

August 2009 Newsletter of the AGU Near-Surface Focus Group

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Recent announcements of interest to the NS community (conferences, academic positions, graduate student opportunities etc.) can be found at the AGU NS-Focus Group Web Page: <http://nsg.agu.org>

AGU NS Membership as of April 2009:

Primary affiliation: 625 members; Secondary: 2042 members

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- 1) 2009 Fall AGU Meeting (<http://www.agu.org/meetings/fm09/>)

This year's Fall AGU meeting is December 14-18 in San Francisco, California, USA. The abstract submission site is now open; abstract submission deadline is September 3. Near-Surface, Hydrogeophysics and NS co-sponsored sessions are listed below. We look forward to seeing you in San Francisco!

Near Surface Geophysics Sessions:

NS01: Near Surface Geophysics General Contributions

This session provides the opportunity for contributions that fall within the broad spectrum of Near Surface Geophysics.

Conveners: Chester J Weiss, Virginia Polytechnic Institute and State University, USA, Tel: +1-540-231-3651, email: cjweiss@vt.edu; Leif Cox, Montana Tech, Dept of Geophysical Engineering, USA, Tel: +1406-496-4888, email: lcox@mtech.edu

NS02: Advanced Inverse Strategies for Improved Characterization and Assessment of Ground-Water, Mineral, and Petroleum Resources

In geophysical imaging and ground-water or petroleum reservoir model calibration, inverse methods typically use a single type of data sensitive to a single physical property. Combining several types of data collected over the same region potentially can reduce ambiguity and enhance inversion results. We welcome contributions demonstrating advanced inversion strategies using data sets 1) sensitive to the same physical property, 2) responsive to different physical properties between which there is an analytic relationship, and 3) disparate data sets where there is no analytic relationship between the properties. This session encourages contributions that describe combined, Bayesian, joint, and cooperative inverse approaches, regularization strategies, worth of combined data, and uncertainty assessment.

Conveners: Michael Friedel, USGS, USA, email: mfriedel@usgs.gov, and Behnam Jafarpour, Texas A&M University, USA, email: behnam@pe.tamu.edu

NS03: Back to Basics: Inversion of Electrical Resistivity Imaging Data

Electrical resistivity imaging (ERI) can be used to obtain information about subsurface structure, properties, and processes for a wide range of near-surface applications. A critical step in the use of ERI is the inversion of the acquired data to obtain an image that displays the magnitude of the electrical resistivity throughout the subsurface region of interest. In obtaining this image, the geophysicist is immediately faced with several critical choices – such as, which inversion algorithm, its implementation and the incorporation of prior geologic knowledge and constraints – which can significantly affect the obtained resistivity image in ways that are not often documented or well understood. This “Back to Basics” session will be a community discussion about the inversion of ERI data.

Synthetic and field data sets will be posted at the AGU Near-Surface Focus Group website (nsg.agu.org), along with information about the acquisition parameters and some limited information about the geology at the site. We ask that volunteers (e.g. you, reading this session description) download one or more of these data sets and invert them using any method to obtain the resistivity model/s. In this session we will compare and discuss the results, and review the “answers” for the synthetic data sets. All abstracts submitted to this session will therefore be from those who have completed the homework assignment. All submitted presentations will be made as posters. This Back to Basics session is an opportunity for our community to have an in-depth discussion about the inversion of ERI data – the advances, the challenges, the limitations, and the outstanding questions.

Conveners: Chester Weiss, Virginia Tech, Dept of Geosciences 4044 Derring Hall (0420), Blacksburg, VA 24061 USA, email: cjweiss@vt.edu, and Rosemary Knight, Stanford University, USA, email: rknight@stanford.edu

NS04: Back to Basics: Measurement of Electrical Properties of Rocks and Sediments

The interpretation of electrical and EM geophysical data acquired for hydrogeological and exploration applications relies on an understanding of how bulk electrical properties such as conductivity, induced polarization, dielectric constant, and self-potentials are related to many pore-scale petrophysical properties and physical/ chemical/ biological processes. Laboratory experiments play a crucial role in revealing these relationships and yet the procedures required to make high quality lab measurements that are representative of in-situ conditions and free of experimental artifacts remain a source of lively debate. We welcome contributions on the topic of electrical properties measurement over the full span of frequencies (DC to hundreds of MHz) used in resistivity, IP, SP, EM and GPR methods.

Conveners: Karl E Butler, University of New Brunswick, Department of Geology 2 Bailey Dr., Fredericton, NB E3B 5A3 CAN, Tel: 506-458-7210, Fax: 506-453-5055, email: kbutler@unb.ca, and James Merriam, University of Saskatchewan, Dept. of Geological Sciences 114 Science Place, Saskatoon, SK S7N 5E2 CAN, Tel: (306) 966-5716, Fax: (306) 966-8593, email: jim.merriam@usask.ca

NS05: Urban Geophysics

Unprecedented industrial growth and rapid urbanization are causing a host of problems and challenges to established and emerging human settlements all over the world. Systematic application of various geophysical methods, individually or in combination, can play a vital role in finding solutions to a number of these problems. The session invites contributions on conceptual developments and applications of various geophysical methods dealing with: urban planning and development, metro tunneling and transportation, seismic risk mitigation in populated areas, siting of heavy structures, archeological investigations and preservation of existing monuments, mining hazards and waste disposal, enhancement of potable water supply in problem areas, land slides in mountainous regions, power transmission, etc. Contributions of urban geophysical studies to special problems unlisted here, and those combining the results of airborne, ground, and bore hole surveys will be most welcome.

Conveners: Saurabh Kumar Verma, National Geophysical Research Institute, Uppal Road, Hyderabad, AP 500007 IND, Tel: 91-40-23434601, Fax: 91-40-23434651, email: skvngri@gmail.com, and Shashi Prakash Sharma, Indian Institute of Technology, IIT Campus, Kharagpur, WB 721302 IND, Tel: 91 - 3222 - 283386, email: spsharma@gg.iitkgp.ernet.in

Hydrogeophysics Sessions:

H49: General Hydrogeophysics

Subsurface characterization for hydrological purposes is traditionally based on core analysis and well and tracer test data gathered from a limited number of boreholes. While core-scale data provides detailed 1-D information along the length of boreholes, hydraulic stress data and tracer breakthrough curves generally provide relatively large-scale information concerning average aquifer properties. However, without complementary information, these traditional techniques are often inadequate for characterizing heterogeneous formations at necessary scales. The additional information needed to adequately resolve subsurface heterogeneity can potentially be bridged by high-resolution geophysical techniques. In view of this, we encourage contributions from all domains of hydrogeophysics with emphasis on studies aimed at characterizing (i) hydraulic properties and processes in both saturated and unsaturated formations, (ii) contaminant or tracer migration, (iii) the geomechanical nature of aquifer materials, and (iv) relevant biological and geochemical properties and processes.

Conveners: Tim Johnson, Idaho National Laboratory, Rita Deiana, Università di Padova, Remke L Van Dam, Michigan State University, and Majken Caroline Looms, University of Copenhagen.

H50: Characterization of Soil Moisture Dynamics and Plant-Soil Water Interactions

Soil moisture dynamics play a pivotal role in earth system science. This session aims to characterize the spatio-temporal dynamics of soil moisture and the interactions between soil moisture and plant communities. The emphasis is on linking near-surface geophysical data with key hydrological, soil physical, and ecological processes. Rather than focusing on the wide array of soil moisture sensing techniques, such as ERT, GPR, and TDR, this session will bring together researchers across discipline divides to discuss the measured soil moisture dynamics as both an end-result and a modeling input. We further invite contributions that aim to identify the temporal dynamics of the spatial structure of soil moisture patterns at different scales. Special emphasis is given to the role of vegetation in the space–time relationships of soil moisture. Greater coordination between measurement and modeling methods will provide a viable step towards linking subsurface processes with ecohydrological patterns.

Conveners: Robert Heinse, University of Idaho, Tyson Ochsner, Oklahoma State University, and Nigel Crook, Stanford University.

H51: Innovative Field Methods and New Theoretical Approaches of Hydrogeophysics for Hydraulic Characterization of Aquifers

Hydraulic characterization of aquifers, i.e. determination hydraulic conductivity and storage parameter fields, is vitally important for water resources management and modeling of the fate and transport of contaminants in the subsurface environment. Traditional approaches (pumping tests, slug tests, etc.) for characterizing aquifers can be laborious, expensive, and highly intrusive, while only yielding sparse data sets. Hydrogeophysical methods offer promise to mitigate or even obviate the major limitations of the traditional methods. Presentations are solicited on: innovative methods for hydrogeophysical data acquisition, new theoretical developments, and modeling approaches that address aquifers and the inherent spatial heterogeneity of hydraulic parameters.

Convener: Bwalya Malama, Boise State University, André Revil, Colorado School of Mines, and Kristopher L. Kuhlman, Sandia National Lab Carlsbad.

H52: Remote Sensing and Hydrogeophysics Applications for Modeling of Land Surface Hydrological Processes

New measurement and monitoring technologies provide unprecedented opportunities to not only characterize hydrological processes and state variables in space and time, but also to improve and validate the current state-of-the-art land surface models. Recent studies have demonstrated that the combination of observation techniques such as Electrical Resistivity Tomography [tm1] (ERT), Electric Magnetic Induction (EMI), Ground Penetrating Radar (GPR), near surface seismics, but also air- and space-borne methods from land monitoring remote sensing platforms (TerraSAR-X, RapidEye, ALOS) and soil moisture characterization (AMSR-E, ERS-Scat and SMOS) with land surface models, through initialization, parameterization, and data assimilation, can provide significant improvements to the representation of hydrological processes. In this session, we welcome contributions with an emphasis on the improvement of the water and energy budget within a modeling framework.. They will deal with the development and application of geophysical and remote sensing techniques (be it as input or parameters) that either stand alone or are integrated with hydrological modeling. Contributions are also encouraged that address the quantification of uncertainties in hydrological products due to errors in temporal sampling techniques, sensors and the applied retrieval algorithms; magnitudes which depend on the hydrological variable(s), sensor, and spatio-temporal scale of interest and which play a significant role in the applicability of the obtained observations.

Conveners: Jennifer Jacobs, University of New Hampshire, Adam Ward, Pennsylvania State University, Dongryeol Ryu, The University of Melbourne, and Christoph Rüdiger, The University of Melbourne.

H53: Aquifer Characterization using Direct-Push Methods

Characterization of the mechanical and fluid transport properties of aquifers, i.e. determination of hydraulic conductivity and soil strength, are fundamental parameters in solving geotechnical and geoenvironmental problems ranging from estimation of contaminant migration to the diagnosis of potentially liquefiable soils. Direct-push methods are rapidly deployed and minimally invasive, providing the potential to gain depth-continuous information about soil properties from either empirical relationships or more refined analytical solutions. As such direct-push methods are emerging as the chosen method to obtain critical soil data. For this session we encourage contributions directed towards solutions developed using direct-push methods for the: (i) hydraulic characterization of aquifers, (ii) characterization of soil strength properties, (iii) analysis of liquefaction susceptibility and other geo-hazards, (iv) characterization of aquifer materials, based on either numerical or experimental methods.

Conveners: Michael Fitzgerald, Georg-August-Universität, Nurhan Ecemis, Izmir Institute of Technology, and Derek Elsworth, Penn State University.

H69: Emerging Applications of Hydrogeophysical Methods for Characterization of Flow and Transport in Subsurface Environments

Strongly perturbed systems with spatiotemporally diverse signals such as those sites undergoing active remediation present both challenge and opportunity for the development and calibration of flow and transport models. Characterization of multiphase processes has traditionally relied upon the interrogation of direct, fluid-phase measurements collected at a limited number of spatial locations. In contrast, geophysical techniques provide spatial averages of the sensor-specific constitutive properties of the medium. Recent advances in geophysical monitoring provide new insights into subsurface flow and transport processes through the combination of traditional borehole methods and non- or minimally invasive geophysical imaging. The goal of this session is to bring together researchers interested in coupling hydrologic and geophysical data, with particular emphasis flow and transport processes occurring in natural or perturbed systems. We invite research that focuses on any aspect of the hydrogeophysical characterization of biological and physicochemical processes at column-, bench-, and field-scales. Processes of particular interest include, but are not limited to, those involving mineral precipitation/dissolution, biofilm and gas evolution, hydraulic property changes, and rate-limited mass transfer.

Conveners: Andrew Ramsburg, Tufts University, Frederick Day-Lewis, USGS, and Yuxin Wu, Lawrence Berkeley National Lab.

Co-Sponsored Special Sessions:

H04: Defining, Measuring and Modeling Hydrological Connectivity Across Scales: Macropores to Landscapes

H40: Shallow and Deep Geothermal Energy

H46: Challenges and Progress in Regional Groundwater Flow, Transport, and Reactive Transport Modeling

C27: Observatories, Tools and Instruments in Polar Regions

IN01: Earth and Space Science Informatics General Contributions

S05: Observation and Analysis of Natural and Induced Microearthquakes

S12: Monitoring Temporal Changes of Earth's Properties with Seismic Waves

T08: Fault processes in nature and lab: from micro scale to 3-D regional observations and models

T24: Moho, Lithosphere and Upper Mantle Structure Beneath Europe: What Have we Learnt in 100 Years?

V32: Volcanic dynamics: temporal changes of physical properties at volcanoes with and without surficial activity

V36: A Multidisciplinary Look at Volcanism in Continental and Oceanic Plate Interiors

2) Update on the Near Surface Student Wiki (from Elliot Grunewald, NS student Representative)

The Near Surface Student Wiki is up and running at ns-students.pbworks.com. Since its launch last month, the wiki has been receiving an average of ten hits a day and more than thirty students have added their information to the Student Members List. A workable outline of pages has been established and several users have already identified directions for new content. Now comes the most important part: it is time for all our student members to really get involved in shaping the wiki into a resource that is most useful to them. If you are a student member and haven't yet visited the wiki, please go check it out. Add your information to the Student Members List. Take a look around the site, and feel free to add your own content wherever you like. It is incredibly simple to edit pages, and your contributions do not need to be polished -- even a short, one-sentence comment on how you would like to see something changed can seed other users act on that suggestion and implement your idea. Remember, only student members currently have access to the wiki. You can log on using the email address at which you receive this newsletter. If you have problems accessing the page, contact Elliot Grunewald (elliotg@stanford.edu).

3) 2010 Joint Assembly Meeting of the Americas, 08-13 August, Foz do Iguassu, Brazil (from Juan Lorenzo, JA 2010 NS Program Representative)

The Near Surface Focus Group (NSFG) is a new and dynamic division of AGU that investigates the complex nature of near-surface geosystems. The Spring Joint Assembly (JA) has always been an exciting meeting for the NSFG. In 2010 the JA will be the Meeting of the Americas to be held in Foz do Iguassu, 08-13 August 2010, Brazil. Join us in this wonderful opportunity to tap the great diversity of experience of the American continents and develop

professional collaborations with neighbors. It is also an excellent opportunity to travel to a beautiful, friendly part of the world and visit the Iguazu National Park and the Iguazu Falls.

In late fall we will begin to accept proposals for sessions, but start thinking about it now. Contact a colleague to organize a session with a north-south counterpoint. Students are encouraged to collaborate and develop a session. Information about the meeting can be found at <http://www.agu.org/meetings/ja10>. If you have any questions or suggestions, please contact Juan Lorenzo (gllore@lsu.edu).

4) Society of Exploration Geophysicists News (from Rob Jacob and Jan van der Kruk)

4.1 Nominations accepted before September 1st -- more information and previous awardees at <http://nsgs.seg.org/section-awards.htm>:

a) Frank Frischknecht Leadership Award -- joint award with EEGS. Awarded to an individual who shows extraordinary leadership in advancing the cause of near-surface geophysics through long-term, tireless, and enthusiastic support of the NS community.

b) Harold Mooney Award -- The honoree is chosen in recognition of scientific and technical excellence and innovation leading to the advancement of near-surface geophysics AND/OR long-term, tireless, and enthusiastic support of the near-surface geophysics community through education, outreach efforts, professional service, or development of opportunities with other professional disciplines that employ geophysics.

Please email nominations to Larry Bentley (lbentley@ucalgary.ca).

4.2 SEG 2009 Meeting Update: Houston, Texas, 25-30 October:

Registration (www.seg.org) is now open for the SEG Annual Meeting and Technical Program and contains five NSG sessions starting on Monday afternoon with the "Inversion and Engineering Applications" session. On Tuesday we have the "Inversion and Engineering Applications" and the "Environmental and Engineering Applications" sessions. On Tuesday evening the Near-surface Geophysics Section Meeting (6:30) and Reception (7:30) is held at the Zula restaurant, second floor, 705 Main St. #B. There is no charge to NSG section members, nonmembers can join on the spot and students are welcome (Student Membership is Free). On Wednesday we start with the "Seismics" Session followed by the "Hydrogeophysics and Environmental Applications" Session in the afternoon. On Friday, Rick Miller, John Bradford, Klaus Hollinger, Greg Baker, and Alan Levander are organizing a Post-Convention workshop on "Near Surface Seismology and GPR". This workshop is supported by the Near Surface Geophysics Section in cooperation with EEGS, EAGE Near Surface, and AGU Near Surface Focus Group. We are looking forward seeing you in Houston.

4.3 NSGS Business Meetings at SEG 2009:

This year's NSGS business meeting is divided in half. The first part will be Tuesday evening (starting at 6:30 at the Zula restaurant, second floor, 705 Main St. #B) and will include a summary of this past year, member discussion with the NSGS executive committee, presentation of Frischknecht and Mooney awards. The second half of the business meeting will be Wednesday afternoon (after Hydrogeophysics and Environmental Applications session) and will be the formal transition between the 2008/2009 executive committee and 2009/2010 executive committee, followed by a look forward to the upcoming year for NSGS.

4.4 Nominations for President-Elect are currently being accepted and should be sent to Rob Jacob (rob.jacob@bucknell.edu).

5) Environmental and Engineering Geophysical Society, July Issue of FastTIMES now available

EEGS is pleased to announce publication of the July issue of FastTIMES, magazine for the near-surface geophysical sciences. This issue features two technical articles on mapping and detection of abandoned mines using various geophysical techniques. It is available for download as a low- and high-resolution pdf document (viewable with the free Acrobat Reader) from the EEGS website at www.eegs.org/fasttimes/latest.html. It is best to download the document and view it outside of a web browser with Acrobat.

EEGS is interested in FastTIMES comments and suggestions. Further, we are always interested in content for the next issue! Please send your submissions to a member of the editorial team - Moe Momayez (moe.momayez@arizona.edu), Jeff Paine (jeff.paine@beg.utexas.edu), or Roger Young (ryoung@ou.edu). Please direct advertising inquiries to Jackie Jacoby (staff@eegs.org).

6) Hydrogeophysics Special Session: CMWR in Barcelona Spain, 21-24 June 2010

Computational Methods in Water Resources XVII International Conference
Hydrogeophysics Special Session: Toward Improved Subsurface Flow and Transport Prediction and Systems Understanding

Conveners: Susan Hubbard (Lawrence Berkeley National Laboratory, [California:sshubbard@lbl.gov](mailto:sshubbard@lbl.gov)) and Sébastien Lambot (Université Catholique de Louvain, Belgium and Forschungszentrum Jülich, Germany; sebastien.lambot@uclouvain.be)

Developing predictive models for water and contaminant fate and transport is complicated by natural heterogeneity and the disparity of scales across which controlling hydrological, geochemical, and microbiological processes dominate. Because geophysical attributes are sensitive to some of the key hydrological and biogeochemical properties that govern flow and transport, they can provide important information for improving the predictive understanding of complex dynamic subsurface systems. In this special session, we solicit contributions that describe novel approaches for using geophysical data to improve quantitative characterization and monitoring of subsurface properties and processes, including studies focused on integration or joint inversion of diverse data sets, model appraisal, approaches to deal with space- and method-varying scale and resolution, uncertainty estimation, and petrophysical studies that link geophysical and hydrobiogeochemical properties. We also encourage contributions that illustrate through applications how geophysically-obtained information has been used to improve flow and transport predictions and ultimately subsurface water resources or contaminant management.

Important Dates: Sept 30, 2009 Abstracts Due; Jan 31, 2010 Papers due
For More Information visit <http://congress.cimne.com/CMWR2010/frontal/default.asp>

7) GPR 2010, XIII International Conference on Ground Penetrating Radar, Lecce, Italy, 21-25 June 2010

Contributions are solicited on (but not limited to): Agriculture, Archaeology, Sedimentology, Hydrology, Concrete/Pavements, Geology/Geotechnical Engineering, Diagnostic of historical buildings, Glaciology, Mining and Tunnelling, Utilities detection and mapping, Planetary Exploration, Demining and UXO and GPR wave interaction with the earth, Inverse Problems/Tomography, Numerical Modelling, Data Processing and Interpretation, Novel GPR Systems and Antennas, Airborne, Borehole and Novel Applications.

For more information visit www.ibam.cnr.it/gpr2010

To contribute material to the NS-letter send an e-mail to:
George Tsoflias tsoflias@ku.edu

DEADLINE: Material must be received 2 full business days prior to the first of each month.

GUIDELINES FOR SUBMISSIONS: All members are welcome to submit content of interest to the NS community. Please keep messages brief and provide contact information and (if available) a web address for additional information. AGU requests formatting of e-mail messages to be as simple as possible (no bold characters (use ALL CAPS instead), no color font, or other special formatting of text and paragraphs). E-mail attachments cannot be distributed.