




Robert Heinse, Graduate Research Assistant

CONTACT INFORMATION	Ag. Sci. Bldg. Room 162 Department of Plants, Soils and Climate Utah State University Logan, UT 84322-4820	<i>Voice:</i> (435) 797-0406 <i>Fax:</i> (435) 797-2117 <i>E-mail:</i> heinse@cc.usu.edu http://www.usu.edu/soilphysics/
EDUCATION	Utah State University , Logan, Utah, USA <i>Department of Plants, Soils and Climate</i> Ph.D. Student, Soil and Environmental Physics <ul style="list-style-type: none">• Research Topic: “Characterization, Modeling and Design of Optimal Plant Growth Media for Reduced Gravity”• Advisor: Scott B. Jones Universität Leipzig , Leipzig, Germany <i>Department of Physics and Geosciences</i> Diplom (M.Sc.), Geophysics, March 2003 <ul style="list-style-type: none">• 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: Peter Schikowsky• Major Professor: Franz Jacobs	
PROFESSIONAL EXPERIENCE	Utah State University , Logan, Utah, USA <i>Graduate Research Assistant</i> Includes current Ph.D. research	2004–present
	Universität Leipzig , Leipzig, Germany <i>Research Fellow</i> Geophysical estimation of retardation potentials of agricultural lands using integrated measurements	April–December, 2003
	Universität Leipzig , Leipzig, Germany <i>Research Assistant</i> Assisted with research and teaching	1999–2002
RESEARCH INTERESTS	<p>My research area is environmental physics. In particular, I am interested in the integrative and complex array of processes governing the physical and hydrologic state of Earth systems at multiple spatial and temporal scales. In conducting my research, I aim to put feet in many waters, to bridge both disciplines and scales, to integratively study the environment in a holistic sense. My research focuses for example on the interface between sample and field scale through fostering the understanding of physical processes associated with fluid and gas transport at the pore/sample scale, and implementation for a variety of scales, ranging from field hydrology to plant-growth in space.</p> <ul style="list-style-type: none">• Joint measurement and integrated interpretation of near-surface geophysical data to estimate water content, hydraulic conductivity and retarding properties of groundwater covering layers as part of a flood case risk assessment in flood catchment areas• Geophysical characterization of transport and fate of snow melt to evaluate interactions between soil, vegetation and microclimate• Reduced gravity impact on fluid configuration and flow as well as impact on oxygen transport in porous media intended to be used for plant growth in space	

REFEREED
PUBLICATIONS

Heinse, R., S.B. Jones, S.L. Steinberg, M. Tuller and D. Or (2007). Measurements and Modeling of Variable Gravity Effects on Water Distribution and Flow in Unsaturated Porous Media. *Vadose Zone J* 6:713-724.  [PDF](#)

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.  [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.  [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, [BibTeX](#)

MANUSCRIPTS IN
PREPARATION

Robinson, D.A., R. Heinse, J.M. Blonquist, I. Lebron and S.B. Jones: Is a Tropical Soil a Good Physical Analogue for Martian Regolith? Considerations on the Dielectric–Water Content Response. *In preparation*

Heinse, R., S.B. Jones, D. Or, T.S. Topham, I.G. Podolskiy, D.H. Poritz and G.E. Bingham: Microgravity Configuration of Fluids in Unsaturated Porous Media: Measurements of Water Retention and Oxygen Diffusion on the ISS. *In preparation*


Heinse, R., S.B. Jones, G.E. Bingham and B. Bugbee: Optimizing Straticulate Plant-Growth Media for Improved Root Zone Performance and Management. *In preparation*

Heinse, R. and S.B. Jones: Towards Using Time-Lapse Electrical Resistivity Imaging for Improved Subsurface Snowmelt Characterization. *In preparation*

CONFERENCE
PROCEEDINGS

Heinse, R. and P. Schikowsky (2003). Geophysical Assessment of Groundwater Protective Layers. 9th EEGS-ES Meeting, Prague 2003, Czech Republic.

LETTERS AND
NEWS ARTICLES

Heinse, R., S.B. Jones, S.L. Steinberg, M. Tuller, and D. Or. (2007). Uncovering the Challenges of Watering Plants in Space. *Crops, Soils, Agronomy CSA News* V52 N12, pp. 2–3, Madison, WI, December 2007.  [PDF](#)

Jacobs, F. (2002). Hochwasserschutz durch Geoelektrische Deichdiagnose. *Wirtschaft und Wissenschaft Transferbrief Leipzig*, Agentur für Innovationsförderung und Technologietransfer GmbH, Leipzig, Germany, March 2002.  [PDF](#)

ABSTRACTS

Heinse, R., S.B. Jones, D. Or, T.S. Topham, I.G. Podolskiy and G.E. Bingham (2007). Oxygen Diffusion Measurements in Unsaturated Porous Media on the International Space Station. AGU Fall Meeting Abstracts, San Francisco, CA, December 10-14, 2007.

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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.

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S.B. Jones, R. Heinse, D. Or, T.S. Topham, D.H. Poritz, I.G. Podolskiy and G.E. Bingham (2007). Oxygen diffusion measurements in partially saturated porous media onboard the International Space Station. 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, UT 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, 2006.

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, UT 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, John F. Kennedy Space Center, Orlando, FL, Feb. 2–3, 2005.

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, Germany 2004.

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, UT 2004.

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

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

Heinse, R. and Schikowsky, P. (2004). Hochfrequente Elektromagnetische und Gleichstromgeoelektrische Untersuchungen zur Bewertung von Auelehmschichten. Rundtischgespräch GEORADAR, Nossen, Germany 2003.

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

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

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, Germany 2001.

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 Hochoflösende Geoelektrik, Bucha/Sachsen, Germany 2000.

TEACHING EXPERIENCE	<p>Teaching Assistant, Utah State University</p> <ul style="list-style-type: none"> • <i>Unsaturated Flow and Transport SOIL 6140</i> (Spring 2007-present) • <i>Environmental Soil Physics SOIL 6650</i> (Fall 2005-present) <p>Assisted students with homework assignments and laboratory data processing, graded homework assignments, and filled in as lecturer for the course.</p> <p>Teaching Assistant, Universität Leipzig</p> <p><i>Applied Geophysics/Engineering Geophysics I and II</i> (Spring 2001–2003)</p> <p>Assisted students with homework assignments, graded homework assignments, demonstrated geophysical equipment for the laboratory section, and filled in as lecturer for the course.</p> <p>Guest Lecturer, Utah State University</p> <p>Single lectures on:</p> <ul style="list-style-type: none"> • <i>Water content measurements for Landscape Irrigation Mgmt. PLSC 5100</i> (Spring 2006) • <i>Time Domain Reflectometry (TDR) for Surface Hydrology SOIL 6600</i> (Spring 2004)
HONORS & AWARDS	<p>Named USU Water Fellow. Provided by the USU Water Initiative, 2008</p> <p>Received GSS Travel Award. Provided by the Graduate Student Senate, Utah State University, 2005 and 2006.</p> <p>Received Graduate Student Fellowship. Provided by the Dept. of Plants, Soils and Biometeorology, Utah State University, 2005/2006.</p> <p>Invited Student Presenter. Don and Betty Kirkham Conference on Soil Physics, October 28–29, Logan, UT 2004.</p>
AFFILIATIONS	<p>AGU American Geophysical Union</p> <p>ASA/CSSA/SSSA Soil Science Society of America</p> <p>SEG Society of Exploration Geophysicists</p>
SERVICE	<p>Peer reviewer for <i>Near Surface Geophysics</i>, <i>Geophysics</i> and <i>Vadose Zone Journal</i></p> <p>Organizer of the <i>Utah State Water Speaker Series</i> 2007–2008</p>
SPECIAL EXPERIENCES	<p>NASA Parabolic Flight Opportunities</p> <p>Reduced Gravity Office, Houston, Texas May, 2006</p> <p><i>Microgravity porous-media experiments</i></p> <p>Underground Mine Experiments</p> <p>Asse potassium salt mine, Lower Saxony, Germany June, 2003</p> <p><i>Geophysical measurements in a salt repository</i></p> <p>Marine Research Vessel Cruises</p> <p>Institut für Ostseeforschung Warnemünde, Germany April, 2000</p> <p><i>ELISA Electrical In-Situ Apparatus experiments</i> February, 2001</p>