

DAVID FRANCIS BOUTT

Department of Geosciences
University of Massachusetts – Amherst
248 Morrill IV-South
611 North Pleasant Street
Amherst, MA 01003-9297

Tel: (413) 545-2724
Fax: (413) 545-1200
Email: dboutt@geo.umass.edu
www.geo.umass.edu/faculty/boutt/

Research Interests:

- Coupling between fluid flow and deformation in geologic materials
- Linkages between micromechanical properties of porous media and macro-scale properties
- Interactions between physical, chemical, and human processes in near-surface hydrologic environments
- Modeling of coupled processes in geologic materials

Education:

B.S. (1997) Geosciences, Lyman Briggs School of Science, Michigan State University, East Lansing, MI, USA

M.S. (1999) Geological Sciences, Michigan State University, East Lansing, MI, USA
Thesis: *Interpreting the impacts of land use on water quality using groundwater flow and transport simulations in the Grand Traverse Bay Watershed*
Thesis advisor: Professor David Hyndman

Ph.D. (2004) Hydrology – Earth and Environmental Sciences, New Mexico Institute of Mining and Technology, Socorro, NM, USA
Dissertation: *The role of fluids in the genesis of opening mode fractures in the crust*
Dissertation advisor: Professor Brian J. O. L. McPherson

Appointments:

Assistant Professor (January 2005 – Present) Department of Geosciences, University of Massachusetts, Amherst, MA, USA

Postdoctoral Appointee (May 2004 – January 2005) Geomechanics Division, Sandia National Laboratories, Albuquerque, NM, USA
Sandia staff sponsor: Dr. Benjamin Cook

Graduate Research Intern (April 2002 – May 2004) Geomechanics Division, Sandia National Laboratories, Albuquerque, NM, USA
Sandia staff sponsor: Dr. Benjamin Cook

Research and Teaching Assistant (September 1999 – August 2003) New Mexico Institute of Mining and Technology, Socorro, NM, USA

Research Assistant September 1997 – August 1999 Michigan State University, East Lansing, MI, USA

Student Trainee – Hydrology (November 1997 – August 1999), USGS Water Resources Division, Lansing, MI, USA

Research Funding:

Upgrade of Department of Geosciences Digital Mapping and Modeling Laboratory at the University of Massachusetts Amherst

PI: Chris Condit, Rob Deconto, Michele Cooke, Jon Woodruff, **D.F. Boutt**
Funding Agency: NSF, EAR-I&F
Amount: \$74,999 to UMass
Duration: 8/1/2010 – 7/31/2011

Geothermal Technologies Program – MA and CT

PIs: S.B. Mabee, J. M. Rhodes, **D.F. Boutt**
Funding Agency: U.S. DOE, Arizona Geological Survey
Amount: \$441,062
Duration: 7/1/2010 – 6/30/2013

Characterizing and quantifying recharge at the bedrock interface

PIs: **D.F. Boutt**, S.B. Mabee
Funding agency: USGS, 104G
Amount: \$174,490 to UMass
Duration: 9/1/2009 – 8/31/2012

Collaborative Research: EcoHydrology of Deep Crystalline Rocks at DUSEL Homestake

PIs: **D.F. Boutt**
Funding agency: National Science Foundation, Division of Earth Sciences
Amount: \$111,416 to UMass
Duration: 5/1/2009 – 4/31/2012

Permeability Anisotropy and Poroelastic Property Evolution of Mudstones recovered from Exp. 319

PI: **D.F. Boutt**
Funding Agency: Consortium For Ocean Leadership
Amount: \$14,910
Duration: 4/1/2010-12/1/2011

Salary for Participation in IODP Expedition 319

PI: **D.F. Boutt**
Funding Agency: Consortium For Ocean Leadership
Amount: \$18,000
Duration: 6/4/2009-12/1/2011

Homestake-DUSEL ICDP Observatory for In-Situ Stress, Hydrology, and Life: Workshop Proposal

PIs: H. Wang, **D.F. Boutt**, G.Grasselli, T. Kieft, L. Murdoch, T. C. Onstott, K. Pedersen, W. Roggenthen, B. Sherwood Lollar, G. Slater, G. Southam, T. Tokunaga, and M. D. Zoback.
Funding Agency: ICDP
Amount: \$48,000
Duration: 7/14/2010-7/13/2011

Collaborative Research: Using Pore Fluid Pressure Gradients to Test the Relative Importance of Hydrologic Versus Mechanical Heterogeneity in Fracture Formation (EAR-0635876)

PIs: **D.F. Boutt** (UMass), Laurel Goodwin (Univ. Wisconsin)

Funding agency: National Science Foundation, Division of Earth Sciences, Tectonics Program

Amount: \$227,750 among 2 institutions; \$140,780 to UMass

Duration: 8/1/07 – 7/31/2011

Carbon Sequestration: Developing An Assessment of Potential CO₂ Storage Resources in Massachusetts

PIs: S. Petsch, S.B. Mabee, **D.F. Boutt**

Funding agency: MA Clean Energy Center

Amount: \$120,968 to UMass

Duration: 7/1/2009 – 6/30/2011

Surface Water-Ground Water Interactions on the Deerfield River

PI: **D.F. Boutt**

Funding Agency: NIWR 104B Competition Massachusetts Water Resources Center

Amount: \$4,998

Duration: 4/1/2010-4/1/2011

Geologic mapping and hydrogeologic modeling of the Nashoba Terrane, Eastern Massachusetts.

PI: Steve Mabee

Co-PI: **D.F. Boutt**, USGS WRD-Marlborough

Funding agency: State of Massachusetts, Department of Environmental Protection

Amount: \$94,315; USGS received an undisclosed amount

Duration: 4/25/07 – 6/01/10

Quantifying the Micromechanical Effects of Variable Cement in Porous Media, Department of Energy

PIs: **D. F. Boutt**, Laurel Goodwin (Univ. Wisconsin); Thomas Buchheit (Sandia National Laboratories)

Funding agency: Department of Energy, Basic Energy Sciences, Geosciences Program

Amount: \$697,733 among 3 institutions; \$185,180 to UMass

Duration: 8/15/05 – 8/14/09

Hydrogeologic assessment of the West Charlemont Aquifer, Charlemont, Massachusetts.

PI: Steve Mabee, **D.F. Boutt**

Funding agency: State of Massachusetts, Department of Environmental and Executive Affairs

Amount: \$30,903; \$13,803 matching from Office of the Massachusetts State Geologist

Duration: 4/25/07 – 6/01/09

Water quantity and quality of the bedrock and surficial aquifers of the Town of Leverett

PI: **D.F. Boutt**

Funding agency: Town of Leverett, Massachusetts

Amount: \$15,171
Duration: 9/1/07 – 8/31/2008

Influence of anthropogenically produced stream-stage fluctuations on groundwater-surfacewater interactions in the Deerfield River, Massachusetts.

PI: **D.F. Boutt**

Funding agency: University of Massachusetts – Amherst, Faculty Research Grant
Amount: \$13,337; \$6689 matching from Department of Geosciences
Duration: 5/1/07 – 4/31/2008

AGU 2002 Horton Research Grant: Discrete coupling of fluid flow and rock deformation: A new approach to a fundamental problem in hydrogeology

PI: **D.F. Boutt**

Funding agency: American Geophysical Union, Hydrology Section
Amount: \$10,000

Pending Research Funding:

FESD Preliminary Proposal, Type I: Stress, Fluid Flow, and Microbial Life in the Earths Continental Crust

PI's: Herb Wang (Wisconsin), **D.F. Boutt**, Lawrence Murdoch (Clemson), Thomas Keift (NMT), Tullis Onstott (Princeton)

Funding Agency: NSF, Frontiers in Earth System Dynamics
Amount: \$4,943,955

Note: Accepted for Full-Proposal due March 15

Hydromechanical Coupling of Fractured Rocks: Implications for flow and transport

PI: **D.F. Boutt**

Funding Agency: DOE, Early Career Science Award
Amount: \$750,0000
Duration: 6/1/2011 – 5/30/2016

Controls on the permeability distribution of fractured crystalline rocks in the shallow subsurface

PI: **D.F. Boutt**, S.B. Mabee

Funding Agency: NSF, Earth Sciences, Hydrologic Sciences
Amount: \$361,133 to UMass
Duration: 1/1/2011 – 12/31/2014

Investigation to Reduce Borehole Resistance, Lower Installation Costs and Improve Geothermal Heat Pump Performance

PI: S.B. Mabee; **D.F. Boutt**

Funding Agency: U.S. EPA, SBIR
Amount: \$24,939 to UMass
Duration: 7/1/2011 – 12/31/2011

Publications:

* indicates student authors

Peer Reviewed Manuscripts (H-index=4; Based on articles 7-15):

1. Doan, M.L., Conin, M., Henry, P., Wiersberg, T., **Boutt, D.F.**, Buchs, D., Saffer, D., McNeill, L., and D. Cukur., *Quantification of Free Gas in the Kumano Forearc Basin detected from Borehole Physical Properties: IODP NanTroSEIZE drilling Site C0009*, *Geochem. Geophys. Geosyst.*, 12, Q0AD06, doi:10.1029/2010GC003284.
2. *Weider, K. and **D.F. Boutt**, *Heterogeneous water table response to climate revealed by 60 years of ground water data*, *Geophys. Res. Lett.*, VOL. 37, L24405, doi:10.1029/2010GL045561, 2010.
3. *Cook, J.B., Goodwin, L.B., and **D.F. Boutt**, *Systematic diagenetic changes in the grain-scale morphology and permeability of a quartz-cemented quartz arenite*, *AAPG Bulletin*, BLTN10-009, In Press, 2010.
4. McNeil, L., Saffer, D.M., Byrne, T., Araki, E., and IODP Expedition 319 Scientists (**D.F. Boutt**), *IODP Expedition 319, NanTroSEIZE Stage 2: First IODP Riser Drilling Operations and Observatory Installation Towards Understanding Subduction Zone Seismogenesis*, *Scientific Drilling*, 10, p 4-13.
5. Lin, W., et al. (2010), *Present-day principal horizontal stress orientations in the Kumano forearc basin of the southwest Japan subduction zone determined from IODP NanTroSEIZE drilling Site C0009*, *Geophys. Res. Lett.*, 37, L13303, doi:10.1029/2010GL043158.
6. **Boutt, D.F.**, Mabee, S.B., and *J.P. Diggins, *A field study of the factors controlling the depth of ground water flow systems in crystalline fractured rock terrain*, *Hydrogeology Journal*, 2010, Published Online September 7th, DOI: 10.1007/s10040-010-0640-y.
7. **Boutt, D.F.**, Cook, B.K., and J.R. Williams, *A coupled fluid-solid model for problems in geomechanics: application to sand production*, *International Journal of Analytical and Numerical Methods in Geomechanics*. published online: 2 AUG 2010 | DOI: 10.1002/nag.938,
8. **Boutt, D.F.**, *Poroelastic response of an unconsolidated aquifer to daily releases of water from an upstream dam*, *Ground Water*, doi:10.1111/j.1745-6584.2009.00,663.x, 2010.
9. **Boutt, D.F.**, Goodwin, L.B, and McPherson, B.J.O.L., *The Role of Permeability and Storage in the Initiation and Propagation of Natural Hydraulic Fractures*, *Water Resources Research*, 45 (W00C13), doi:10.1029/2007WR006557, 2009.
10. **Boutt, D.F** and *B.J. Fleming, *Implications of anthropogenically driven river stage fluctuations on mass transport in a valley fill aquifer*, *Water Resources Research*, doi:10.1029/2007WR006526, 2009.
11. **Boutt D.F.**, Cook, B.K, McPherson, B.J.O.L., and J.R. Williams, 2007, *Direct simulation of fluid-solid mechanics in porous media using the discrete element and lattice-Boltzmann methods*, *Journal of Geophysical Research – Solid Earth*, 112, B10209, doi:10.1029/2004JB003213.
12. McPherson, B.J.O.L., and **D.F. Boutt**, 2007, *Evaluation of Forces Responsible for Fracturing in the Spraberry Trend*, *Midland Basin*, *Geofluids*, 7(4), p 415-426.
13. **Boutt D.F.**, Grasselli G., Fredrich J.T., Cook B.K., Williams J.R., 2006, *Trapping zones: The effect of fracture roughness on the directional anisotropy of fluid flow and colloid transport in a single fracture*, *Geophysical Research Letters*, V. 33, L21402,10.1029/2006GL027275.

14. Wayland, K.G, D.W. Hyndman, **D.F. Boutt**, B.C. Pijanowski, D.T. Long, *Modeling The Impact Of Historical Land Uses On Surface Water Quality Using Ground Water Flow And Solute Transport Models*, Lakes and Reservoirs, 7(3), p 189-199, 2002. Times Cited: 2
15. **Boutt, D.F.**, and McPherson, B.J.O.L., *Simulation of sedimentary rock deformation: Lab-scale model calibration and parameterization*, Geophysical Research Letters 29(4), 10.1029/2001GL013706, 2002.
16. **Boutt, D.F.**, Hyndman, D.W., Pijanowski, B.C., and David T. Long, *Identifying potential land use-derived solute sources to stream baseflow using ground water models and GIS*, Ground Water 39(1), 24-34, 2001.

Submitted manuscripts under review:

1. *Plourde, K.P., **Boutt, D.F.**, Goodwin, L.B, and J. Cook. *The influence of cementation on the poroelastic behavior of aquifers and reservoirs*, Journal of Geophysical Research – Solid Earth
2. Murdoch, L., Germanovich, L, Wang, H., Onstott, T., Elsworth, D., Stetler, L., and **D.F. Boutt**, *Hydrogeology of the vicinity of DUSEL Homestake*, Submitted to Hydrogeology Journal in November 2010.

Manuscripts in Preparation for Submission in the next 6 months:

1. French, W., **Boutt, D.F.**, and Goodwin, L.B., *Sample dilation and fracture formation in quartz-rich sandstones and siltstones under undrained experimental conditions*, Intended to Journal of Geophysical Research-Solid Earth
2. Weider, K., and **D.F. Boutt**, *Ground water table response to long-term climate: The role of subsurface stratigraphy*, Intended to Water Resources Research.
3. Cook, J.E., Goodwin, L.B., Boutt, D.F., and H. Tobin, *Mechanical and hydrologic evolution of a sandstone with progressive diagenesis: How compaction and cementation influence elastic and inelastic behavior*, Intended to Journal of Geophysical Research-Solid Earth.

Peer-reviewed articles and reports:

1. Mabee, S.B. **Boutt, D.F.**, Diggins, J.P, Sorenson, J.R. and R.A. Mondazzi, *Borehole Geophysical and Hydraulic Investigation of the Fractured-Rock Aquifer in Eastern Massachusetts*, USGS Open File Report, In Review.
2. Saffer, D., McNeill, L., Byrne, T., Araki, E., Toczko, S., Eguchi, N., Takahashi, K., and the Expedition 319 Scientists, *NanTroSEIZE Stage 2: NanTroSEIZE riser/riserless observatory Expedition 319 of the riser drilling platform Shingu, Japan, to Yokkaichi, Japan Sites C0009 & C0011 5 May -31 August 2009* Integrated Ocean Drilling Program, Japanese Implementing Organization, Center for Deep Earth Exploration (CDEX) at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and U.S. Implementing Organization Science Services, Texas A&M University, 2010.

Non peer-reviewed articles and reports:

1. Mabee, S.B., *B.J. Fleming, and **D.F. Boutt**, *Hydrogeologic assessment of the West Charlemont aquifer*, Charlemont, Massachusetts, project completion report, 2007.

2. Grasselli G., **Boutt D.F.**, Fredrich J.T., Cook B.K., Williams J.R., 2005, *Experimental and numerical study of colloid transport in a single fracture*, in Proc. IACMAG 2005 Conference, Turin, Italy, pp 277-284
3. Cook BK, **Boutt DF.** and Strack O.E. DEM-fluid model development for near wellbore mechanics. *Numerical modeling in Micromechanics via Particle Methods*, 2004, Shimizu, Hart & Cundall (eds). Taylor & Francis Group, London, ISBN 90 5809 679 3.
4. **Boutt, D.F.**, *Discrete Analysis of the Role of Pore Fluids in the Genesis of Opening Mode Fractures in the Shallow Crust*, Ph.D. Thesis, New Mexico Institute of Mining and Technology, Socorro, NM, 2004, 239 pp.
5. **Boutt D.F.**, McPherson, B.J.O.L., Cook, B.K., and J.R. Williams, *Application of a directly coupled numerical model of fluid-solid mechanics*, in *Soil and Rock America 2003 Proceedings*, edited by P.J. Culligan, H.H Einstein, and A.J. Whittle, Volume 1, p 977-983
6. **Boutt, D.F.**, and B.J.O.L. McPherson, *The role of particle packing in modeling rock mechanical behavior using discrete elements*, in *Discrete Element Methods: Numerical Modeling of Discontinua*, edited by B.K. Cook, and R.P. Jensen, pp. 86-92, ASCE, Santa Fe, NM, 2002.
7. Villeneuve, P.J. and **D.F. Boutt**, Hydrogeologic Investigation of Leverett, Massachusetts, May 2008, UMass Hydrogeology Group.
8. 2009 Integrated Ocean Drilling Program Expedition 319 Preliminary Report NanTroSEIZE Stage 2: NanTroSEIZE riser/riserless observatory, Demian Saffer, Lisa McNeill, Eiichiro Araki, Tim Byrne, Nobuhisa Eguchi, Sean Toczko, Kyoma Takahashi, and the Expedition 319 Scientists, doi:10.2204/iodp.pr.319.

Awards:

2003 Best TA Award – New Mexico Tech Hydrology Program
 AGU Fall Meeting 2002, Best Student Paper Award – Hydrology
 Warren T. Wood Hydrogeology Award at Michigan State University

Summary of International Scientific Involvement:

Invited Participant in the COSC Swedish Drilling Program as Hydrogeologist, full proposal submitted to ICDP, Sweden
 Member of IODP Expedition 319, Drilling into the Kumano Basin for NanTROSEIZE project, off-shore Japan
 Co-PI on workshop proposal for the InterContinental Drilling Program for 5-km deep hole at DUSEL-Homestake
 Participant and contributor to IODP writing program and INVEST meeting in Bremen, Germany
 IODP 319 Post-cruise meeting in Barcelona, Spain
 PI on an Office of International Science and Engineering proposal for visit and work at the ASPO underground laboratory, Sweden
 Associate editor for Hydrogeology Journal, a journal of the International Association of Hydrogeologists

Presentations:

Invited Seminars:

- MA-RI Water Resources Division, United States Geological Survey, Northborough, MA (October 2010)

- K.D. Nelson Lecturer, Department of Geosciences, Syracuse University, Syracuse, NY (September 2010)
- Department of Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM, (March 2008)
- Department of Civil and Environmental Engineering, University of Massachusetts – Amherst (April 2006)
- Weeks Lecture, Department of Geology and Geophysics, University of Wisconsin (February 2006)
- Department of Civil Engineering, Massachusetts Institute of Technology (Fall 2007)
- Geophysics Brown Bag Seminar, Department of Geology and Geophysics, University of Wisconsin (February 2006)
- Deerfield River Watershed Association (October 2006)

Conference Presentations:

** indicates student authors*

2010

*Cook, J.E., Goodwin, L.B., and **D.F. Boutt**, (2010) Systematic Diagenetic Changes in Grain-Scale Morphology in a Quartz-Cemented Quartz Arenite and the Resulting Effects on Permeability, Mechanical Properties, and Ultrasonic Velocity, Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 111.

Boutt, D.F. and *K. Weider, (2010) Sixty years of ground water data from the New England region reveal a heterogeneous and complex response to climate, Geological Society of America Abstracts with Programs, Vol. 42, No. 5, p. 40.

INVITED: **Boutt, D.F.** Fractured Bedrock Aquifers and Their Response to Climate Change, 2010 NGWA Fractured Rock Virtual Conference, October 27, 2010

*Weider, K. and **Boutt, D.F.** (2010) Regional Data-Driven Study of the Water Table Response in New England over the last 60 Years, Tufts Water: Systems, Science & Society, May 2010.

*Bevan, L.B. and **Boutt, D.F.** (2010) Characterizing groundwater recharge across the surficial-bedrock interface, Seventh Annual MA Water Resources Research Conference, 2010.

*Weider, K. and **Boutt, D.F.** (2010) Regional Data-Driven Study of the Water Table Response in New England over the last 60 Years, Seventh Annual MA Water Resources Research Conference, 2010.

Wang, H., **Boutt, D.** Murdoch, L., Onstott, T.C., Roggenthen, W., and M. Zoback (2010) A Drilling Program to Examine Connections between In-Situ Stress, Hydrology, and Life at the Deep Underground Science and Engineering Laboratory (DUSEL) in Lead, South Dakota, USA GeoDarmstadt2010.

2009

Weider, K.M. and **Boutt, D.F.** (2009) A Data-Driven Study of the Climatic and Hydrogeologic Factors Influencing Water Table Fluctuations in the Northeast United States Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract H33E-0924

French, M.E., Goodwin, L.B. and **Boutt, D.F.** (2009) Experimental evidence for hydrologic and mechanical controls on formation of hydraulic fractures in quartz-rich sandstone and siltstone Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract MR41A-1851

- Lin, W et al. (2009) A preliminary result of stress orientation obtained from drilling induced tensile fractures and borehole breakouts at Site C0009 of Expedition 319, NanTroSEIZE Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract T21C-1831
- Bouff** et al. (2009), Downhole Hydrologic Testing in the Kumano Basin and Underlying Sediments: Results from NanTroSEIZE Expedition 319, Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract T21C-1837
- Kieft, T.L., **Bouff, D.F.**, Murdoch, L.C., and H.F. Wang (2009) Ecohydrology of Deep Fractured Rocks at Homestake DUSEL Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract H23E-1000
- Murdoch, L.C., Germanovich, L.N., **Bouff, D.F.**, Kieft, T.L., Wang, H.F., and Onstott, T.C. (2009) A Conceptual Hydrogeologic Model of the Vicinity of DUSEL Homestake Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract H23E-1009
- Efimenko et al. (2009), Defining Lithological Units by Cuttings, Core and Logging Data at Site C0009A in the Nankai Trough, Japan: IODP Expedition 319, Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract T21C-1836
- Kano et al. (2009), Hydraulic Fracture Measurements at Site C0009 of IODP Expedition 319, NanTroSEIZE, Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract T21C-1833
- Saffer et al. (2009), Stress and Pore Pressure Measurement in IODP Riser Drilling: An Example from Expedition 319, Kumano Basin offshore SW Honshu, Japan Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract NH34A-07
- Onstott et al. (2009) DUSEL and the future of deep terrestrial microbiology (Invited), Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract B21D-02
- McNeill et al. (2009) In situ stress and deformation patterns across the Nankai Kumano basin and forearc: Results from IODP Expedition 319, Eos Trans. AGU, 90(52), Fall Meet. Suppl. Abstract NH34A-06
- Bouff, D.F.** (2009) Depth evolution of fractured rock permeability in shallow crystalline rock aquifers, Geological Society of America Abstracts with Programs, Vol. 41, No. 7, p. 465
- Bouff, DF**, Weider, K. (2009) Ground Water and Climate Change. 2009 Massachusetts Water Resources Conference, Amherst, MA.
- Guerra, WG, **Bouff, DF**. (2009), Seasonal Groundwater levels provide evidence of recent climate change in the Northeast, Northeastern Section of the Geological Society of America, Portland, ME.

2008

- Buchheit, T, Cook, J, Goodwin, L B, Plourde, K, **Bouff, D F** (2008), The Effect of Cement Distribution, Abundance, and Morphology on the Mechanical Behavior of Granular Porous Media, Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract MR33B-1860
- French, M E, Goodwin, L B, **Bouff, D F**, Lilydahl, H. (2008), Experimental Study of the Roles of Mechanical and Hydrologic Properties in the Initiation of Natural Hydraulic Fractures, Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract MR21A-1761.
- Bouff, D F**; Wang, H; Kieft, T L. (2008) Deep and Ultradeep Underground Observatory for In Situ Stress, Fluids, and Life, Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract H53A-1003.
- *Plourde, KP, **Bouff, DF**, Goodwin, LB, Cook, JC. (2008) Quantifying the Effects of Cementation on Hydromechanical Properties of Granular Porous Media Using Discrete Element Models, 2008 Geological Society of America Joint Annual Meeting, Houston Texas.

Jennie Cook, Laurel Goodwin, Thomas Buchheit, **David Boutt** and Kathleen Plourde, (2008), The Effect of Progressive Cementation on the Mechanical Properties of a Quartz Arenite, 2008 Geological Society of America Joint Annual Meeting, Houston Texas.

2007

- *Fleming, B.J., **Boutt, D.F.**, (2007) Determining Water Fluxes Across Surface Water/Groundwater Interfaces Using Temperature Data and Numerical Models, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract H31D-1547
- *K E Plourde, **D F Boutt**, L B Goodwin, T E Buchheit, (2007) Evaluation of the Effects of Cementation on Specific Storage of Granular Porous Media Using Discrete Element Models, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract H23C-1512
Note: Kat won a best student paper for her poster presentation
- *J P Diggins, **D F Boutt**, (2007) Exploring the Depth and Nature of Flow Systems in Fractured Igneous and Metamorphic Bedrock Aquifers, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract H23G-1707
- *J.P. Diggins, **Boutt, D.F.**, Manda, A.K., and S.B. Mabee, (2007) Development of Regional-Scale Conceptual models of Groundwater Flow in the Fractured Crystalline Bedrock Aquifers of the Nashoba Terrane using Borehole Geophysical Techniques and Outcrop Data. 2007 NGWA/U.S. EPA Conference on Fractured Rock Aquifers, Portland, Maine
- *Manda, A.K., S.B. Mabee, and **D.F. Boutt**, (2007) Discrete fracture network modeling of hydrostructural domains: an example from Eastern Massachusetts. 2007 NGWA/U.S. EPA Conference on Fractured Rock Aquifers, Portland, Maine
- Boutt, D.F.**, and *J.P. Diggins, (2007) What controls the depth of flow systems in New England fractured rock terrain?, Geological Society of America Annual Meeting, Denver, CO, 2007
- Boutt, D.F.**, and *B. J. Fleming, (2007) Mass transport between surface water and groundwater: The influence of dispersive driven mixing, Geological Society of America Annual Meeting, Denver, CO, 2007
- *Moreau, S.A., and **D.F. Boutt**, (2007) Observations of hyporheic zone processes during short-term, daily water releases on the Deerfield River in Charlemont, Massachusetts, Geological Society of America Annual Meeting, Denver, CO, 2007
- *B. J. Fleming, **Boutt, D.F.**, (2007) Influence of anthropogenically produced stream-stage fluctuations on groundwater-surfacewater interactions in the Deerfield River, Massachusetts, Gordon Research Conference on Catchment-scale biogeochemical cycling.
- *B. J. Fleming, **Boutt, D.F.**, (2007) Influence of anthropogenically produced stream-stage fluctuations on groundwater-surfacewater interactions in the Deerfield River, Massachusetts, Massachusetts Water Resources Research Conference, Amherst, MA
- *J.P. Diggins, **Boutt, D.F.**, *Manda, A.K., and S.B. Mabee, (2007) Characterizing fractured crystalline bedrock aquifers using DFN in the Nashoba Terrane, Eastern Massachusetts, 2007 Massachusetts Water Resources Research Conference, Amherst, MA.

2006

Boutt, D.F., Cook, B.K. and J.R. Williams, (2006) Simulating the mechanical behavior of a porous fluid saturated rock with a coupled discrete-element and lattice-Boltzmann model, Proceedings of the 7th World Congress on Computational Mechanics, Los Angeles, CA, USA, July 16-22, 2006

- *Cook, J.C, Goodwin, L.B., **Boutt, D.F.**, and T.B. Buchheit, (2006) Micromechanical Effects of Cement on Deformation of Porous Granular Media: Example of the San Gregorio Fault, California and Laboratory Studies, 2006 AGU Fall Meeting, San Francisco, CA.
- Boutt, D.F.**, Mabee, S.B., Manda, A.K., and J.P. Diggins, (2006) Characterizing fractured crystalline bedrock aquifers using discrete fracture networks in the Nashoba Terrane, Eastern Massachusetts, 2006 AGU Fall Meeting, San Francisco, CA.
- *Cook, J.C, Goodwin, L.B., **Boutt, D.F.**, and T.B. Buchheit, (2006) Micromechanical Effects of Cement on Deformation of Porous Granular Media: Example of the San Gregorio Fault, California and Laboratory Studies, Gordon Research Conference on Rock Deformation, 2006.
- Boutt, D.F.**, (2006) Elucidating the role of anisotropic stress fields on fluid flow and transport in fractured rock aquifers, Gordon Research Conference on Flow through Permeable Media, 2006.
- *J.P. Diggins, **Boutt, D.F.**, Manda, A.K., and S.B. Mabee, (2006) Estimating bulk permeability of fractured rock aquifers using detailed outcrop data and discrete fracture network modeling, 2006 Geological Society of America Annual Meeting, Philadelphia, PA, October.
- *B. J. Fleming, **Boutt, D.F.**, and S. B. Mabee, (2006) Advection and Dispersion processes within a coupled surface water ground water system in the Deerfield River Watershed, 2006 Geological Society of America Annual Meeting, Philadelphia, PA, October.
- S. Nathan, **Boutt, D.F.**, and S. B. Mabee, (2006) Prototype Three-Dimensional Geologic Model of the Marlborough Quadrangle, Massachusetts: 3-D Modeling on a Shoestring, 2006 Geological Society of America Annual Meeting, Philadelphia, PA, October.

2005

- *Fleming, B.J., **Boutt, D.F.**, and S.B. Mabee, (2005), Characterizing a stratified drift aquifer within a bedrock valley in Charlemont, MA, 2005 Massachusetts Water Resources Research Center Annual Meeting
- *Gosselin, M.J. and **D.F. Boutt**, (2005), Design of a Meso-Scale Poly-axial Testing Device for Examining the Role of Anisotropic Stress on Fluid Flow in Fractured Rock, 2005 Massachusetts Water Resources Research Center Annual Meeting
- *Gosselin, M.J. and **D.F. Boutt**, (2005), Design of a meso-scale poly-axial testing device for examining the role of anisotropic stress on fluid flow in fractured rock, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H33A-1378
- Boutt, D.F.**, Grasselli, G, Fredrich, J.T., Cook, B.K., Williams, J.R., (2005), Colloid Traps: Microscale Modeling of Solid Transport Through a Single Rock Fracture, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract H41B-0415
- Boutt, D.F.**, Buchheit, T.E., Goodwin, L.B., and B.K. Cook (2005), Quantifying the Micromechanical Effects of Variable Cement in Porous Media, Eos Trans. AGU, 86(52), Fall Meet. Suppl., Abstract MR33A-0142
- Boutt, D.F.**, (2005), Natural Hydraulic Fracture Genesis: Experimental and Numerical Analysis of the Role of Hydrologic Properties, Presented at the 2005 Hubbert Quorum Symposium at the USGS in Menlo Park, CA.

2004

Boutt, D.F., (2004), The Role of Permeability and Storage in the Initiation and Propagation of Fractures, Presented at 2004 Gordon Research Conference on Rock Deformation, South Hadley, MA.

Cook, B.K., **Boutt, D.F.**, Strack, O.E., Williams, J.R., and S. Johnson, (2004), Advancements in Discrete Mechanics and Their Application to Near-Wellbore Modeling, Sand Control & Management US 2004, Houston, TX.

2003

Boutt, D.F., McPherson, B.J., Cook, B.K., Lee, M.Y., Goodwin, L.B. and J.R. Williams, (2003), Experimental Analysis of the Role of Fluid Transport Properties in Fluid-Induced Fracture Initiation and Propagation, Presented at the 2003 Fall AGU meeting in San Francisco, CA December.

Boutt, D.F., McPherson, B.J., Cook, B.K. and J.R. Williams, (2003), Fluid-induced fracture initiation and propagation in geologic systems: A discrete analysis, Seventh international Conference on Computational Mechanics, Albuquerque, NM.

Boutt, D.F., Cook, B.K., and J.R. Williams, (2003), Application of a Directly Coupled Numerical Model of Fluid-Solid Mechanics, Soil and Rock America 2003, Boston, MA.

2002

Boutt, D.F., McPherson, B.J.O.L, Cook, B.K., and J.R. Williams - An Analysis of the Role of Fluid Pressure Gradients in Fracture Initiation and Propagation using Direct Simulation of Coupled Fluid-Solid Mechanics, Presented at the 2002 Fall AGU meeting in San Francisco, CA December.

Boutt, D.F., Cook, B.K., McPherson, B.J.O.L, and J.R. Williams - Application of a Coupled Lattice-Boltzmann-Discrete Element Model to Problems in Geomechanics and Geohydrology, Presented at the 2002 3rd International Discrete Element Conference in Santa Fe, NM September

Boutt, D.F., and McPherson, B.J.O.L, - The Role of Particle Shape and Packing in the Analysis of Rock Mechanical Behavior, Presented at the 2002 3rd International Discrete Element Conference in Santa Fe, NM September, 2002

2001

Boutt, D. F. and B. J. O. L. McPherson - Discrete Element Models of the Micromechanics of Sedimentary Rock: The Role of Friction vs. Organization, Presented at the Fall AGU meeting in San Francisco, CA December, 2001.

INVITED: **Boutt, D. F.** and B .J. O. L. McPherson - Using Direct Approaches to Gain Insight Into the Micromechanics of the Role of Fluids in Geologic Fracture Genesis, Presented at Rock Fracture Workshop at the 2001 DC Rocks conference of the American Association of Rock Mechanics (ARMA)

2000

INVITED: McPherson, B. J. O. L. and **D. F. Boutt** (2000), Fracture Genesis: Sedimentary Basin Evolution Modeling with Coupled Geomechanical and Hydrodynamic Aspects, Presented at the Fall AGU conference in December 2000, San Francisco, CA.

Boutt, D. F. and B. J. O. L. McPherson, (2000), Examining paleostress histories using laboratory tests, field observations, and particle flow modeling, Presented at the annual Geological Society of America Conference in November, 2000, Reno, NV.

1999

Boutt, David F., David W. Hyndman, Bryan C. Pijanowski, and David T. Long, (1999) Modeling the influence of land use on water quality in a large watershed , Presented at the 1999 AGU spring meeting in Boston, MA

1998

Boutt, David F., David W. Hyndman, Sarah W. Woodhams, David T. Long, Bryan C. Pijanowski, and Sheridan K. Haack (1998) - Quantifying groundwater and solute fluxes into Grand Traverse Bay using a high-resolution groundwater flow model, Presented at the 1998 GSA conference in Toronto, Ontario, Canada

Boutt, David F., David W. Hyndman, David T. Long, Andy W. Olds, Bryan C. Pijanowski, and Sheridan K. Haack (1998) - The effect of land use change on groundwater in the Grand Traverse Bay Watershed., Presented at the 1998 International Association of Great Lakes Research Annual Conference, Hamilton, Ontario, Canada

Boutt, David F., David W. Hyndman, David T. Long, Andy W. Olds, Bryan C. Pijanowski, and Sheridan K. Haack (1998) - The effect of land use change on groundwater dynamics in Grand Traverse Bay Watershed, Traverse City, Michigan, Presented at the 1998 Geological Symposium of Michigan in Lansing, MI

Teaching:

Semester	Course number/title	credits	enrollment	Q11/Q12*	Notes
Spring 05	Geosci 587/ Hydrogeology	4	11	4.5/4.1	
Fall 05	Geosci 687/ Adv. Hydrogeology	3	5	4.8/4.8	
	Geosci 787 / Hydrogeology Seminar	1	5		“journal club” seminar
Spring 06	Geosci 587 / Hydrogeology	4	3	4.3/3.7	
	Geosci 787 / Hydrogeology Seminar	1	4	4.7/4.3	“journal club” seminar
Fall 06	Geosci 101/ The Earth	4	83	4.16/3.78	
	Geosci H01/ The Earth Honors section	1	11	5.0/5.0	
	Geosci 787/ Hydrogeology	1	4	4.5/4.0	“journal club” seminar

Spring 07	Seminar Geosci 591E/ Earth modeling	3	15	4.17/3.92	Co-taught with Prof. Michele Cooke and Prof. Robert Deconto
	Geosci 591F/ Fluids in Geologic Processes	3	9	4.56/3.89	
Fall 07	Geosci 787 / Hydrogeology Seminar	1	4	4.75/4.0	“journal club” seminar
	Geosci 687/ Adv. Hydrogeology	3	3	No Survey Performed	No Survey Performed
	Geosci 787/ Hydrogeology Seminar	1	4	4.2/4.0	“journal club” seminar
Spring 08	Geosci 587 / Hydrogeology	4	14	4.3/4.1	
	Geosci 787 / Hydrogeology Seminar	1	5	4.8/4.7	“journal club” seminar
Fall 08	Geosci 101/ The Earth	4	94	4.3/3.7	
	Geosci H01/ The Earth Honors section	1	15	4.5/4.5	
	Geosci 787/ Hydrogeology Seminar	1	4	4.2/4.0	“journal club” seminar
Spring 09	Geosci 587 / Hydrogeology	4	9	4.9/4.9	Co-Taught with PhD Student Alex Manda
	Geosci 787 / Hydrogeology Seminar	1	2	4.5/4.0	“journal club” seminar
	Geosci 231/ Geological Field Methods	3	18	4.6/4.4	Co-Taught with Leckie and Cooke
Fall 09	Geosci 787 / Hydrogeology Seminar	1	11	4.9/4.4	
Spring 10	Geosci 587 / Hydrogeology	4	15	4.7/4.3	
	Geosci 787 / Hydrogeology Seminar	1	7	5.0/4.3	“journal club” seminar

	Geosci 591CP	3	3.7	4.9/4.9	Co-Taught with Leckie, Williams, Seaman
	CHC 391D	1	11	4.8/4.4	Co-Taught with Cooke
	Geosci 231/ Geological Field Methods	3	18	4.6/4.4	Co-Taught with Cooke
Fall 10	Geosci 687/ Advanced Hydrogeology	3	7	4.6/4.3	
	Geosci 787 / Hydrogeology Seminar	1	5	4.7/3.7	

*Q11 records student evaluation of instructor's teaching (5 – most effective, 1 – least)

*Q12 records student evaluation of the course (5 – one of the best, 1 – one of the worst)

Master and Doctoral Student Advising

Graduate Students (all in Dept. of Geosciences):

Doctoral Students

1. Evan-Earrest Heckler, *The Role of In Situ Stress on Shallow Crustal Permeability: Evaluating the Role of Hydromechanical Coupling in the Hydrogeologic Properties of Fractured-Rock Aquifers using Field-Based Observations and Numerical Methods* (Anticipated 2013)
2. Alex Manda (2009), *Combining outcrop data and groundwater numerical models to investigate the role played by hydrostructural domains in controlling fluid flow in crystalline rock aquifers.*, Note: Co-advised with Steve Mabee, Now an Assistant Professor at East Carolina University

Master Students

1. Erin Bradley, *Microfractures associated with Natural Hydraulic Fractures*, (MS Anticipated 2011)
2. Liam Bevan, *Characterization of Groundwater Recharge to Fractured Bedrock Aquifers Through Glacial Till*, (MS Anticipated 2011)
3. Brian Yellen, *A reach-scale study of dam-induced hyporheic exchange: controlling mechanisms and effects, Deerfield River, Massachusetts.* (MS Anticipated 2011)
4. Kaitlyn Weider (2010), *A data-driven study of the water table fluctuations in New England over the last 60 years*, Now at HRP Associates, Connecticut
5. Brandon Fleming (2009), *Ground water-surface water interactions in a valley-fill aquifer subject to daily stream stage changes*, Now at USGS, WRD-MD, Baltimore, Maryland.
6. Kathleen Plourde (2009), *Micromechanical basis for the storage properties of weakly cemented sandstones*, Now at Exxon-Mobil, Houston, Texas.
7. John Patrick Diggins (2009), *Characterizing the regional-scale flow in fractured crystalline bedrock aquifers of the Northeast, US*, Now at Environmental Resources Management, Boston, MA.

8. Phil Villeneuve (2009), *Ground water surfacewater interactions in a mixed alluvial fractured bedrock environment*, Now at Sovereign Consulting, Amherst, MA.

Undergraduate Theses:

1. Shakib Ahmed, In Progress, Analyzing the Hydraulic Properties of Soil at Assabet River Watershed, Eastern Massachusetts, UMass Amherst Commonwealth Honors College.
2. Taylor Lucey, In Progress, A Look Inside the Deerfield River's Metabolism using a Cotton Strip Assay, UMass Amherst Commonwealth Honors College.
3. Adam Brown, *Ground water flow dynamics in a New England glacial aquifer system*, May 2010, UMass Amherst Commonwealth Honors College.
4. Willie Guerra, *A complex interplay of groundwater and climate at Ft. Kent, ME*, May 2008, UMass Amherst Commonwealth Honors College.

Undergraduate Research Assistants:

Brandon Fleming (UMass Geosciences)
Martin Gosselin (UMass Geosciences)
Sabrina Moreau (Univ. New Hampshire)
Ben Clinton (UMass Geosciences)
Nick Castonguay (UMass Geosciences)
Matt Walsh (UMass Geosciences) - Graduate Research Assistant
William Guerra (UMass Geosciences)
Taylor Lucey (UMass Geosciences)
Nathaniel Goodhue (UMass Geosciences)

Scientific Outreach and Synergistic Activities:

Professional affiliations:

American Geophysical Union
National Groundwater Association
Geological Society of America

Invited Speakers Hosted:

Gary Robbins, 2010 Department of Geosciences GLS Speaker
Tim Schiebe, 2010 Darcy Lecturer
Liz Sreaton, 2010 IODP Distinguished Lecturer
Susan Hubbard, 2010 Birdsall-Driess Lecturer
Denis LeBlanc, 2009 Department of Geosciences GLS Speaker
Grant Garven, 2008 Department of Geosciences GLS Speaker
Larry McKay, 2008 Birdsall-Driess Lecturer
Mike Ceilia, 2008 Darcy Lecturer
Bridget Scanlon, 2007 Birdsall-Driess Lecturer
Mark Person, 2007 TEI Invited Lecturer
Matt Davis, 2006 Department of Geosciences GLS Speaker

Requested Reviewer:

journals:

AAPG Bulletin
Hydrogeology Journal
Geophysical Research Letters
Ground Water
International Journal for Numerical and Analytical Methods in Geomechanics
International Journal for Numerical Methods in Engineering
Water Resources Research
Geofluids
Journal of Geophysical Research – Solid Earth
Journal of Geophysical Research – Earth Surface
Journal of Hydrology
Geophysical Journal International

funding agencies:

National Science Foundation – ad hoc reviewer
Department of Energy, Basic Energy Sciences
Department of Energy – panel review: ESRP 2007 review panel

Synergistic activities:

Session Chair for National Meetings:

- Chair of NGWA Session at the Ground Water Summit in Baltimore, MD entitled “Recent advances in Fractured Rock Hydrogeology”
- Co-Chair of AGU Session on Groundwater/Surface Water Interactions: Dynamics and Patterns Across Spatial and Temporal Scales at the AGU Fall 2010 Meeting
- Session chair 2009 Portland GSA Annual Meeting T29. Recent Advances in the Conceptualization, Characterization, and Interpretation of Fluid Movement and Transport Dynamics in Fractured and Karst Aquifers (GSA Hydrogeology Division; GSA Structural Geology and Tectonics Division)
- Co-chair of session in honor Madhi Hantush at the Geological Society of America Annual Meeting 2007
- Co-chair of WCCM-VII Minisymposium on Discrete Elements Models, 2006
- Organizer and session moderator for the Massachusetts Water Resources Research Conference, 2005

Lead investigator for the development of a working group for fractured rock hydrology at the proposed site of the Deep Underground Science and Engineering Laboratory at the former Homestake Mine, Black Hills, South Dakota.

INVEST 2010 Participant - Traveled to Bremen, Germany as an invited member of the US Science team to prepare the next generation of ocean drilling program

Member of the International Organizing Committee for the 5th International Conference on Discrete Element Methods

AGU best student paper reviewer from 2006-2009

Invited participant in 15 person panel on Compaction bands, Sponsored by DOE Basic Energy Sciences, Geosciences, 2004

Volunteer Judge for Hydrology Section Outstanding Student Paper Awards, AGU Fall 2006, 2008, 2009 Meeting,

Hydrogeology Team member of DUSEL-Henderson NSF S3 Proposal, 2006

Member of the subcommittee on Ground Water, a subgroup of the federal Advisory Committee on Water Information (ACWI), 2007

Community Outreach:

I have given in-kind support through advice and consulting to the following local agencies:

- Northfield Aquifer Protection Committee
- Town of Charlemont
- Town of Sunderland, Board of Health
- VT-PACE
- Deerfield River Watershed Association
- Town of Leverett
- Connecticut River Watershed Association

Departmental, College, and University Service:

Member – UMass-Amherst Geosciences Department, Executive and Personnel Committee (2005-2006,2008-2009)

College of Natural Sciences Environmental Sciences Curriculum Committee (2009-2010)

College of Natural Sciences Scholarship Committee (Spring 2010-Present)

Geosciences Department Award Committee (2007-Present)

Geosciences Department Graduate Student Applications Review Committee (2006-Present)

Earth Systems Program Undergraduate Advisor (2008-Present)

Environmental Sciences Program Undergraduate Advisor (Fall 2010-Present)

Search Committees:

Chair of UMass-Extension Water and Climate Change Search Committee, Department of Geosciences, UMass (Ongoing)

Member Department of Geosciences Head Search (2009)

Member of Geography Water Search Committee, Department of Geosciences, UMass (2008)

Member Sedimentology/Stratigraphy position, Department of Geosciences, UMass (2006-2007)

Jr. Faculty evaluator, UMass College of Natural Sciences and Mathematics Dean Search (2005)

Judge for Department of Geosciences Research Review

Member of UMass Amherst The Environmental Institute sponsored Climate Change and Water Resources working groups