

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

- 2015 **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 **D.M. Schroeder**, D.D. Blankenship, D.A. Young, A.E. Kirshner, 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**, 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 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 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 of 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

- 2015 J.S. Greenbaum, D.D. Blankenship, D.A. Young, A.R.A. Aitken, B. Legresy, **D.M. Schroeder**, T.G. Richter, J.L. Roberts, R.C. Warner, T.D. van Ommen, M.J. Siegert. Increasing Ocean Access to Totten Glacier, East Antarctica, *Nature Geoscience* (in review)
- D.M. Schroeder**, C. Grima, D.D. Blankenship. Evidence for Variable Grounding Zone Extent and Shear Margin Bed Conditions Across Thwaites Glacier, West Antarctica, in preparation for *Geophysics*
- D.M. Schroeder**. Airborne Radar Sounding Constraints on the Englacial Attenuation and Thermal Structure of Thwaites Glacier, West Antarctica, in preparation for *Journal of Geophysical Research*
- 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**, C. Grima, B.A. Campbell. Radar Sounding Losses Through Rough Ice Surfaces, in preparation for *Geophysical Research Letters*
- 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. Cross Track Clutter Discrimination Using a Two Channel VHF Radar Sounder: Demonstration in Greenland, in preparation for *IEEE Transactions on Geoscience and Remote Sensing*
- 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

- 2015 **PI**, Development of radar sounder analysis techniques to characterize the subsurface of Europa (JPL SURP, PI: D.M. Schroeder) (in review)
- 2015 **Co-I**, Electromagnetic modeling of radar sounder scattering phenomenology at Europa (JPL SURP: PI: M. Haynes) (in review)
- 2014 **PI**, Technique development for improved grounding zone characterization using airborne radar sounding (NASA Cryosphere, PI: D.M. Schroeder)
- 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) (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)
- 2013 **Collaborator**, Investigating Cryospheric Evolution by Constraining Antarctic geothermal Flux Estimates (ICECAFE) (NASA Sea Level Rise, PI: D.A. Young) (ranked selectable)
- 2013 **Key Personnel**, Ice Penetrating Radar (IPR) for Europa Exploration (NASA Instrument Concepts for Europa Exploration. PI: A. Moussessian)
- 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)

INVITED TALKS

- 2015 Department of Electrical Engineering, University of Colorado, Boulder, February 13th
- 2014 Department of Geophysics, Stanford University, November 13th
- 2014 Norwegian Polar Research Institute, Tromsø, 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, 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. 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

2007 – present Mentor/Supervisor for High School (39), Undergraduate (8), and Graduate (2) Students
 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 – present 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 Operation Ice Bridge, NASA Cassini Data Analysis and Participating Scientist (external),
 NASA Planetary Instrument Concepts for Advancement of Solar System Observations (external)
 Affiliations: International Glaciological Society, American Geophysical Union, Society of Exploration
 Geophysicists, IEEE Geoscience and Remote Sensing, IEEE Antennas and Propagation

OUTREACH

2014 – present Co-Chair, Earth and Space Science Committee, National Science Olympiad
 2013 – present Planetary Science National Event Supervisor, National Science Olympiad
 2015 Keynote Speaker, MIT Science Olympiad Invitational
 2014 Guest Speaker, Lakeway Men's Breakfast, 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, Solon High School, Solon, OH
 2010 Tejas Club Life Raft Debate, Austin, TX
 2009 Energy and Climate Facilitator, Clinton Global Initiative University, Austin, TX