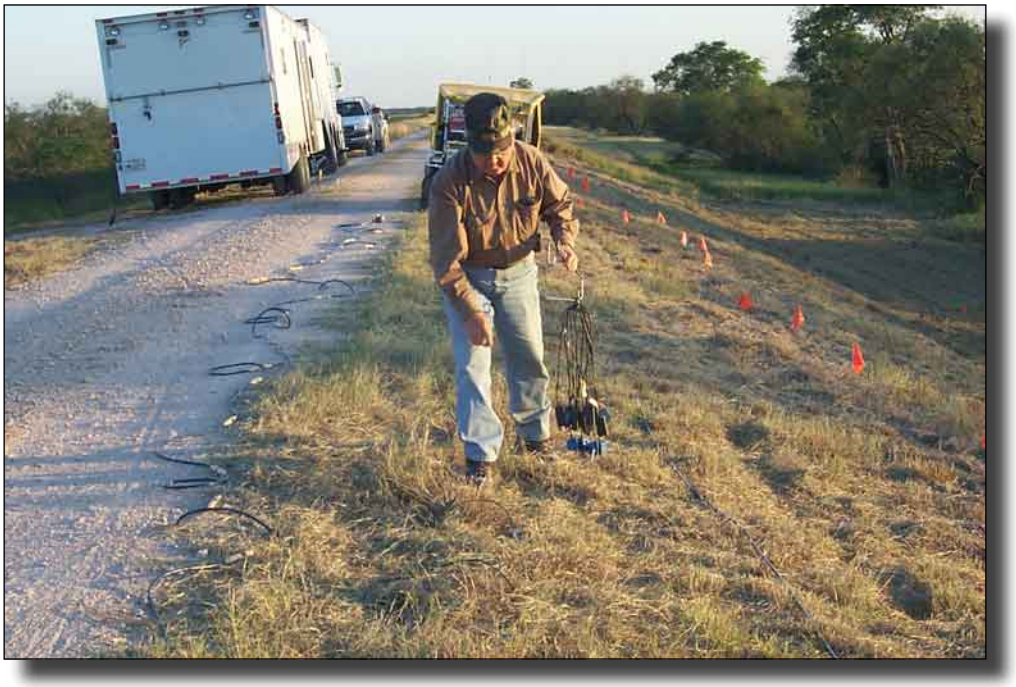
Bob was a visionary in his innate sense of knowing what was important and what was going to become important. His early recognition of the importance of seismic velocities for characterizing the foundation stability of critical structures and the stability of dams to earthquake shaking, led to development of methods, procedures and equipment for determination of compression and shear seismic velocities. He chaired an ASTM subcommittee that established a standard method for crosshole seismic testing, and developed and patented a borehole seismic source system. After his retirement from the Corps of Engineers in 2002, he continued and enjoyed making his borehole seismic sources, and sold and rented the sources to many practitioners around the world.

In addition to seismic refraction and borehole seismic methods for determining seismic velocities as a function of depth, Bob was an early advocate of surface wave methods for geotechnical and other near-surface applications. He developed innovative surface vibrator systems for constructing Rayleigh wave dispersion curves, one frequency at a time, for determining shear wave velocity versus depth. This early work in utilization of surface waves for geotechnical applications, foreshadowed the development, decades later, of the SASW and MASW methods and their extensive applications.

The professional activities, accomplishments and major R&D efforts of Bob Ballard are too numerous to mention, but particularly notable are: (1) member of external advisory committee for the Department of Geophysics, Colorado School of Mines; (2) member of the Geophysical Engineering Committee of the American Society of Civil Engineers; (3) Program Manager for the Army's tunnel detection mission, that

transitioned from the Korean tunnel problem in the 1980's to the problem of drug intrusion tunnels along the southwestern U. S. border; (4) member of the interagency coordinating committee for tunnel detection; (5) cavity detection and site characterization in karst regions; (6) sub-bottom acoustic profiling for sediment type characterization; (7) detection and mapping of articulated concrete mattress revetments along the Mississippi River; (8) manager of the Corps of Engineers' Strong Motion Instrumentation Program; and (9) new concepts for levee condition assessment, including an innovative program of levee assessment along the Rio Grande for the International Boundary and Water Commission.

Bob often assembled "dream teams" of scientists to address all aspects of problems that were particularly complex and important. We feel blessed to have participated in some of these projects, and through this participation we have formed lasting relationships with other scientists. Bob Ballard was a "feet on the ground geophysicist," a principal investigator, a supervisor, a program manager, a mentor, and most importantly a friend.



Geoscientists Without Borders — Don't Fence Them In

by Rhonda Jacobs, Geoscientists Without Borders Program Manager, Society of Exploration Geophysicists (withoutborders@seg.org)

With the May 2008 cyclone and earthquake disasters in recent news, many people remember the horrors of the December 2004 Indonesian tsunami. No one knew how the tsunami was going to change more than the beach landscapes and lives of those in its path. Geophysicists played a part in the recovery of the population in the area.

A fisherman watches the horizon off the western coast of Thailand, two years after the deadly tsunami.

SEG Foundation vice-chair Bill Barkhouse congratulating Schlumberger Executive Vice-President Dalton Boutte after his announcement of Schlumberger's1 million commitment to Geoscientists Without Borders at the 2007 SEG Annual Meeting.

"A post-tsunami helicopter electromagnetic (EM) survey, flown by the German BGR along the coasts of Aceh, northern Sumatra, was used to discriminate between fresh-water and saltwater aquifers. Saltwater intrusion occurred close to the coast as a result of the tsunami and deep saltwater occurrences particularly around 30 m depth were mapped up to several kilometers inland. Based on the survey results, recommendations were made to locate shallow, hand-dug wells and medium-depth (60 m) water wells."

Geoscientists Without Borders Committee Member Louise Pellerin of Green Engineering, Inc.

The effects of the tsunami in 2004 were also going to be felt at the Society of Exploration Geophysicists (SEG) when it became the catalyst for a new program of the Society of Exploration Geophysicists Foundation. In 2005 the Society's then-President Craig Beasley urged SEG members to help, stating in the January issue of ***The Leading Edge*** that "…we have a significant contribution to make as geophysicists." Three years later, the society is now pleased to announce the establishment of a new program, Geoscientists Without Borders.

Geoscientists Without Borders is an answer to the question, "What can I do?" Made possible by a founding commitment of $1 million from Schlumberger, this program will benefit areas and communities by providing necessary funding for projects that serve those in need through application of geophysical and geoscience technologies. These humanitarian projects will create a lasting legacy and a brighter future while raising the profile of applied geoscience. Dalton Boutte, Executive Vice President of Schlumberger and President of Schlumberger subsidiary WesternGeco, expressed the goal of the program well in his announcement of the founding commitment to the SEG Foundation, "When we looked at the technologies we have developed in the oil and gas sector and the potential benefits to humanitarian efforts, we were interested in enabling these applications through interaction with the academic com-

munity, students, and the SEG Foundation. We are proud to be able to help establish a program that will focus on humanitarian applications of geoscience and inspire students to use their skills in the geosciences to make the world a better place."

The program details were announced in May 2008 and it is clear indeed that students and universities will have an important role in the success of the program. In return, the students will bring benefit to their own lives through the experience of planning and executing such projects. According to Gabriel Borges, outgoing 2007 president of the SEG Student Section at the University of Oklahoma, "the program represents a great opportunity for geoscience students to provide an early contribution to the professional community while building their technical skills and assuming a leadership role in the global fight for human dignity in these disadvantaged communities."

The project award application process began with the posting of the first request for proposals in May. Qualifying projects will be required to demonstrate that they will deliver humanitarian and environmental benefits through application of geophysical and geoscience expertise. These benefits could include a wide range of projects, such as locating fresh water supplies, pollution remediation, natural hazard detection, man-made hazard mitigation, sustainable resource development, and related education. Anyone interested in applying for grants or offering their services as mentors should visit the SEG website at *www.seg.org/foundation*.

Students acquiring electromagnetic data for groundwater applications.

It is natural that the Society of Exploration Geophysicists would respond to a world-shaking event. A global organization, it is dedicated to advancing the science and technology of applied geophysics. The SEG Foundation is the affiliated charitable organization dedicated to serving the objectives of the Society through related programs. The SEG Foundation brings opportunities for scholarships, provides travel grants, and supports field camp programs and other projects of merit. These programs are made available to student members worldwide as it also supports student sections at over 190 academic institutions around the world.

The Schlumberger commitment to the program was made to the SEG Foundation Major Gift Campaign, "Advancing Geophysics Today, Inspiring Geoscientists for Tomorrow." Gary Servos, Board Chair of SEG Foundation, explains why this new investment in the future of geophysics is so important: "SEG Foundation has a long history of supporting students and universities engaged in the study of applied geophysics. We are proud to work with Schlumberger to raise this engagement to a new level. Geoscientists Without Borders will strengthen university programs, introduce students to the practical and humanitarian benefits of geophysics and geoscience, and make a difference to the quality of life in many of the world's most disadvantaged communities."

Geoscientists Without Borders will eliminate fences to bring a positive impact to the world — one project at a time. For more information, please visit the Geoscientists Without Borders web page at *www.seg.org/gwb*.

Coming Events

FastTIMES *highlights upcoming events of interest to the near-surface community. Send your submissions to the editors for possible inclusion in the next issue.*

Near Surface 2008

September 15–17, 2008, Kraków, Poland
Registration deadline September 1

The Near Surface Division of the European Association of Geoscientists and Engineers will convene "Near Surface 2008 - 14th European Meeting of Environmental and Engineering Geophysics" in Kraków, Poland from September 15–17, 2008. Together with the Local Advisory Committee, a full program has been developed, consisting of the conference, an exhibition, social events, a workshop, and a field trip. The conference, exhibition, and the icebreaker reception will take place in the Auditorium Maximum. Latest nformation on Kraków and the venue will be available on the Near Surface 2008 website (*www.eage.org*), where you will also find information on the technical program and registration.

About Kraków

Kraków is one of the oldest and largest cities of Poland and is located in the very center of continental Europe. Thanks to its rich history, Kraków represents a synthesis of all things Polish, connecting tradition with modernity. In the beautiful and mysterious streets of the Old Town, you will find everything you need to allow you to escape from everyday life. Galleries full of exhibitions, cafes and restaurants, all of this should be part of any visit to Kraków. Kraków has traditionally been one of the leading scientific, cultural, and artistic centers in Poland.

Technical Program

The technical program consists of oral and poster presentations covering diverse near-surface geophysical applications disciplines. The oral and poster sessions will run in parallel from September 15 to 17, 2008. Near Surface 2008 is an international conference; therefore all the presentations will be given in English.

Near-Surface Geophysics at the 2008 SEG Annual Meeting

November 9–14, 2008, Las Vegas, Nevada
Advance pricing registration deadline September 30, 2008

The Near Surface Geophysics Section of the Society of Exploration Geophysicists (SEG) invites you to attend the 2008 SEG International Exposition and 78th Annual Meeting in Las Vegas, Nevada, November 9–14, 2008. Advance registration is now open; visit *www.seg.org* for meeting details. If you have any questions please do not hesitate to email Rob Jacob (*Robert_Jacob@brown.edu*).

There are multiple Near Surface Geophysics (NSG) events planned for the 2008 SEG meeting, including a shindig fit to celebrate the NSGS 15th anniversary. This year, the SEG Forum Series will kick off the SEG Technical Program, with a focus on hydrogeophysics, where top executives, researchers, and governmental representatives provide their perspectives on the future direction of using geophysics

to better characterize our groundwater resources, leading to better management of our groundwater supplies. In addition to the several near-surface and environmental technical sessions, the NSGS is sponsoring two special sessions at SEG 2008: Hydrogeophysics in Practice and UXO Detection.

Students are encouraged to apply for one of the multiple NSGS $500 travel grants to attend SEG 2008. See *nsgs.seg.org/travelg.htm* for details. If you are not a member of the SEG-NSG Section, please consider joining (*nsgs.seg.org/join.htm*). NSG Section membership is only $15 (free to students), and SEG membership is not required.

EEGS-NSGS Workshop on Induced Polarization: Research and Recent Advances in Near-Surface Applications

November 14, 2008, SEG Annual Meeting, Las Vegas, Nevada, USA

The Environmental and Engineering Geophysical Society (EEGS) and the Society of Exploration Geophysicists, Near- Surface Geophysics Section (SEG-NSGS) invite you to a jointly sponsored workshop on induced polarization (IP) to be held following the 2008 SEG Annual Meeting in Las Vegas, Nevada. Scientists and engineers will come together to share research and near-surface application of IP to diverse environmental, hydrological, and engineering problems, including infrastructure assessment.

The workshop will begin with a short historical and tutorial discussion of IP, followed by technical sessions on:

(1) Recent Research in IP Data Acquisition,

(2) Rock Properties, Theory and Laboratory Studies of IP,

(3) Inverse Modeling and Imaging of IP Data, and

(4) Near Surface Applications of IP

and conclude with a discussion and summary.

Co-Organizers

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22nd Symposium on the Application of Geophysics to Engineering and Environmental Problems

March 29–April 2, 2009, Fort Worth, Texas

The Environmental and Engineering Geophysical Society (EEGS), general chair Doug Laymon, and technical chair Dwain Butler invite you to attend the 22nd Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) being held at the Renaissance Worthington Hotel in downtown Fort Worth, Texas. Fort Worth is a city filled with culture and western heritage and is known as the city "Where the West Begins." Fort Worth has much to offer and enjoy including the historical stockyards, great museums, an exciting downtown, wonderful restaurants, and fun nightlife in the Sundance Square area.

So save the dates on your calendar for March 29 through April 2, 2009 and plan to submit an abstract for the 2009 meeting. The SAGEEP 2009 theme is "Expanding Horizons for Near-Surface Geophysics." Abstracts that focus on recent developments in near-surface geophysical methods, innovative uses of geophysics for challenging engineering and environmental problems, and case histories are welcome. Abstracts not to exceed 200 words are due no later than September 19, 2008 and may be submitted electronically at www.eegs.org. If accepted, full manuscripts will be due December 12, 2008.

In addition to the technical presentations, other SAGEEP 2009 activities will include field trips, short courses, workshops, and networking opportunities. For the latest information about SAGEEP 2009, visit the conference web site at www.eegs.org/sageep/index.html. To become involved, please contact SAGEEP 2009 General Chair Doug Laymon at doug.laymon@tetratech.com.

Recent Events

***FastTIMES** presents contributed summaries of recent events to inform readers who were unable to attend. As a service to other readers, please send the editors summaries of events you attend for possible inclusion in future issues.*

SAGEEP 2008 Wrap-Up

Philadelphia, Pennsylvania, April 6–10, 2008

by Jonathan E. Nyquist, SAGEEP 2008 General Chair, Temple University (nyq@temple.edu)

SAGEEP 2008 was held in the Downtown Marriot Hotel in historic Philadelphia, Pennsylvania from April 6–10th. Ron Kaufmann, SAGEEP Technical Chair, put together a fine program of 110 oral papers and 27 posters, which were presented to an audience of 367 registrants. The short courses held on Saturday and Sunday before the meeting, and Thursday after the meeting, were well attended, as was our first Sunday afternoon field trip: a bicycle tour of the geology of Philadelphia. Afterward, attendees relaxed at the Sunday night icebreaker or went bowling at Lucky Strikes Lanes.

Ray Scheinfeld of Weston Solutions (far right) led a chilly but marvelous Sunday afternoon bicycle tour of geology and hydrology of Philadelphia.

Monday morning provided an opportunity to recognize EEGS over-achievers. Congratulations to Dr. Ken Stokoe II, winner of the Frank Frischknecht Award, a pioneer in near-surface geophysics who influenced the careers of many EEGS members in attendance. Congratulations also to Greg Baker, winner of the new EEGS/Geonics Early Career Award. Greg was also the speaker at the Technical Luncheon, where he gave us an appreciation for the impressive scope of his research. And congratulations to Micki Allen, winner of EEGS Gold Medal Award, along with thanks for the contributions she made to SAGEEP again this year.

Following the awards, Dr. Robin Bell, Senior Scientist at Columbia's Lamont-Doherty Observatory, opened the technical session with a fascinating keynote address on the geophysical exploration of vast freshwater lakes kilometers beneath the Antarctic ice sheets. Running concurrently with the technical sessions this year for the first time was Environmental and Engineering Geophysical University (EEGU). EEGU, intended primarily for non-geophysicists, included one- to three-day introductions to the application of geophysics to issues in water resources and contamination and in transportation and geotechnical engineering.

A tourist takes his daughters in hand before detouring around Scott Simon, who is demonstrating GPR equipment in front of the Liberty Bell and across the street from Philadelphia's Independence Visitor's Center.

This year the outdoor equipment demonstration was held Monday afternoon in Philadelphia's Independence Park, on the lawn next to the Liberty Bell. Passing tourists were bemused by a plethora of seismic and electrode resistivity arrays, radar carts, EM equipment, and magnetometers. With 10 exhibits and well over a hundred attendees, the outdoor demonstration was both fun and successful.

Bridget Stoyer links arms with a life-size bronze replica of one of the framers of the U.S. Constitution at Tuesday's Gala (bonus points if you can identify the statue).

Tomio Inazaki examines a plaque commemorating the role played by the six-inch rifles of the Union's Fourth U.S. Artillery Battery A in repulsing Pickett's Charge. The Thursday field trip, led by Dr. Roger Cuffey (Penn State), was devoted to the influence of geology on the battle of Gettysburg.

William Owen, who has served as Chief of the Geophysics and Geology Branch for the California Department of Transportation (DOT) was the speaker at the Tuesday business luncheon. Bill described opportunities to expand the use of geophysics within state DOTs, and address problems with America's aging infrastructure.

Tuesday night's Gala was held in the National Constitution Center. The evening included cocktails, dinner, music, dancing, and a chance to explore one of America's newest museums, with numerous high-tech electronic exhibits devoted to the history of the United States Constitution. Admittedly, it was a bit unsettling to watch SAGEEP attendees swearing in as President of the United States, but it has been a long time since I could watch this ceremony without trepidation.

The attendees who sacrificed another day at the office to remain Thursday, after the close of the meeting, to participate the Gettysburg field trip were rewarded with gorgeous weather and a fascinating tale of geology and American Civil War history – everything from dinosaur footprints in the shale slabs forming one of the bridges to diabase boulder fields used as cover by Confederate sharpshooters. The trip was a perfect end to a successful and enjoyable conference.

By the time you read this the SAGEEP 2009 call for abstracts will have been issued (see the page following the cover). Help spread the word. I challenge each of you to coax someone new to attend next year.

See you in Fort Worth!

Near-Surface Geophysics Special Sections in The Leading Edge

by Richard D. Miller, Editorial Board Member, ***The Leading Edge*** (rmiller@kgs.ku.edu)

As many of you are aware, the Society of Exploration Geophysicists' magazine, ***The Leading Edge*** (***TLE***), publishes special sections each month highlighting emerging or active areas of applied geophysics. In the coming months, the near-surface community will have several opportunities to enlighten the entire geophysical community on the high quality and innovative nature of their work. Over the next year or so special sections on "near surface" and "hydrogeophysics" have been placed on the editorial calendar to provide opportunities to emphasize the use geophysics to solve near-surface problems. "Near Surface" is scheduled for publication in November 2008 and "Hydrogeophysics" is scheduled for the October 2009 issue of ***TLE***. The deadline for papers to be considered for the Hydrogeophysics special section is June 2009. If you have any comments, questions, or would like to submit a paper, please contact Rick Miller at rmiller@kgs.ku.edu.

Multiple Hires in Earth Surface and Hydrologic Processes

Jackson School of Geosciences, The University of Texas at Austin

The Jackson School is building a premier education and research program in Earth Surface and Hydrologic Processes. We seek outstanding scientists at the forefront of their disciplines who are attracted to challenging areas of scholarship that require collaboration across disciplines and programs. We seek to address compelling questions in surface and hydrologic processes within the broad theme of determining how surface and hydrologic processes are influenced by their dynamic setting at the interface of the lithosphere, atmosphere, hydrosphere, and biosphere.

Over the next three years, the Jackson School plans to hire six or more faculty and scientists who complement our existing strengths. We are interested in a range of research areas from quantitative geomorphology to hydrologic-biologic interactions to societal impacts and resource sustainability, and capabilities ranging from modeling landscape dynamics to remote sensing, near-surface geophysics, aerogeophysics, and monitoring groundwater and coastal systems. We also encourage innovative scientists in other areas related to surface and hydrologic processes to apply. More information can be found at www.jsg.utexas.edu/hiring/hydro.html.

FastTIMES Editor-in-Chief

Environmental and Engineering Geophysical Society

The Environmental and Engineering Geophysical Society seeks candidates to serve as Editor-in-Chief for ***FastTIMES***, the society's quarterly electronic newsmagazine for the near-surface geophysical community. Preferred qualifications include (a) broad knowledge of near-surface geophysical methods, (b) willingness to solicit article contributions, (c) facility with electronic publishing tools including Adobe Photoshop and InDesign, (d) willingness to participate in monthly EEGS Board of Directors conference calls and meetings, (e) membership in EEGS, and (f) a commitment to on-time publication of four issues per year. Interested candidates should contact President Bill Brown (bbrown@aeroquest.com).

One Post-doctoral Position and Two Ph.D. Positions in Hydrogeophysics: Surface Water-Groundwater Interaction and Contaminant Transport

Hydrogeophysics Group, Århus University, Denmark
The Technical University of Denmark, Department of Environmental Engineering

Applications are invited for two funded Ph.D. scholarships in hydrogeophysics. Funding is available for three years from the Danish Strategic Research Council through the Riskpoint project. Annual salary starts at 40,000 € plus pension/holiday pay.

The Riskpoint project aims to develop a complete risk assessment tool that can be used to identify and prioritise clean up and management of point sources of contamination to groundwater. Water-borne contaminants are transported across the different compartments of the hydrological cycle. The EU water framework directive emphasizes the continuity of water and contaminant fluxes across the groundwater–surface water interface.

Non-invasive geophysical techniques offer a wide spectrum of innovative technologies to map the parameters governing water flow and solute transport at the groundwater–surface water interface. This project will focus on a well-instrumented Danish field site and will implement different 4D geophysical monitoring techniques (resistivity imaging/IP, TDEM, MRS) to set up and constrain detailed reactive contaminant transport models.

For these positions we seek young researchers (MSc in Sciences or Engineering) with a strong mathematical background and interest in geophysics and hydrological modeling. We expect good communication skills, both verbally and in writing and willingness to travel. For the post-doctoral position (based at Århus University), experience in resistivity /IP methods or MRS, field experience, and project management skills are advantageous. For the Ph.D. position at Århus University, experience with the MRS method is an advantage. The Ph.D. position at DTU requires a strong background in numerical flow and contaminant transport modeling.

Please send an application and CV plus contact details of two references by email to Associate Professor Esben Auken (esben.auken@geo.au.dk) and Associate Professor Peter Bauer-Gottwein (pbg@er.dtu.dk). The application will stay open until August 1, 2008. The positions will be filled as soon as suitable candidates are identified. Funding is available for an immediate start but the starting date is negotiable. For more information, please contact Esben Auken or Peter Bauer-Gottwein. See also www.hgg.au.dk and www.env.dtu.dk.

Join EEGS Now!

Environmental and Engineering Geophysical Society

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Phone: (303).531-7517 Fax: (303) 820-3844
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