Professional Development Grant
Final Report

"*Attend and Present at the Annual Meeting of the Geological Society of America*"

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Professional Enhancement Opportunity

I had the opportunity to present research that I did in collaboration with Dr. Jason Patton at the annual meeting of the Geological Society of America that was held in Indianapolis, Indiana from November 4 – 7, 2018. My presentation (and research) was titled "*A Preliminary Investigation of Optimum Magnetometer Transect Spacing to Locate Legacy Oil and Gas Wells*" and examined how abandoned oil and gas wells can be found when there is no surface expression in the general vicinity of a well's recorded location. Finding abandoned wells is of importance due to the potential of environmental contamination into the groundwater or atmosphere of fluids and volatiles from deeper in the earth as these wells age and deteriorate. It was my hope that presenting this material would provide useful feedback from others working in the field, as well as open potential collaborations with other researchers around the country. My total budget for this proposal was $1,906.

Review of Opportunity

Our research on using a magnetometer to locate abandoned oil and gas wells had previously been presented with two undergraduate students at two regional meetings held in Little Rock and Jonesboro. A written version of this research will be published in the next issue of the journal of the Arkansas Academy of Science. These presentations and publication were only given to a regional audience, and opportunity to present to a national audience was the most logical next step for our work. The Geological Society of America is one of the premier professional societies for geoscience researchers, academics, and professionals. Presenting our work at a conference of the caliber of the

Geological Society of America should allow for collaboration, insights, and expertise that we have not been able to reach previously. Further, it should allow us to get feedback and motivation prior to our efforts to publish our results in a national publication.

Summary of Experiences

I presented my talk on the first day of the conference on Sunday, November 4 in the session titled "*Advances in Data Discovery and Analysis for Hydrogeology*." It was the thirteenth talk in the session, and was attended by approximately 40 people. I felt that the talk went well, and the discussion and question period after my presentation was very helpful. There were many questions from members of the audience and the session leaders, primarily on details that would help someone start a similar project, or on future applications and improvements for the methodology. It was very beneficial. After the session I was able to speak with a few other researchers about their attempts to mitigate the effects of abandoned wells, and hopefully this will lead to future collaborations dealing with future applications of our research. Further, I spoke with several vendors who provided me with other ideas on how to locate these wells with other geophysical methods.

The remainder of the meeting included many other talks and poster presentations that provided me with a greater enthusiasm for continued research and teaching, as well as ideas for future pathways in both my research and education. There were several sessions each day on educational methodologies and practices that will help me in my

courses that I teach, particularly to reaching first generation students like we have at Arkansas Tech.

Conclusions

The opportunity to present my research and attend the annual meeting of the Geological Society of America was very beneficial to me. I was able to give my presentation, network with other scientists, gain new knowledge through attendance at other sessions and presentations, and reinvigorate and motivate myself to improve my research and teaching. I greatly appreciate the Professional Development committee for funding my proposal and allowing me this opportunity. I have included a copy of the program schedule and my badge, an attendance certificate, and my abstract from the online program, as evidence of my attendance.

59-4 2:20 PM Guzman, Pablo*: **TEMPORAL AND SPATIAL ANALYSIS OF RECHARGE IN THE INTER-ANDEAN CATCHMENT OF TARQUI (ECUADOR)**

59-5 2:35 PM Frisbee, Marty D.*; Caffee, Marc W.: **IS BASEFLOW IN THE HEADWATERS OF THE WABASH RIVER, IN/OH SUPPORTED BY PLEISTOCENE RECHARGE?**

59-6 2:50 PM Cascarano, Ryan N.; Reeves, Donald M.*; Henry, Mark A.: **A MICRO-PULSE DYE TRACER APPROACH FOR QUANTIFYING FLUID AND SOLUTE FLUX ACROSS THE GROUND WATER – SURFACE WATER INTERFACE**

59-7 3:05 PM Rosenberry, Donald O.*: **BIOLOGICAL INFLUENCES ON FLOW BETWEEN GROUNDWATER AND SURFACE WATER**

3:20 PM **BREAK**

59-8 3:35 PM Herzog, Skuyler*; Ward, Adam S.: **MULTI-SCALE HYPORHEIC INTERACTIONS IN POOL-STEP-RIFFLE SEQUENCES: IMPLICATIONS FOR FIELD STUDIES AND STREAM RESTORATION (Invited Presentation)**

59-9 3:55 PM Briggs, Martin A.*; Johnson, Zachary C.; Snyder, Craig D.; Hitt, Nathaniel P.; Kurylyk, Barret L.; Lautz, Laura K.; Irvine, Dylan; Hurley, Steve; Lane, John W.: **USING MULTI-YEAR AIR AND STREAM TEMPERATURE SIGNALS TO INFER GROUNDWATER DISCHARGE DYNAMICS AT WATERSHED SCALES**

59-10 4:10 PM Zimmer, Margaret*; McGlynn, Brian L.: **THREE-DIMENSIONAL SURFACE WATER-GROUNDWATER CONNECTIVITY DRIVES EVENT AND SEASONAL RUNOFF AND CARBON EXPORT ACROSS WATERSHED SCALES (Invited Presentation)**

59-11 4:30 PM Cook, Sarah B.*; Thomas, Brian F.; Hopkins, Kristina G.; Bain, Daniel J.: **DUSTING OFF THE ARCHIVES: WHAT ARCHIVES CAN TELL US ABOUT CHANGES IN WATER STORAGE AND STREAMFLOW DUE TO URBAN DEVELOPMENT**

59-12 4:45 PM Herzog, Skuyler*; Peter, Kathy; Tian, Zhenyu; Wu, Christopher; McCray, John E.; Lynch, Katherine; Kolodziej, Ed: **QUANTIFYING ATTENUATION OF HUNDREDS OF ORGANIC STORMWATER CONTAMINANTS BY A RESTORED URBAN HYPORHEIC ZONE**

5:00 PM **CONCLUDING REMARKS**

SESSION NO. 60

T101. Advances in Data Discovery and Analysis for Hydrogeology (GSA Hydrogeology Division; GSA Geoinformatics Division; GSA Karst Division)

1:30 PM, Indiana Convention Center, Room 133

Junfeng Zhu, Ming Ye, Velimir Vesselinov and David Lampe, Presiding

60-1 1:30 PM Lin, Yu-Feng F.*; Stumpf, Andrew J.; Kumar, Praveen; Sargent, Steve: **MEASURING EARTH'S VITAL SIGN—TEMPERATURE—IN FOUR DIMENSIONS (Invited Presentation)**

60-2 1:50 PM Bayless, E. Randall*; Lampe, David; Olyphant, Greg A.; Izbicki, John; Delin, Geoffrey N.; Groover, Krishangi Devi; Waddle, Robert C.: **EFFECTS OF HYDROGEOLOGICAL SETTING AND ESTIMATION METHODS ON GROUNDWATER FLOW VECTORS**

60-3 2:05 PM Haacker, E.M.K.*: **STATISTICAL ANALYSIS OF DRIVERS OF CHANGE IN GROUNDWATER ELEVATION TRAJECTORY IN THE HIGH PLAINS AQUIFER**

60-4 2:20 PM Rogers, Martina*; Sukop, Michael C.; Simmons, Susan: **ANALYSIS OF WELL WATER LEVEL TIME SERIES DATA FOR AQUIFER PARAMETER ESTIMATION**

60-5 2:35 PM Erickson, Melinda L.*; Brown, Craig J.; Stackelberg, Paul E.; Nolan, Bernard T.: **PREDICTING GROUNDWATER QUALITY IN DRINKING WATER WELLS IN THE GLACIAL AQUIFER SYSTEM, NORTHERN USA**

60-6 2:50 PM Adams, Ryan F.*; Kress, Wade H.; Miller, Benjamin V.: **WATERBORNE-GEOPHYSICAL SURVEYS TO IDENTIFY LITHOLOGIC CONTROLS ON GROUNDWATER-SURFACE WATER INTERACTION IN AN ALLUVIAL AQUIFER SYSTEM**

60-7 3:10 PM Schoefernacker, Scott R.*; Larsen, Daniel: **RESPONSE OF ELECTRICAL RESISTIVITY AND INDUCED POLARIZATION AT AN UNLINED LANDFILL IN GULF COASTAL PLAIN SEDIMENTS, MEMPHIS, TENNESSEE**

3:25 PM **BREAK**

60-8 3:40 PM Yeh, Tian-Chyi Jim*: **PRINCIPLE OF PARSIMONY, FAKE SCIENCE, AND SCALES (Invited Presentation)**

60-9 4:00 PM Dai, Zhenxue; Xu, Lulu*; Soltanian, Mohamad Reza; Xu, Bin: **A PERMEABILITY-POROSITY RELATIONSHIP AND A NEURAL NETWORK MODEL TO PREDICT PETROPHYSICAL PROPERTIES IN LIMESTONE**

60-10 4:15 PM Zhu, Junfeng*; Nolte, Adam M.: **MACHINE LEARNING IN IDENTIFYING KARST SINKHOLES IN THE INNER BLUEGRASS REGION OF KENTUCKY**

60-11 4:30 PM Smith, Jacqueline A.*; Caruso, Emily; Wright, Nicholas: **MICROPLASTIC POLLUTION IN TRIBUTARIES OF THE MOHAWK RIVER, NEW YORK STATE**

60-12 4:45 PM Maldonado-Sánchez, Guadalupe*; Al, Tom: **NON-CONSERVATIVE BEHAVIOUR OF IODIDE TRACER IN ARGILLACEOUS LIMESTONE INDICATED BY X-RAY RADIOGRAPHY**

60-13 5:00 PM Davis, Michael G.*; Patton, Jason A.: **A PRELIMINARY INVESTIGATION OF OPTIMUM MAGNETOMETER TRANSECT SPACING TO LOCATE LEGACY OIL AND GAS WELLS**

60-14 5:15 PM Horodecky, Dan*: **MEASURING CONTACT ANGLE DYNAMICS ON ROCK FRACTURE FACES**

SESSION NO. 61

T110. Lakes through Space and Time II (GSA Limnogeology Division; GSA Sedimentary Geology Division; GSA Quaternary Geology and Geomorphology Division; AASP - The Palynological Society; American Quaternary Association; Association for the Sciences of Limnology and Oceanography; International Association of Limnogeology; SEPM (Society for Sedimentary Geology); GSA Continental Scientific Drilling Division)

1:30 PM, Indiana Convention Center, Room 134

Scott W. Starratt and Michelle F. Goman, Presiding

1:30 PM **INTRODUCTORY REMARKS**

61-1 1:35 PM Finkelstein, David B.*; VanHoesen, Stephen: **CHEMICAL EVOLUTION OF LAKES IN TERRAINS DOMINATED BY UNCONSOLIDATED SEDIMENTS: GEOCHEMICAL**

CERTIFICATE OF COMPLETION

is hereby awarded to

Michael Davis

In Recognition for attending the

GEOLOGICAL SOCIETY OF AMERICA
ANNUAL MEETING

Held on 4 - 7 November 2018 by the Geological Society of America

Indianapolis, Indiana, USA

Vicki S. McConnell, GSA Executive Director

Melissa Cummiskey, GSA Director of Meetings and Events

GSA 2018 4-7 November Indianapolis, Indiana, USA
THE GEOLOGICAL SOCIETY OF AMERICA®

60-13: A PRELIMINARY INVESTIGATION OF OPTIMUM MAGNETOMETER TRANSECT SPACING TO LOCATE LEGACY OIL AND GAS WELLS

Sunday, 4 November 2018
05:00 PM - 05:15 PM
Indiana Convention Center - Room 133

Legacy oil and gas wells are a potential environmental hazard that may act as a conduit for subsurface fluids such as brines, waste fluids, carbon dioxide, or methane to reach the shallow subsurface or the surface. Many of these wells have been plugged, have surface equipment removed, and have little or no visible trace at the surface, thus making an environmental assessment of these wells difficult. In order to assess large numbers of wells, identifying the typical anomaly size is critical to maximize the transect spacing and therefore minimize magnetometer field work time. Using an Overhauser magnetometer along a set of predefined transects with an initial spacing of 2 m, magnetic anomalies from the metal casing of five abandoned wells were detected. We identified significant variation in the size of the anomalies both horizontally and vertically. The vertical anomaly associated with four of the wells ranged from approximately 1000-4000 nanoteslas (nT), with one well anomaly more than 10,000 nT above background. Horizontal anomalies for the five wells that exceeded 50 nT above the background were all larger than 20 m across. Based on these results, a spacing of 20 m would be sufficient to identify the target location of the anomaly and allow further study.

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View Related Events

Day: Sunday, 4 November 2018

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