

Robert Heinse, Graduate Research Assistant

CONTACT INFORMATION Ag. Sci. Bldg. Room 162 *Voice:* (435) 797-0406
Department of Plants, Soils and Climate *Fax:* (435) 797-2117
Utah State University *E-mail:* heinse@cc.usu.edu
Logan, UT 84322-4820 USA www: <http://soilphysics.usu.edu/>

EDUCATION **Utah State University**, Logan, Utah, USA
Department of Plants, Soils and Climate
Ph.D. Student, Soil Physics
• Research Topic: “Characterization, Modeling and Design of Optimal Plant Growth Media for Reduced Gravity”
• Advisor: S. B. Jones

Universität Leipzig, Leipzig, Germany
Department of Physics and Geosciences
Diplom (M.Sc.), Geophysics, March 2003
• Minors: Geology and Meteorology
• Thesis Topic: “Geophysical investigation of structure and hydraulic properties of alluvial clays on example of the Elbe flood plains near Torgau, Germany”
• Advisor: P. Schikowsky
• Major Professor: F. Jacobs

PROFESSIONAL EXPERIENCE **Utah State University**, Logan, Utah, USA
Graduate Research Assistant **January, 2004–present**
Includes current Ph.D. research

Universität Leipzig, Leipzig, Germany
Research Fellow **April–December, 2003**
Geophysical estimation of water retention potentials of agricultural lands

Universität Leipzig, Leipzig, Germany
Student Assistant **1999–2002**
Assisted with research and teaching

ISUP GmbH, Dresden, Germany
Student Assistant **1996–2001**
Processing of preconsulting data

Siemens Microelectronics, Dresden, Germany
Student Trainee **July–August, 1997**
Particle- and climate measurements in cleanrooms

RESEARCH INTERESTS Interaction of pore scale phenomena and field/sample scale application aiming at the betterment of extracting soil physical parameters by prospering the understanding of physical processes associated with fluid and gas transport in the pore scale, and implementation for a variety of scales, ranging from field hydrology to containerized plant growth media in space.

FIELD-SCALE
Transformation of geophysical data into petrophysical parameters. Joint measurement and integrated interpretation of near-surface geophysical data. Non-destructive estimation of water content,


hydraulic conductivity and retarding properties of groundwater covering layers. Monitoring of dynamic water table changes and the influence of flooding pre-flooders. Geophysical determination of water retention characteristics of tilled lands as part of a flood case risk assessment in possible flood catchment areas.


SAMPLE-SCALE

Study of water retention and gas diffusion in porous media under reduced gravity conditions. Alterations in fluid distribution and flow as well as impact on oxygen transport in defined media intended to be used for advanced life support in space. Enhance the fundamental understanding of pore scale forces that play a key role in engineering porous media and would otherwise be masked by gravity.

REFEREED PUBLICATIONS

Heinse, R., S.B. Jones, S.L. Steinberg, M. Tuller and D. Or: Measurements and Modeling of Variable Gravity Effects on Water Distribution and Flow in Unsaturated Porous Media. *Accepted for publication in Vadose Zone Journal*

Heinse, R., G. Kluitenberg, K.S. Lewis, R.S. Austin, P.J. Shouse, G.B. Bingham, and S.B. Jones (2006): Integration of Heat Capacity and Electrical Conductivity Sensors for Root Module Water and Nutrient Assessment. SAE Technical Paper 2006-01-2211. The 36th International Conference on Environmental Systems (ICES), Norfolk, VI, July 17–20, 2006.  [PDF](#) [BibTeX](#)

Heinse, R., S.D. Humphries, R.W. Mace, S.B. Jones, S.L. Steinberg, M. Tuller, R. Newman and D. Or. (2005): Measurement of Porous Media Water Retention during Parabolic Flight Induced Microgravity. SAE Technical Paper 2005-01-2950. The 35th International Conference on Environmental Systems (ICES) and the 8th European Symposium on Space Environmental Control Systems (ESSECS), Villa Pamphili Hotel, Rome, Italy, July 11–14, 2005.  [PDF](#) [BibTeX](#)

Jones, S.B., R. Heinse, G.B. Bingham and D. Or (2005): Modeling and Design of Optimal Growth Media from Plant-Based Gas and Liquid Fluxes, SAE Technical Paper 2005-01-2949, The 35th International Conference on Environmental Systems (ICES) and the 8th European Symposium on Space Environmental Control Systems (ESSECS), Rome, Italy, July 11–14, 2005. [BibTeX](#)

CONFERENCE PROCEEDINGS

Heinse, R. and P. Schikowsky (2003): Geophysical assessment of groundwater protective layers. 9th EEGS-ES Meeting, Prague 2003, Czech Republic

ABSTRACTS

Heinse, R., S.B. Jones, D. Or, T.S. Topham, I.G. Podolskiy and G.E. Bingham (2007). An Automated Oxygen Diffusion and Water Retention Measurement System for Microgravity. Agronomy Abstracts, ASA, Madison, WI.

Heinse, R., S.B. Jones, G.E. Bingham and B. Bugbee (2007). Optimizing Straticulate Plant-Growth Media for Improved Root Zone Performance and Management. Agronomy Abstracts, ASA, Madison, WI.

Jones, S.B., R. Heinse, D. Or and G.E. Bingham (2007). Oxygen diffusion measurements in partially saturated porous media in microgravity. Agronomy Abstracts, ASA, Madison, WI.

Heinse, R., S.B. Jones, B. Bugbee and G.E. Bingham (2007). Improving Root Zone Performance: Physical and Numerical Modeling of a Layered Plant-Growth Medium. USU Water Initiative, Spring Runoff Conference, Logan 2007

Heinse, R., S.B. Jones, B. Bugbee and G.E. Bingham (2006). Graduated Plant-Growth Media for Optimizing Gaseous, Liquid and Nutrient Requirements: Modeling, Design and Monitoring. AGU Fall Meeting Abstracts, San Francisco, CA, December 11-15

Heinse, R. and S.B. Jones (2006). Porous-Media Water Retention and Distribution observed in Variable Gravity during Parabolic Flight. Agronomy Abstracts, ASA, Madison, WI.

Schikowsky, P., R. Heinse and D. Laass (2006): Complex Geophysical Measurements for Predicting Hydrogeological Properties of Alluvial Clays. SEG Hydrogeophysics Workshop, Vancouver, British Columbia, 31 July–2 August 2006

Heinse, R., K.S. Lewis and S.B. Jones (2006). A Small-Scale Multifunctional Heat-Pulse Sensor for Soil Water Content and Electrical Conductivity. West Regional National Cooperative Soil Survey (WRCSS) and Western Society of Soil Science (WSSS) conference, Park City, Utah, June 19-23, 2006

Lewis, K.S., R. Heinse, R. Austin, P. Shouse and S.B. Jones (2006). Measuring Electrical Conductivity Using A Low-Power Datalogging System. West Regional National Cooperative Soil Survey (WRCSS) and Western Society of Soil Science (WSSS) conference, Park City, Utah, June 19-23, 2006

Heinse, R., K. Lewis and S.B. Jones (2006): Water Content and Electrical Conductivity Assessment using Small-Scale Multifunctional Heat-Pulse Sensors. USU Water Initiative, Spring Runoff Conference, Logan 2006

Heinse, R., Lewis, K., Kluitenberg, G. E., Bingham, G. and S. B. Jones (2006): Coupled heat capacity and electrical conductivity measurements for root zone water and nutrient assessment. Habitation 2006, Conference on Habitation Research and Technology Development. Rosen Plaza Hotel, Orlando, FL, February 5–8, 2006

Jones, S. B. , Heinse, R., Or, D., Poritz, D. and G. E. Bingham (2006): Characterization and analysis of water retention and oxygen diffusion in plant growth media on earth: Criteria for comparison in microgravity. Habitation 2006, Conference on Habitation Research and Technology Development. Rosen Plaza Hotel, Orlando, FL, February 5–8, 2006

Heinse, R., Jones S. B. and D. Or. (2005): Inverse Modeling of Porous Media Unsaturated Hydraulic Properties in Microgravity. Agronomy Abstracts, ASA, Madison, WI.

Blonquist, J. M., Heinse, R., Ditthakit, P., Mace, B., Lewis K. and S. B. Jones (2005): An Instrumented Soil Column For Teaching Unsaturated Flow And Transport Processes. Agronomy Abstracts, ASA, Madison, WI.

Jones, S. B., Heinse R., Bingham G. B. and D. Or (2005): Particulate Plant Growth Media for Reduced Gravity: Experiences and Challenges. Workshop on Granular Materials in Lunar and Martian Exploration, Feb. 2–3, 2005. John F. Kennedy Space Center, Orlando, FL.

Heinse, R., Jones S. B., Humphries S. D., Mace R. W., Steinberg S. L., Tuller M., Newman R. and D. Or (2004): Porous Media Water Retention and Saturated Hydraulic Conductivity During Parabolic Flight Induced Microgravity. Agronomy Abstracts, ASA, Madison, WI.

Or, D., Jones S. B., Tuller M. , Steinberg S. L., Alexander I., Diadziec N., Reddi L. N., Kluitenberg G., Ogden F. L. and R. Heinse (2004): Unsaturated Flow in Zero Gravity—Lessons and Challenges. Agronomy Abstracts, ASA, Madison, WI.

Laass, D., Schwabe, J., Schikowsky, P. and Heinse, R. (2004): Einsatz der Geophysik bei hydrogeologischen Aufgabenstellungen. GeoLeipzig 2004—Geowissenschaften sichern Zukunft, Leipzig 2004, Germany

Heinse, R., Laass, D. and Schikowsky, P. (2004): Common and Multi-Offset Ground Penetrating Radar in Assessing Soil Water Content Dynamics in the Vadose Zone. 85th Annual Meeting Pacific Division American Assoc. for the Advancement of Science, Logan 2004

Heinse, R. and Schikowsky, P. (2004): Geophysical Assessment of Groundwater Protective Layers. USU Water Initiative, Spring Runoff Conference, Logan 2004

Schwabe, J., Grützner, C., Heinse, R. and Schikowsky, P. (2004): Georadarmessungen für hydrogeologische Aufgabenstellungen. Rundtischgespräch GEORADAR, Nossen 2003, Germany

Heinse, R. and Schikowsky, P. (2004): Hochfrequente elektromagnetische und gleichstromgeoelektrische Untersuchungen zur Bewertung von Auelehmdeckschichten. Rundtischgespräch GEORADAR, Nossen 2003, Germany

Heinse, R., Schikowsky, P. and Storz, W. (2003): Geophysikalische Untersuchungen zur Deckschichtbewertung—Ein Beitrag zum Grundwasserschutz. 63. Jahrestagung der Deutschen Geophysikalischen Gesellschaft, Jena 2003, Germany

Heinse, R., Grützner, C., Schwabe, J. and Schikowsky, P. (2003): Georadarmessungen zur Bewertung von Auelehmdeckschichten - Ein Beitrag zum Grundwasserschutz. 63. Jahrestagung der Deutschen Geophysikalischen Gesellschaft, Jena 2003, Germany

Heinse, R., Schikowsky, P. and Storz, W. (2003): Geophysikalische Untersuchungen zu Struktur und hydraulischen Eigenschaften von Auelehm am Beispiel der Elbaue bei Torgau. X. Arbeitsseminar Hochauflösende Geoelektrik, Kloster Nimbschen bei Leipzig 2002, Germany

Heinse, R. Just, A. and Kürschner, D. (2002): Modelluntersuchungen zur elektrischen Vertikaltomographie in Gewässern. 62. Jahrestagung der Deutschen Geophysikalischen Gesellschaft, Hannover 2002, Germany

Just, A., Helbig, K., Heinse, R., Flechsig, Ch., Jacobs, F. and Endler, R. (2001): Messungen mit einer neuen Elektrischen In Situ Apparatur (ELISA) in der Ostsee. 61. Jahrestagung der Deutschen Geophysikalischen Gesellschaft, Frankfurt 2001, Germany

Just, A., Helbig, K., Heinse, R., Flechsig, Ch., Jacobs, F. and Endler, R. (2000): Messungen mit der Elektrischen In Situ Apparatur (ELISA) in der Ostsee. IX. Arbeitsseminar Hochauflösende Geoelektrik, Bucha/Sachsen 2000, Germany

TEACHING
EXPERIENCE

Teaching Assistant, Utah State University

- *Unsaturated Flow and Transport SOIL 6140* (Spring 2007-present)
 - *Environmental Soil Physics SOIL 6650* (Fall 2005-present)
- Assisted students with homework assignments and laboratory data processing, graded homework assignments, and filled in as lecturer for the course.

Teaching Assistant, Universität Leipzig

- Applied Geophysics/Engineering Geophysics I and II* (Spring 2001–2003)
- Assisted students with homework assignments and laboratory data processing, graded homework assignments, demonstrated experiments for laboratory section, and filled in as lecturer for the course.

Guest Lecturer, Utah State University

Single lectures on:

- *Water content measurements for Landscape Irrigation Mgmt. PLSC 5100* (Spring 2006)
- *Time Domain Reflectometry (TDR) for Surface Hydrology SOIL 6600* (Spring 2004)

HONORS & AWARDS	Invited Student Presenter. Don and Betty Kirkham Conference, October 28–29, Logan, Utah, 2004	
	Received Graduate Student Fellowship. Provided by the Dept. of Plants, Soils and Biometeorology, Utah State University, 2005/2006	
	Received GSS Travel Award. Provided by the Graduate Student Senate, Utah State University, 2005 and 2006.	
AFFILIATIONS	AGU American Geophysical Union	
	ASA/CSSA/SSSA Soil Science Society of America	
	SEG Society of Exploration Geophysicists	
SERVICE	Peer reviewer for <i>Near Surface Geophysics</i> , <i>Geophysics</i> and <i>Vadose Zone Journal</i>	
	Member of the <i>Utah State Water Speaker Series Committee</i>	2007–2008
	Board member and trustee of the πr^2 graduate student fraternity	2004–2005
SPECIAL EXPERIENCES	NASA Parabolic Flight Opportunities	
	Reduced Gravity Office, Houston, Texas	May, 2006
	<i>Microgravity porous-media experiments</i>	
	Underground Mine Experiments	
	Asse potassium salt mine, Lower Saxony, Germany	June, 2003
	<i>Geophysical measurements in a salt repository</i>	
Marine Research Vessel Cruises		
Institut für Ostseeforschung Warnemünde, Germany	April, 2000	
<i>ELISA Electrical In-Situ Apparatus experiments</i>	Feb. 2001	