

Dustin M. Schroeder

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EDUCATION

- 2014 **Jackson School of Geosciences, University of Texas**, Austin, TX
Doctor of Philosophy (Ph.D.) in Geophysics
- 2007 **Bucknell University**, Lewisburg, PA
Bachelor of Science in Electrical Engineering (B.S.E.E.), *honors, magna cum laude*
Bachelor of Arts (B.A.) in Physics, *magna cum laude*
Minors in Mathematics and Philosophy

PROFESSIONAL EXPERIENCE

- 2014 – present **Jet Propulsion Laboratory, California Institute of Technology**, Pasadena, CA
Radar Geophysicist and Systems Engineer
- 2012 **Applied Physics Lab, Johns Hopkins University**, Laurel, MD
Graduate Researcher in Radar Sounding Theory, Advisor: R.K. Raney
- 2008 – 2014 **Institute for Geophysics, University of Texas**, Austin, TX
Graduate Researcher in Geophysical Glaciology, Advisor: D.D. Blankenship
- 2007 – 2008 **Freescall Semiconductor**, Austin, TX
Platform Hardware Engineer, Multimedia Applications Division
- 2006 – 2007 **Department of Electrical Engineering, Bucknell University**, Lewisburg, PA
Undergraduate Researcher in Antenna Design, Advisor: D.F. Kelley
- 2005 **Lerner Research Institute, Cleveland Clinic Foundation**, Cleveland, OH
Undergraduate Researcher in BioMEMS, Advisor: S. Roy
- 2004 **Harvard-Smithsonian Center for Astrophysics**, Cambridge, MA
Undergraduate Researcher in Space Telescope X-ray Optics, Advisor: P.B. Reid
- 2002 **Department of Physics, Case Western Reserve University**, Cleveland, OH
Undergraduate Researcher in Experimental Particle Astrophysics, Advisor: D.S. Akerib

AWARDS AND FELLOWSHIPS

- 2014 Best Graduate Student Paper Award, Jackson School of Geosciences
- 2014 National Science Olympiad Heart of Gold Award for Service to Science Education
- 2013 Best Ph.D. Student Speaker Award, Jackson School of Geosciences
- 2013 Jackson School of Geosciences Research Symposium, 1st Place Late-Career Ph.D.
- 2012 NASA Group Achievement Award: Operation Ice Bridge
- 2012 Gale White Fellowship, University of Texas Institute for Geophysics
- 2012 David Brunton Jr. Fellowship, University of Texas Graduate School
- 2010 The Friar Society, The University of Texas
- 2009 – 2014 NSF Graduate Research Fellowship
- 2008 University of Texas Graduate School Recruiting Fellowship
- 2007 Thelma Johnson Showalter Prize, Bucknell University
- 2007 Phi Beta Kappa, Bucknell University
- 2006 Tau Beta Pi, Bucknell University
- 2006 Sigma Pi Sigma, Bucknell University
- 2005 COMAP Mathematical Contest in Modeling, Meritorious Winner

PUBLICATIONS

Refereed Papers

- 2014 **D.M. Schroeder**, D.D. Blankenship, D.A. Young, A.E. Krishner, J.B. Anderson. Radar Sounding Evidence for Deformable Sediments and Outcropping Bedrock Beneath Thwaites Glacier, West Antarctica, *Geophysical Research Letters*
- 2014 G. Grima, D.D. Blankenship, D.A. Young, **D.M. Schroeder**. Surface Slope Control on Firn Density at Thwaites Glacier, West Antarctica: Results from airborne radar sounding, *Geophysical Research Letters*
- 2014 **D.M. Schroeder**, R.K. Raney, D.D. Blankenship. Detecting Subglacial Water Bodies from the Specularity of Radar Bed Echoes. *IEEE Geoscience and Remote Sensing*
- 2014 C. Grima, **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Planetary Landing Zone Assessment by Radar Sounder: Demonstration in Antarctica, *Planetary and Space Science*
- 2014 **D.M. Schroeder**, D.D. Blankenship, D.A. Young, E. Quartini. Evidence for Elevated and Spatially Heterogeneous Geothermal Flux Beneath the West Antarctic Ice Sheet, *Proceedings of the National Academy of Sciences*
- 2014 A.E. Witus, C.M. Branecky, J.B. Anderson, W. Szczucinski, **D.M. Schroeder**, D.D. Blankenship, M. Jakobsson. Meltwater Intensive Glacial Retreat in Polar Environments and Investigation of Associated Sediments: Example from Pine Island Bay, West Antarctica, *Quaternary Science Reviews*
- 2013 **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Evidence for a Water System Transition Beneath Thwaites Glacier, West Antarctica, *Proceedings of the National Academy of Sciences*
- 2013 J.A. MacGregor, G.A. Catania, H.B. Conway, **D.M. Schroeder**, I.R. Joughin, D.A. Young, S.D. Kempf, D.D. Blankenship. Weak Bed Control of the Eastern Shear Margin of Thwaites Glacier. *Journal Glaciology*
- 2012 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, *Journal of Geophysical Research Earth Surface*
- 2011 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*

Papers in Preparation and Review

OBSERVATIONAL GEOPHYSICAL GLACIOLOGY

- D.M. Schroeder**. Airborne Radar Sounding Constraints on the Englacial Attenuation and Thermal Structure of Thwaites Glacier, West Antarctica, in preparation for *Geophysical Research Letters*
- D.M. Schroeder**, C. Grima, D.D. Blankenship. Evidence for Ocean Incursion at the Grounding Zone of Thwaites Glacier, West Antarctica, in preparation for *Nature Geoscience*
- M.G.P. Cavitte, D.D. Blankenship, D.A. Young, **D.M. Schroeder**, M.J. Siegert, E. Le Meur. Radar Stratigraphy Connecting Lake Vostok and Dome C, East Antarctica, Across the Last Two Glacial Cycles, in preparation for the *Journal of Glaciology*

ICE PENETRATING RADAR SOUNDING THEORY

- D.M. Schroeder**. Bright Prospects for Radar Detection of Europa's Ocean, *Icarus* (submitted)
- D.M. Schroeder**, C. Grima, B.A. Campbell. Radar Sounding Losses Through Rough Ice Surfaces, in preparation for *IEEE Geoscience and Remote Sensing Letters*
- D.M. Schroeder** and E. Rodriguez. Limitations and Requirements on the Passive Probing of Europa's Ice Shell Using Jupiter as a Radio Noise Source, in preparation for *Icarus*
- M. Haynes and **D.M. Schroeder**. An Hybrid Eikonal/Point Target Model for Icy Satellite Radar Sounding, in preparation for *IEEE Transactions on Antennas and Propagation*

GEOPHYSICAL RADAR SYSTEM DEVELOPMENT

D. Castelletti, **D.M. Schroeder**, S. Hensley, D.D. Blankenship, A. Moussessian, L. Bruzzone, J.J. Plaut, Y. Gim, D.A. Young, S.D. Kempf, G. Ng. Cross Track Clutter Discrimination Using a Two Channel VHF Radar Sounder: Demonstration in Greenland, in preparation for *Planetary and Space Science*

D.M. Schroeder and C. Grima. Optimal Radar Sounder Frequency Selection for Ice Shell and Particle/Plasma Observation at Europa, in preparation for *Planetary and Space Science*

Technical Reports

- 2014 **D.M. Schroeder**, C. Grima, G.W. Patterson, Y. Gim, D.D. Blankenship, A. Moussessian. Topographic Imager Requirements for Clutter Rejection for the Europa Clipper IPR, Europa Clipper Project, NASA
- 2014 C. Grima and **D.M. Schroeder**. Radio noise power level at Europa, REASON Science Team
- 2012 **D.M. Schroeder**, C. Grima, D.D. Blankenship. Assessing the Utility of the Europa Clipper Radar Sounder to Identify Potential Landing Sites, Europa Science Definition Team, NASA

GRANTS

- 2014 **PI**, Technique development for improved grounding zone characterization using airborne radar sounding (NASA Cryosphere, PI: D.M. Schroeder) \$90,000
- 2014 **Co-I**, Science Team Member, Radar for Europa Assessment and Sounding: Ocean to Near Surface (REASON) for NASA Europa Mission (NASA, PI: D.D. Blankenship) (in review)
- 2014 **Collaborator**, Radar sounding estimation of hydrological and thermal boundary conditions for the deep interior of the West Antarctic Ice Sheet (NSF OPP, PI: D.A. Young) \$ 277,894 (in review)
- 2014 **Collaborator**, Radar Surface Statistical Reconnaissance of Mars for Landing Site and Geologic Characterization (NASA MDAP, PI: D.D. Blankenship) \$88,623 (in review)
- 2014 **Collaborator**, Radar Surface Statistical Reconnaissance of Mars for Landing Site and Geological Characterization of Planetary Bodies (Jackson School Seed Grant, PI: D.A. Young) \$15,311
- 2013 **Collaborator**, Investigating Cryospheric Evolution by Constraining Antarctic geothermal Flux Estimates (ICECAFE) (NASA Sea Level Rise, PI: D.A. Young) \$1,072,227 (ranked selectable)
- 2013 **Key Personnel**, Ice Penetrating Radar (IPR) for Europa Exploration (NASA Instrument Concepts for Europa Exploration. PI: A. Moussessian) \$1,546,860
- 2009 **NSF GRFP Fellow**, Quantifying Sources of Uncertainty in Predicted Contributions of the West Antarctic Ice Sheet to Sea Level Rise (NSF, PI: D.M. Schroeder) \$90,000

INVITED TALKS

- 2014 Department of Geophysics, Stanford University, November 13th
- 2014 Norwegian Polar Research Institute, Tromso, Norway, June 4th
- 2014 Department of Geology, University of Kansas, April 9th
- 2013 Bromery Seminar, Earth and Planetary Science, Johns Hopkins University, November 7th
- 2013 Radar Science and Engineering Section, Jet Propulsion Laboratory, Caltech, September 19th
- 2012 Institute for Geophysics, University of Texas at Austin, September 7th
- 2012 Space Research Group, Applied Physics Lab, Johns Hopkins University, May 3rd

CONFERENCE PARTICIPATION (Selected Abstracts)

- 2014 **D.M. Schroeder**, C.Y. Grima, D.D. Blankenship, Characterizing Englacial Attenuation and Grounding Zone Geometry Using Airborne Radar Sounding, AGU Fall Meeting, San Francisco, December 15th - 19th
- 2014 M.J. Siegert, N. Ross, **D.M. Schroeder**, Channelised Subglacial Hydrology Modulates West Antarctic Ice Stream Basal Conditions and Flow, AGU Fall Meeting, San Francisco, December 15th – 19th
- 2014 **D.M. Schroeder**, Analysis Techniques, Information Content, and Measurement Requirements for Airborne Radar Sounding Data, NASA/NSF Workshop on Instruments for Polar Geology and Geophysics Research, Washington DC, October 9th -10th (**invited**)

- 2014 **D.M. Schroeder**, C. Grima, D.D. Blankenship, Characterizing the Location and Extent of the Thwaites Glacier Grounding Zone Using Airborne Radar Sounding, West Antarctic Ice Sheet Workshop, Julian, CA, September 24th – 27th
- 2014 D.A. Young, E. Quartini, E.M. Powell, **D.M. Schroeder**, T.G. Richter, D.D. Blankenship, Structure of the Marie Byrd Land crustal province from GIMBLE aerogeophysics, SCAR Open Science Conference, Auckland, New Zealand, August 25th – 28th
- 2014 **D.M. Schroeder**, D.D. Blankenship, D.A. Young, E. Quartini, J.B. Anderson, A.E. Witus, Radar-sounding observations of basal water, sediments and geothermal heat flux and their implications for the past and future sea-level contribution of the Amundsen Sea sector of West Antarctica, IGS Symposium on the Contribution of Glaciers and Ice Sheets to Sea-Level Change, Chamonix, France, May 26th – 30th
- 2014 D.D. Blankenship, **D.M. Schroeder**, Airborne Studies of Subglacial Boundaries in West Antarctica, International Symposium on Polar Sciences, Incheon, South Korea, May 27th – 29th
- 2014 D.D. Blankenship, A. Moussessian, **D.M. Schroeder**, K.M. Soderlund, C.Grima, Y. Gim, J.J. Plaut, B.E. Schmidt. Flyby Sounding of Europa's Icy Shell: Radar Investigations, Analogs, and Instruments for the Europa Clipper Mission, Workshop on the Habitability of Icy Worlds, Pasadena, CA, February 5th – 7th
- 2013 **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Quantifying Bedform Geometry, Water Configuration, and Melt Rate Beneath Thwaites Glacier from Radar Scattering Functions. AGU Fall Meeting, San Francisco, CA, December 9th – 13th
- 2013 C. Grima, **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Planetary Surface Roughness Derived from Ice Penetrating Radar Data: Method and Concept Validation in Antarctica. AGU Fall Meeting, San Francisco, CA, December 9th – 13th
- 2013 C. Cura, E. Arnold, B. Karwoski, C. Grima, **D.M. Schroeder**, D.A. Young, D.D. Blankenship. Enhancing Europa Surface Characterization with Ice Penetrating Radar: A Comparative Study in Antarctica. AGU Fall Meeting, San Francisco, December 9th – 13th
- 2013 **D.M. Schroeder**, D.D. Blankenship, D.A. Young. What Can Radar Scattering Tell Us About Past and Future Retreats in the Amundsen Sea Embayment? WAIS Workshop, Sterling, VA, September 29th – October 2nd
- 2013 **D.M. Schroeder**, D.D. Blankenship, R.K. Raney, D.A. Young. Buried Information: Constraining Bed Geometry and Material from the Doppler-Dependent Radar-Scattering Function. International Symposium on Radioglaciology, Lawrence, September 9th – 13th
- 2013 M.G.P. Cavitte, D.D. Blankenship, D.A. Young, **D.M. Schroeder**, M.J. Siegert, E. LeMeur. Extending East Antarctic Ice-Core Chronology with Radar Layer Stratigraphy. IGS International Symposium on Radioglaciology, Lawrence, KS, September 9th – 13th
- 2012 **D.M. Schroeder**, D.D. Blankenship, D.A. Young, E.M. Powell. Configuration of Subglacial Water and Sediments Beneath Thwaites Glacier, West Antarctica: Context for a Potential Basal-Water-Triggered Grounding-Line-Retreat. AGU Fall Meeting, San Francisco, CA, December 3rd – 9th
- 2012 **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Evidence for Ice-Flow-Coupled Subglacial Water Systems Beneath West Antarctica's Potentially Unstable Thwaites Glacier, WAIS Workshop, Eatonville, WA, September 19th – 22nd
- 2012 **D.M. Schroeder**, D.D. Blankenship, D.A. Young. Remote Sensing of Subglacial Water Networks with Ice Penetrating Radar, Chapman Conference on Remote Sensing of Terrestrial Water Cycle, Kona, HI, February 19th – 22nd
- 2011 **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, San Francisco, CA, December 5th – 9th (**invited**)
- 2011 **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 10th – 16th
- 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 3rd – 6th

- 2009 **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 7th – 11th

TEACHING EXPERIENCE

- 2013 Guest Lecturer, The Cryosphere, Rice University, 1 Lecture
 2013 Geophysical Glaciology: Ice Penetrating Radar, UT Institute for Geophysics, 10 Weeks
 2010 Radar Principles Short Course, UT Institute for Geophysics, 4 Weeks

FIELD WORK

- 2010 – 2011 The ICECAP Project and Operation Ice Bridge, East Antarctica (2 Months)
 2009 – 2010 The ICECAP Project, East Antarctica (3 Months)
 2008 – 2009 The ICECAP Project, East Antarctica (3 Months)
 Agencies: NSF (US), NASA (US), NERC (UK), AAD (AUS), IPEV (FR), PNRA (IT)
 Bases: McMurdo (US), Casey (AUS), Terra Nova (IT), Cap Prud'homme (FR)
 Targets: Aurora Subglacial Basin, Astrolabe, Byrd, Totten, and Wilkes Glaciers
 Instruments: VHF Radar, HF Radar, GPS, Gravimeter, Magnetometer, Lidar
 Role: Lead RF Engineer and Radar Operator

INSTRUMENT DEVELOPMENT

- 2014 – present REASON Radar Sounder, NASA Europa Clipper Mission
 2013 – 2014 University of Texas MARFA Dual Phase Ice Penetrating Radar
 2010 – 2011 University of Texas Dual Frequency Ice Penetrating Radar
 2008 – 2011 University of Texas HiCARS II Ice Penetrating Radar

PROFESSIONAL SERVICE

- 2013 – 2014 Technical Assistant, RIME Radar Sounder, JUICE mission, ESA
 2013 – 2014 Technical Assistant, Europa Assessment Group, NASA
 2011 – 2012 Member, Working Group for Europa and Ganymede Radar Sounding
 2010 – 2012 Technical Assistant, Europa Science Definition Team, NASA
 Reviewer: Geophysical Research Letters, Journal of Geophysical Research,
 Journal of Glaciology, IEEE Geoscience and Remote Sensing Letters
 Panels: NASA Cassini Data Analysis and Participating Scientist (external), NASA Operation Ice Bridge
 Affiliations: American Geophysical Union, International Glaciological Society,
 IEEE Geoscience and Remote Sensing Society, IEEE Antennas and Propagation Society

OUTREACH

- 2014 – 2014 Co-Chair, Earth and Space Science Committee, National Science Olympiad
 2013 – 2014 Planetary Science National Event Supervisor, National Science Olympiad
 2004 – 2014 Member, Earth and Space Science Committee, National Science Olympiad
 2014 Guest Speaker, Lakeway Men's Breakfast, Austin, TX
 2007 – 2014 Science Olympiad Coach, Liberal Arts and Sciences Academy, Austin, TX
 2003 – 2013 Astronomy National Event Supervisor, National Science Olympiad
 2011 Onboard Science Lecture, Aurora Australis AAD Voyage: Casey to Hobart

2010	Guest Speaker, University Methodist Church, Austin, TX
2010	Guest Speaker, Solon High School, Solon, OH
2010	Tejas Club Life Raft Debate, Austin, TX
2009	Energy and Climate Facilitator, Clinton Global Initiative University, Austin, TX