

# Dustin M. Schroeder

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## Education

- Ph.D. Geophysics**, *Jackson School of Geosciences, University of Texas at Austin* Expected 2014  
*Thesis: Characterizing the Subglacial Hydrology of Thwaites Glacier Using Focused Airborne Radar Sounding*  
Advisor: D.D. Blankenship GPA: 3.88/4.0
- B.S. Electrical Engineering** with *Departmental Honors*, **Bucknell University** 2007  
*Honors Thesis: Design of a Dielectric Rod Antenna for Ground Penetrating Radar Landmine Detection Applications*  
Advisor: D.F. Kelley GPA: 3.92/4.0
- B.A. Physics**, *Magna Cum Laude*, **Bucknell University** 2007  
*Minors: Mathematics and Philosophy* GPA: 3.83/4.0

## Appointments

|   |                                   |                |
|---|-----------------------------------|----------------|
| University of Texas Institute for Geophysics          | <i>Graduate Researcher</i>        | 2008 - Present |
| Johns Hopkins University Applied Physics Lab          | <i>Graduate Researcher</i>        | Spring 2012    |
| Freescale Semiconductor                               | <i>Platform Hardware Engineer</i> | 2007 - 2008    |
| Bucknell University                                   | <i>Undergraduate Researcher</i>   | 2003 - 2007    |
| Cleveland Clinic Foundation Lerner Research Institute | <i>Undergraduate Researcher</i>   | Summer 2005    |
| Harvard-Smithsonian Center for Astrophysics           | <i>Undergraduate Researcher</i>   | Summer 2004    |
| Parker Hannifin Corporation                           | <i>Summer Intern</i>              | Summer 2003    |
| Case Western Reserve University                       | <i>Undergraduate Researcher</i>   | Summer 2002    |

## Honors

|  |                  |
|--|------------------|
| University of Texas Institute for Geophysics, Gale White Fellowship                              | 2012             |
| Friar Society, <i>Oldest Honor Society at the University of Texas</i>                            | 2010             |
| <b>NSF Graduate Research Fellowship</b>  | 2009, 2013, 2014 |
| University of Texas <b>Graduate School Recruitment Fellowship</b> , <i>Top 10% in Discipline</i> | 2008             |
| Bucknell University, Thelma Johns Showalter Prize, <i>For Greatest Promise in Public Affairs</i> | 2007             |
| COMAP Mathematical Contest in Modeling, Meritorious Winner                                       | 2005             |
| <b>Phi Beta Kappa</b> , <i>Liberal Arts Honor Society</i>  |                  |
| <b>Tau Beta Pi</b> , <i>Engineering Honor Society</i>  |                  |
| <b>Sigma Pi Sigma</b> , <i>Physics Honor Society</i>   |                  |

## Research Interests

I am interested in the use of geophysical radar remote sensing to study water in all its phases and configurations in the earth system. Currently, my research focuses on the characterization of subglacial water using airborne radar sounding. Subglacial water systems have the potential to facilitate or trigger ice sheet retreat and increased rates of sea level rise. I study the effect of subglacial water on ice sheet flow and also develop new radar analysis techniques to characterize that water. I approach observational science as a system: from instrument development to survey design, data processing, parameter estimation, modeling, and inference. Within that framework, I am particularly interested in the transmission of information and uncertainty between each step and using that understanding to adapt the system to answer fundamental questions about the natural world. I aspire to be both an observational geoscientist with a deep understanding of the instruments I use as well as a geophysical radar engineer with a deep understanding of the science for which I design instruments. This deliberate combination of earth system science and radar system engineering provides a powerful and intellectually rich perspective for the study of water in this and other geophysical settings (i.e. surface water, soil moisture, oceans, precipitation, planetary ice).

## Research Experience

### **University of Texas Institute for Geophysics**

Austin, TX

2008 - Present

Advisor: D.D. Blankenship

*Use focused airborne radar sounding data to constrain the configuration and dynamic state of subglacial water systems beneath Thwaites Glacier, West Antarctica and their potential impact on future ice-sheet stability*

### **Johns Hopkins University Applied Physics Lab**

Laurel, MD

Spring 2012

Advisor: R.K. Raney

*Developed a theoretical framework for processing focused radar sounding data to measure the scattering functions of subglacial interfaces by comparing energy from focusing with different reference-function Doppler-bandwidths*

### **Bucknell University, Electrical Engineering Department**

Lewisburg, PA

2006 - 2007

Advisor: D.F. Kelley

*Optimized design of an antenna for ground penetrating radar using finite difference time domain simulation*

### **Cleveland Clinic Foundation Lerner Research Institute**

Cleveland, OH

Summer 2005

Advisor: S. Roy

*Observed and modeled adult stem-cell kinetics on micro-fabricated surfaces for tissue engineering*

### **Harvard-Smithsonian Center for Astrophysics**

Cambridge, MA

Summer 2004

Advisor: P.B. Reid

*Developed protocol and produced first profile of grazing-incidence optics for the IXO x-ray telescope*

### **Case Western Reserve University, Physics Department**

Cleveland, OH

Summer 2002

Advisor: D.S. Akerib

*Assisted with experimental setup, maintenance, and improvement for the Cryogenic Dark Matter Search II*

## Field Experience

### **The ICECAP Project and Operation Ice Bridge**

Antarctic Seasons: 2008, 2009, 2010

#### **International Airborne Antarctic Geophysical Survey**

Role: **Lead RF Field Engineer** and Radar Operator

Sponsoring Agencies: NSF (US), NASA (US), NERC (UK), AAD (AUS), IPEV (FR), and PNRA (IT)

Bases of Operation: McMurdo (US), Casey (AUS), Terra Nova (IT) Cap Prud'homme (FR)

Targets: Aurora Subglacial Basin, Astrolabe Glacier, Byrd Glacier, Totten Glacier, and Wilkes Glacier

Instruments: VHF Radar, HF Radar, GPS, Gravimeter, Magnetometer, Photon-Counting Lidar

*Participated in flight operations, instrument development, and geophysics and navigation for an international airborne geophysics survey*

*Led the RF development, testing, and operation of the University of Texas HiCARS II airborne ice-penetrating radar sounder*

## Teaching Experience

Short Course on Ice Sheet Sounding Radar

UTIG Airborne Geophysics Group

Spring 2010

*Taught a short course on radar principles and their application to focused airborne radar sounding of ice*

High School Science Olympiad Coach

Liberal Arts and Sciences Academy

2007 - Present

*Placement Nationally: 30<sup>th</sup> (2007), 19<sup>th</sup> (2008), 8<sup>th</sup> (2009), 7<sup>th</sup> (2010), 9<sup>th</sup> (2011), 7<sup>th</sup> (2012)*

Astronomy National Event Supervisor

Science Olympiad National Championships

2003 - Present

*Write rules and National Championship Exam for high school and middle school students*

## Synergistic Activities

|  |  |                |
|--|--|----------------|
| Jupiter Icy Moon Explorer (ESA)              | <i>Radar Sounder Working Group</i>       | 2011 - present |
| Earth and Space Sciences Committee           | <i>National Science Olympiad</i>         | 2003 - Present |
| Physics Committee                            | <i>National Science Olympiad</i>         | 2011 - Present |
| Europa Science Definition Team (NASA)        | <i>Technical White Paper Author</i>      | Summer 2012    |
| Clinton Global Initiative University         | <i>Energy and Climate Change Session</i> | Spring 2009    |
| Freescale Semiconductor University Relations | <i>Program Lead</i>                      | 2007 - 2008    |
| Journal of Geophysical Research              | <i>Reviewer</i>                          |                |
| Geophysical Research Letters                 | <i>Reviewer</i>                          |                |

## Outreach

|   |  |             |
|---|--|-------------|
| Aurora Australis, AAD Voyage: Casey to Hobart         | <i>Onboard Science Lecture Speaker</i> | Spring 2011 |
| Bucknell University Physics Department                | <i>Weekly Colloquium</i>               | Fall 2010   |
| University Methodist Church, Austin, TX               | <i>Guest Speaker</i>                   | Spring 2010 |
| Solon High School, Solon, OH                          | <i>Guest Speaker</i>                   | Spring 2010 |
| Tejas Club, Austin, TX                                | <i>Life Raft Debate Winner</i>         | Spring 2010 |
| University of Texas Institute for Geophysics          | <i>Brownbag Speaker</i>                | Spring 2009 |
| Science Olympiad Coaches Clinic, Dearborn, MI         | <i>Astronomy Session Speaker</i>       | Fall 2008   |
| Tufts University, Wright Center for Science Education | <i>Space Science Workshop Speaker</i>  | Summer 2004 |

## Professional Affiliations

American Geophysical Union  
 International Glaciological Society  
 IEEE Geoscience and Remote Sensing Society  
 IEEE Antennas and Propagation Society

## Mentoring

### Undergraduate Students

|                 |   |                                |                |
|-----------------|---|--------------------------------|----------------|
| Arami Rosales   | <i>University of Texas, Austin</i>              | <i>Physics</i>                 | 2011 - Present |
| Evelyn Powell   | <i>University of Texas, Austin</i>              | <i>Physics, Plan II Honors</i> | 2010 - Present |
| John Desantos   | <i>University of Texas, Austin</i>              | <i>Physics, Plan II Honors</i> | 2008 - Present |
| Tad Komack      | <i>University of Chicago</i>                    | <i>Geophysical Science</i>     | 2008 - Present |
| Leo Breston     | <i>University of Illinois, Urbana-Champaign</i> | <i>Engineering</i>             | Summer 2012    |
| Harris Davidson | <i>University of Illinois, Urbana-Champaign</i> | <i>Engineering</i>             | Summer 2012    |

### High School Students

|                     |                         |   |   |
|---------------------|-------------------------|---|---|
| Marc Sands          | <i>LASA 2010 - 2012</i> | <i>Now Studying Physics</i>               | <i>At the University of Chicago</i>                 |
| Daniel Wang         | <i>LASA 2010 - 2012</i> | <i>Now Studying Mathematics</i>           | <i>At the Massachusetts Institute of Technology</i> |
| Chris Wang          | <i>LASA 2010 - 2012</i> | <i>Now Undeclared</i>                     | <i>At the Columbia University</i>                   |
| Calvin Ling         | <i>LASA 2010 - 2012</i> | <i>Now Studying Business</i>              | <i>At Stanford University</i>                       |
| Victoria Cui        | <i>LASA 2009 - 2011</i> | <i>Now Studying Neuroscience</i>          | <i>At Columbia University</i>                       |
| Jeffery Holzgrafe   | <i>LASA 2009 - 2011</i> | <i>Now Studying Chemical Engineering</i>  | <i>At Olin College</i>                              |
| Chloe Ling          | <i>LASA 2009 - 2011</i> | <i>Now Studying Chemistry</i>             | <i>At the California Institute of Technology</i>    |
| Angela Liu          | <i>LASA 2009 - 2011</i> | <i>Now Undeclared</i>                     | <i>At Yale University</i>                           |
| Eliza McDonald      | <i>LASA 2008 - 2010</i> | <i>Now Studying Astrophysics</i>          | <i>At the University of California, Berkeley</i>    |
| Rose Kent McGlew    | <i>LASA 2008 - 2010</i> | <i>Now Studying Forensic Science</i>      | <i>At the University of Oregon</i>                  |
| Frasier Liljestrand | <i>LASA 2008 - 2009</i> | <i>Now Studying Geoscience</i>            | <i>At Rice University</i>                           |
| Ryan Doubrava       | <i>LASA 2008 - 2009</i> | <i>Now Studying Classics</i>              | <i>At the University of Texas, Austin</i>           |
| Andrew Vanderberg   | <i>LASA 2008 - 2009</i> | <i>Now Studying Physics</i>               | <i>At the University of California, Berkeley</i>    |
| Jonathan Hillis     | <i>LASA 2008 - 2009</i> | <i>Now Studying Environmental Studies</i> | <i>At Carleton College</i>                          |

## Publications

### Refereed Articles

A.P. Wright, D.A. Young, J.L. Roberts, **D.M. Schroeder**, J.L. Bamber, J.A. Dowdeswell, N.W. Young, A.M. Le Brocq, R.C. Warner, A.J. Payne, D.D. Blankenship, T.D. van Ommen, M.J. Siegert. *Evidence for a Hydrological Connection Between the Ice Divide and Ice Sheet Margin in the Aurora Subglacial Basin Sector of East Antarctica*, JGR Earth Surface ,117, March 2012

D.A. Young, A.P. Wright, J.L. Roberts, R.C. Warner, N.W. Young, J.S. Greenbaum, **D.M. Schroeder**, D.E. Sugden, J.W. Holt, D.D. Blankenship, T. Van Ommen, M.J. Siegert. *A Dynamic Early East Antarctic Ice Sheet Suggested by Ice Covered Fjord Landscapes*, **Nature**, 2, June 2011

### Selected Abstracts: Invited Talks

**D.M. Schroeder**. *Interpretation of Subglacial Hydrologic Systems from Radar Echo Specularity: Application to Thwaites Glacier, West Antarctica*, Johns Hopkins University Applied Physics Lab, July 2012

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *Interpretation of Sub-resolution Bedform and Subglacial Hydrologic Network Geometries from Radar Echo Specularity: Application to Thwaites Glacier, West Antarctica*, AGU Fall Meeting, December 2011

### Selected Abstracts: Oral Presentations

D.A. Young, J.L. Roberts, A.P. Wright, J.S. Greenbaum, S.D. Kempf, G. Ng, T.G. Richter, J.W. Holt, E. Le Meur, **D.M. Schroeder**, R.C. Warner, N.W. Young, D.D. Blankenship, M.J. Siegert, T. Van Ommen. *ICECAP Data Over the Periphery of East Antarctica: A New View of a Crucial Ice Sheet*, SCAR Open Science Conference, Portland, OR, July 2012

D. D. Blankenship, B. E. Schmidt, D. A. Young, **D.M. Schroeder**, J.S. Greenbaum. *The Search for a Habitable Europa: Radar, Water, and an Active Ice Shell*, EPSC-DPS Joint Meeting, October 2011

D.A. Young, **D.M. Schroeder**, D.D. Blankenship, C.S. Jackson, M.J. Siegert, A.P. Wright, J.L. Roberts, R.C. Warner, T. van Ommen, N.W. Young. *Under the Antarctic Ice: New Data in the East, New Approaches in the West*, WAIS Workshop, Loveland, CO, September 2011 (**invited**)

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *The Basal Boundary of the Thwaites Glacier Catchment: Characterizing and Anisotropic Hydrological Environment*, International Symposium on Antarctic Earth Science, Edinburgh, UK, July 2011

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *Basal Specularity of Thwaites Glacier, West Antarctica: Results from a New Tool for Evaluating Subglacial Hydrology*, West Antarctic Ice Sheet Workshop, Raystown, PA, September 2010

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *The Subglacial Hydrology of Thwaites Glacier: Characterization and Interpretation of a Basin-Scale Specularity Map*, SCAR Open Science Conference, Buenos Aires, Argentina, August 2010

D.A. Young, D.D. Blankenship, M.J. Siegert, T. Van Ommen, A.P. Wright, J.L. Roberts, J.S. Greenbaum, B.C. Frederick, **D.M. Schroeder**, J.W. Holt, R.C. Warner, N.W. Young. *Extent, geomorphology and geo- physics of the Aurora and Wilkes Subglacial Basins, East Antarctica: Influences on ice sheet architecture*, SCAR Open Science Conference, Buenos Aires, Argentina, August 2010

A.P. Wright, M.J. Siegert, D.A. Young, D.D. Blankenship, T. Van Ommen, J.L. Roberts, J.S. Greenbaum, B.C. Fredrick, **D.M. Schroeder**, J.W. Holt, R.C. Warner, N.W. Young. *Subglacial hydrology of the Aurora Basin, East Antarctica, from the geophysical investigations of the ICECAP project*, SCAR Open Science Conference, Buenos Aires, Argentina, August 2010

J.W. Holt, D.A. Young, D.D. Blankenship, J.S. Greenbaum, **D.M. Schroeder**, T.G. Richter, A.P. Wright, T. Van Ommen, M.J. Siegert, J.L. Roberts, R.C. Warner. *Bed topography of the Byrd Glacier trunk from radar soundings of the ICECAP project*, SCAR Open Science Conference, Buenos Aires, Argentina, August 2010

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *Improved Characterization of Subglacial Hydrology Using Multiple Radar Focusing Windows: Examples from Thwaites Glacier, West Antarctica*, First Antarctic Climate Evolution Symposium, Granada, Spain, September 2009

### *Selected Abstracts: Posters*

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *Comparative Subglacial Hydrology of Thwaites Glacier, Using Basal Specularity*, Chapman Conference, Exploration and Study of Antarctic Subglacial Aquatic Systems, Baltimore, March 2010

**D.M. Schroeder**, D.D. Blankenship, D.A. Young. *Remote Sensing of Subglacial Water Networks with Ice Penetrating Radar*, Chapman on Remote Sensing of Terrestrial Water Cycle, Kona, February 2012

*Updated August 11 2012*