Kenneth Morgan Golden

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Education

B.A.	1980	Dartmouth College, Mathematics and Physics
M.S.	1983	New York University, Courant Institute, Mathematics
Ph.D.	1984	New York University, Courant Institute, Mathematics

Employment

1984-87	NSF Mathematical Sciences Postdoctoral Fellow, Rutgers University
1987-91	Assistant Professor of Mathematics, Princeton University
1991-96	Associate Professor of Mathematics, University of Utah
1996-17	Professor of Mathematics, University of Utah
2007-	Adjunct Professor of Bioengineering, University of Utah
2017-	Distinguished Professor of Mathematics, University of Utah

Professional Summary

- **Visiting Positions:** Institut des Hautes Études Scientifiques (IHÉS), Stanford University Math Department, Università di Roma 1 Math Department, Università di Napoli Physics Department, Moscow Civil Engineering Institute, Université de Provence Aix-Marseille 1 Math Department, Universidade de Saõ Paulo Math Department, Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro, Hong Kong University of Science and Technology Mathematics and Physics Departments, and Université de Paris Nord Math Department.

- **Research Interests:** Sea ice, mathematics of climate, composite materials, percolation theory, homogenization theory for partial differential equations, phase transitions and statistical physics, diffusion processes, inverse problems and remote sensing.

- **Publications and Lectures:** Published in a wide range of journals, including *Science*, *Physical Review Letters*, *Communications in Mathematical Physics*, *J. Statistical Physics*, *Annals of Probability*, *Proc. of the Royal Society A: Mathematical, Physical & Engineering Sciences*, *Geophysical Research Letters*, *Nature Geoscience*, *The Cryosphere*, *IEEE Trans. Geosci. and Remote Sensing*, *Deep Sea Res.*, *Annals of Glaciology*, *Multiscale Modeling and Simulation*, *J. Biomechanics*, *Mech. Materials*, *Ecological Complexity*, *J. Fractal Geometry*. Given over 400 invited lectures on six continents, including 3 presentations in the US Congress.

- **Taught** over 60 classes since 1981 in calculus, linear algebra, and differential equations to over 8,000 first and second year undergraduates in science and engineering, as well as a broad range of advanced undergraduate and graduate courses, including mathematics and climate, sea ice, partial differential equations, functional analysis and spectral theory, composite materials and homogenization, and statistical mechanics.

- **Mentored** 39 undergraduate researchers at the University of Utah since 2001 (from 11 majors across the Colleges of Science, Engineering, and Mines and Earth Sciences), 12 Ph.D. and M.S. students, 7 postdoctoral fellows, and 9 high school students. Many of these students and postdocs have assisted in field experiments on sea ice in the Arctic and Antarctic.

- **Polar Expeditions:** Traveled to the polar regions eighteen times to study sea ice – seven to Antarctica and eleven to the Arctic.

- **Antarctic expeditions:**

  1980 Summer voyage (January - March) aboard the US Coast Guard icebreaker *Polar Sea* into the multiyear pack ice in the western Weddell Sea.

  1994 Antarctic Zone Flux Experiment (ANZFLUX), winter voyage (July-August) aboard the US icebreaker *Nathaniel B. Palmer* into the first year pack ice in the eastern Weddell Sea.

  1998 Mertz Glacier Polynya Experiment, winter voyage (July) aboard the Australian icebreaker *Aurora Australis* – terminated due to serious engine fire after entering sea ice pack.

  1999 Mertz Glacier Polynya Experiment, winter voyage (July-August) aboard the *Aurora Australis*, in and near the Mertz Glacier polynya, Buchanan Bay, Antarctica.

  2007 Sea Ice Physics and Ecosystem Experiment (SIPEX), late winter − early spring voyage (September-October) aboard the *Aurora Australis*, off Wilkes Land, Antarctica; Adam Gully (working toward combined Mathematics B.S./M.S.) assisted in the experiments.

  2010 McMurdo Sound Expedition – Tim Haskell's Field Camp, joint with Antarctica New Zealand, November-December; study area in first year sea ice about 20 km from Scott Base; led a team of four from University of Utah: Cynthia Furse, Professor of Electrical and Computer Engineering (ECE) and Assoc. V.P. for Research, Joyce Lin, NSF VIGRE Postdoc in Mathematics, David Lubbers, Senior Undergraduate in ECE.

  2012 Sea Ice Physics and Ecosystem Experiment II (SIPEX II), late winter − early spring voyage (September-November) aboard the *Aurora Australis*, off the coast of East Antarctica; Christian Sampson (Mathematics Ph.D. student) and David Lubbers (Electrical and Computer Engineering M.S. student) assisted in the experiments.

- **Arctic expeditions:**

  Studied Arctic sea ice in the Chukchi Sea off Barrow, Alaska in **2000, 2001, 2002, 2003, 2004, 2007, 2011, 2012, 2013** and **2016**. Since 2003, eight undergraduates, five graduate students, three postdoctoral fellows, and one professor have assisted in field experiments.

  Instructor for University of Alaska Fairbanks course in 2013 on field techniques in sea ice research, held in Barrow, Alaska and on nearby sea ice.

  2014 Study of Under-Ice Blooms in the Chukchi Ecosystem (SUBICE), six week expedition (May-June) into the Arctic sea ice pack aboard the US Coast Guard icebreaker *Healy*.

- **Research in High School and College:** Studied passive microwave images of Antarctic sea ice during senior year of high school (1975-76) at NASA Goddard Space Flight Center with Jay Zwally; participant in a 1975 NSF Summer Science Training Program at the Institute for Arctic and Alpine Research, University of Colorado, in the mountains west of Boulder. Conducted experiments on melting snow at high altitude, and assisted Andrew Millington in coring peat bogs to analyze pollen distributions for paleoclimatic reconstruction; modeled radar propagation in sea ice for remote sensing of ice thickness during college (1977-80) at the US Army Cold Regions Research and Engineering Lab (CRREL) with Steve Ackley.

- **Media coverage:** My mathematical sea ice research and expeditions have been featured in over 50 newspaper, magazine, and web articles, including profiles in *Science*, *Science News*, *Scientific American*, and *Physics Today*. I have been interviewed on radio, television, and the web, and featured in videos produced by NSF, SIAM, and NBC News.

Honors and Awards

- 2014 Fellow of the Explorers Club[1]. Fourth math professor since 1904 elected as a member.
- 2013 Inaugural Fellow of the American Mathematical Society (AMS).
- 2013 Guest of Honor, Institut des Hautes Études Scientifiques (IHÉS) Gala, *Mathematics: Mind of the Earth*, hosted by the French Ambassador to the US, Pierre Hotel, New York City.
- 2013 AMS-MAA-SIAM Gerald and Judith Porter Public Lecture, Joint Mathematics Meetings, San Diego.
- 2012 Distinguished Scholarly & Creative Research Award, University of Utah, $10,000. First math professor since 1992 to receive the University's highest faculty award for research.
- 2012 Myriad Faculty Award for Research Excellence, University of Utah, College of Science, $20,000. The award recognizes efforts to foster undergraduate research and provide learning experiences for students.
- 2011 Fellow of the Society for Industrial and Applied Mathematics (SIAM), for "extraordinary interdisciplinary work on the mathematics of sea ice."
- 2009 Houghton Lecturer, Department of Earth, Atmospheric and Planetary Sciences, MIT.
- 2009 SIAM Invited Address, Joint Math Meetings (AMS-MAA-SIAM), Washington D.C.
- 2007 University Distinguished Teaching Award, University of Utah. First math professor since 1987 to receive the University's highest teaching award, fourth since 1965.
- Presented my research on mathematics of sea ice and climate in the US Congress:
    1. 6/2003, on behalf of the American Mathematical Society as the AMS Exhibitor at the Coalition for National Science Funding (CNSF) Exhibition and Reception.
    2. 11/2007, only speaker at a Congressional Luncheon Briefing on behalf of the AMS.
    3. 5/2011, SIAM Exhibitor at the CNSF Exhibition and Reception.
- 1996 Member of the Electromagnetics Academy, for "scholarly accomplishments and significant contributions to the field of electromagnetics and its various applications."
- 1994 Faculty Fellow Award, University of Utah.
- 1989 Excellence in Teaching Award, Princeton Engineering Council, Princeton University.
- 1981−84 Hertz Foundation Fellow, NYU.

[1] A multidisciplinary professional society founded in 1904, to advance field research and the scientific exploration of land, sea, air, and space. Members have included Roald Amundsen, Robert Peary, Charles Lindbergh, Sir Edmund Hillary, Chuck Yeager, Neil Armstrong, Jane Goodall, E. O. Wilson, and Walter Munk.

Service and Memberships

- Reviewed papers for journals in math, physics, engineering, and geophysics; reviewed proposals for NSF and other agencies in US and abroad; served on NSF panels and site reviews.

- Served as Modeling Coordinator (overseeing theoretical research) for Office of Naval Research Accelerated Research Initiative on Sea Ice Electromagnetics, 1992-98, with over 60 researchers at 20 institutions, including MIT, JPL/CalTech, U. of Washington, RPI, Ohio State, etc.

- Service to the University of Utah Mathematics Department:

  Faculty Hiring Committee ($1991-93, 1999-2001$)
  Executive Committee ($1992-96, 2002-04$)
  Coordinator for Engineering Math classes ($1996-98$)
  Director of Undergraduate Studies ($2002-08$)
  Chair, Undergraduate Curriculum Committee ($2002-08$)
  Research Experiences for Undergraduates (REU) Program Coordinator ($2003-07$)
  Coordinator for Calculus classes ($2003-05$)
  Instructorship Hiring Committee ($2008-09$)
  Engineering Math Committee ($2008-2012$)
  Undergraduate Curriculum Committee ($2008-2012$)
  Awards Committee ($2014-15$)
  Applied Math Research Committee ($2015-$)
  Chair, Faculty Hiring Committee ($2015-16$)
  Faculty Hiring Committee ($2017-2018$)
  Development Committee ($2017-2018$)

- Service to the University of Utah:

  Member, University of Utah Academic Senate ($2000-03$)
  Member, Academic Senate Executive Committee ($2000-02$)
  Member, College of Science Dean's "Kitchen Cabinet" ($2007-10$)

- Editorial Boards:

  SIAM Journal on Applied Mathematics, 1996−99
  Applicable Analysis, 2004−08
  Mathematics of Planet Earth, Springer Book Series, 2014−

- Member of American Mathematical Society (AMS), Society for Industrial and Applied Mathematics (SIAM), American Geophysical Union (AGU), Intl. Glaciological Society (IGS), American Physical Society (APS), and Amer. Assoc. for the Advancement of Science (AAAS).

- Chair, Committee for Math Awareness Month April 2009, "Mathematics and Climate," Joint Policy Board for Mathematics (AMS, SIAM, ASA, MAA), www.mathaware.org/mam/09. Committee members: Kerry Emanuel (MIT), Inez Fung (UC Berkeley), Margot Gerritsen (Stanford), David Holland (NYU/Courant), Jon Huntsman, Jr. (Governor of Utah), David Neelin (UCLA), Mary Lou Zeeman (Bowdoin), Jay Zwally (NASA/Goddard).

- Chair, American Mathematical Society Committee on Science Policy, 2012−2013; Member at Large, 2010−2013.

- Member, American Mathematical Society Committee on Education, 2012−2013.

- Member, Joint Program Committee, 2013−2014, for the AMS-MAA Joint Mathematics Meetings in Baltimore, Maryland, January 2014.
- American Mathematical Society Representative to the AMS-MAA-SIAM *Gerald and Judith Porter Public Lecture* Committee, 2015–2018.
- Master of Ceremony, 2015 Institut des Hautes Études Scientifiques (IHÉS) Gala, *Math and Games of Chance*, Honored Guest Speakers: Ingrid Daubechies, Richard Garriott de Cayeux, hosted by the French Ambassador to the US, Pierre Hotel, New York City.
- Chair, AMS-MAA-SIAM *Gerald and Judith Porter Public Lecture* Committee, 2017–2018.
- Member, AMS–SIAM Committee to Select the Winner of the George David Birkhoff Prize, 2017–2018.

Organizing Activities

1989−1991 Probability Theory Seminar, Princeton University Math Department

1993 Session on *Composites and Inhomogeneous Media*, AMS Meeting, April, Salt Lake City

1994 Workshop on *Modeling the Electromagnetic Properties of Sea Ice*, January, Hanover, NH

1994 Session on *Percolation Problems*, SIAM Materials Meeting, April, Pittsburgh

1995 Workshop on *Disordered Media and Percolation*, Inst. Math. Appl. (IMA), Nov., Minneapolis

1996 Workshop on *Sea Ice Electromagnetics*, January, Salt Lake City

1997 Session on *Inverse Problems for Composite Media*, SIAM Materials Conf., May, Philadelphia

1999 Session on *Electromagnetic Inverse Problems*, Fourth International Congress on Industial and Applied Mathematics, July, Edinburgh

2002 Co-Chair, Sixth International Conference on the *Electrical Transport and Optical Properties of Inhomogeneous Materials* (ETOPIM6), July, Snowbird, UT

2002 *Random Phenomena in Applied Mathematics*, Conference in Honor of George Papanicolaou's 60th Birthday, January, Stanford

2003 *Electrorheological Fluids*, European Mathematical Society (EMS) and French Mathematical Society (SMAI - SMF), February, Nice

2006 Member, International Organizing Committee for ETOPIM7, July, Sydney

2006 Member, Electrical Transport and Optical Properties of Inhomogeneous Media Assoc. Comm.

2008−2010 Member, Advisory Board of NSF-funded SIAM-based *Climate Math Web Portal*

2009 Invited Minisymposium on *Polar Climate Modeling*, Joint Math Meetings (AMS, MAA, SIAM), January, Washington D.C.

2009 Member, International Organizing Committee for ETOPIM8, June Crete

2010 Invited Symposium on *Sea Ice in the Changing Climate: Modeling a Multiscale Nonlinear System* at the National Meeting of the American Assoc. for the Advancement of Science (AAAS), February, San Diego

2010 Invited Workshop on *Polar Climate*, IPAM Program on Model and Data Hierarchies for Simulating and Understanding Climate, May, Institute for Pure and Applied Mathematics, UCLA

2011 Invited Special Session on Mathematics and Climate, Spring Eastern Sectional Meeting of the American Mathematical Society, College of the Holy Cross, April, Worcester, MA

2011 Ocean Ecologies and their Physical Habitats in a Changing Climate, June 20 - July 1, Mathematical Biosciences Institute, Ohio State

2012 Member, Scientific Program Committee, *Ocean Sciences Meeting*, American Geophys. Union, The Oceanography Soc., American Soc. of Limnology and Oceanography, February, Salt Lake City

2014 Member, Scientific and Editorial Committees, International Glaciological Society Symposium, March, Hobart, Tasmania

2014 Member, Organizing Committee for the Thirteenth International Continuum Models and Discrete Systems Symposium, July, Salt Lake City, UT

2015 Lead Organizer, American Mathematical Society Mathematics Research Community (MRC) on *Differential Equations, Probability, and Sea Ice*, June, Snowbird, UT – with 39 graduate students and postdoctoral researchers. Co-Organizers: Mary Silber, Deborah Sulsky, Daniel Feltham, and Court Strong.

2015 Chair, Organizing Committee for the *Conference on Mathematics of Sea Ice*, September, Pacific Institute for Mathematical Sciences (PIMS), University of British Columbia, Vancouver. Co-Organizers: Cecilia Bitz (University of Washington), Ian Eisenman (Scripps Inst. Oceanography, UCSD), Mike Meylan (Univ. of Newcastle, AU), Grae Worster (Cambridge University, UK)

2015 Co-organizer of Minisymposium on *Mathematics of Climate: From the Tropics to Antarctica* with Sam Stechmann, International Congress on Industrial and Applied Mathematics (ICIAM), August, Beijing

2015 Co-Organizer of Session on *Planet Earth: Cryosphere, Climate, and the Environment* with Hans Kaper, 2015 SIAM Conference on Mathematical & Computational Issues in the Geosciences, July, Stanford

2017 Member, Scientific Committee of the Isaac Newton Institute Programme on *Mathematics of Sea-Ice Phenomena*, Fall, Cambridge University

2017 Chair, Organizing Committee for Workshop 1: *Multi-scale modelling of ice characteristics and behaviour*, as part of the Isaac Newton Institute Programme on *Mathematics of Sea-Ice Phenomena*, Fall, Cambridge University. Co-Organizers: Daniel Feltham (University of Reading, UK), Marika Holland (National Center for Atmospheric Research), Elizabeth Hunke (Los Alamos National Laboratory), Kaj Riska (Total E&P UK Limited), Vernon Squire (University of Otago, NZ), Courtenay Strong (University of Utah).

Research Grants

1988–90 NSF Grant DMS-8801673 (funded by NSF and AFOSR), Princeton University, "Macroscopic Properties of Random and Quasiperiodic Media," PI: K. M. Golden, $42,000.

1990–92 AFOSR Grant AFOSR-90-0203, Princeton University, "Macroscopic Properties of Random and Quasiperiodic Media," PI: K. M. Golden, $57,000.

1992–93 NSF Grant DMS-9204328 (funded by NSF and AFOSR), U. of Utah, "Mathematical Aspects of Materials Science," PI: K. M. Golden, $35,000.

1992–97 ONR Grant N00014-93-10141, U. of Utah, "Mathematical and Experimental Studies of the Electromagnetic Properties of Sea Ice," PI: K. M. Golden, co-PI: S. A. Johnson (Department of Bioengineering), $379,000.

1993–96 NSF Grant DMS-9307324 (Division of Mathematical Sciences), U. of Utah, "Analysis and Optimization of the Effective Properties of Inhomogeneous Materials," PI: K. M. Golden, co-PI: A. V. Cherkaev, $135,000.

1994–99 ONR Grant N00014-94-10958, U. of Utah, "Electromagnetic Behavior of Sea Ice Microstructure," PI: K. M. Golden, co-PI: S. A. Johnson, $181,000.

1996–00 NSF Grant DMS-9622367, U. of Utah, "Percolation in Composite Materials," PI: K. M. Golden, $72,000.

1997–01 ONR Grant N00014-93-10141, U. of Utah, "Electromagnetic and Acoustic Scattering in the Ocean Environment," PI: K. M. Golden, co-PI: E. Cherkaev, $185,000.

1997–01 NSF Grant OPP-9725038 (Office of Polar Programs), U. of Utah, "Percolation in Sea Ice," PI: K. M. Golden, $290,000.

2000–02 NSF Grant DMS-0076129, U. of Utah, "Critical Phenomena in Composite Media," PI: K. M. Golden, $35,000.

2002–03 NSF Grant DMS-0211211, U. of Utah, "Sixth International Conference on the Electrical Transport and Optical Properties of Inhomogeneous Media," PI: K. M. Golden, co-PI's: S. Blair (Dept. of Electrical and Computer Eng.), G. W. Milton (Dept. of Mathematics), C. Johnson (School of Computing), Z. V. Vardeny (Dept. of Physics), $37,000; Also funded by Army Research Office for $10,000.

2002–06 NSF Grant DAS-0222171 (Division of Atmospheric Sciences), U. of Utah and U. of Alaska Fairbanks, Collaborations in Mathematical Geosciences (CMG): "Microstructural Controls on Transport Processes in Geophysical Systems," with REU Supplement, PI: K. M. Golden, co-PI: H. Eicken (UAF), $733,000.

2005–09 NSF Grant DMS-0537015, U. of Utah, "Analysis and Computation of Electromagnetic Transport in Composite Materials," with REU Supplement, PI: K. M. Golden, co-PI: D. Dobson, $403,000.

2006–07 NSF Grant DMS-0629032, U. of Utah, "Electrical Transport and Optical Properties of Inhomogeneous Media (ETOPIM) Conference Traveler Funding," PI: G. W. Milton, co-PI's: K. M. Golden and Z. V. Vardeny (Dept. of Physics), $19,600.

2006–12 NSF Grant DMS-0602219, U. of Utah, "EMSW21-VIGRE: Vertical Integration in Mathematics at the University of Utah," PI: A. Bertram, co-PI: D. Dobson, Senior Personnel: F. Adler, E. Cherkaev, K. M. Golden, N. Korevaar, G. Savin, K. Schmitt, and P. Trapa, $3,500,000.

2009–13 NSF Grant ARC-0934721 (Arctic Natural Sciences), U. of Utah and U. of Alaska Fairbanks, Collaborations in Mathematical Geosciences (CMG): "Mathematics and Electromagnetics for Monitoring Transport Processes in Sea Ice," PI: K. M. Golden, co-PI's: Hajo Eicken, Elena Cherkaev, Jingyi Zhu, Senior Personnel: Cynthia Furse, $850,000.

2010–11 University of Utah Research Instrumentation Grant, "Climate Change and Electromagnetic Monitoring of Sea Ice Processes" (portable network analyzer and DC resistance meters for laboratory and polar field measurements), PI: K. M. Golden, $29,960.

2010–13 NSF Grant DMS-1009704, "Phase Transitions in Composite Media," PI: K. M. Golden, $307,000.

2010–16 NSF Grant DMS-0940249, "Collaborative Research: Mathematics and Climate Change Research Network," PI's: C. Jones, UNC, Chapel Hill; D. Camp (Cal Poly, San Luis Obispo), C. Danforth (U. Vermont), I. Fung (UC Berkeley), K. M. Golden (U. Utah), D. Holland (NYU), E. Kostelich (Arizona State U.), R. McGehee (U. Minnesota), R. Pierrehumbert (U. Chicago), M. Silber (Northwestern), K. K. Tung (U. Washington), and M. L. Zeeman (Bowdoin). $5,000,000 (total for the 12 grants).

2012–13 ONR Grant N00014-12-10861, Applied and Computational Analysis Program, "Spectral Theory of Advective Diffusion in the Ocean," PI: K. M. Golden, co-PI's: N. B. Murphy and J. Zhu, $50,000.

2012–15 ONR Grant N00014-13-10291, Arctic and Global Prediction Program, "Multiscale Models of Melting Arctic Sea Ice," U. of Utah and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), PI: K. M. Golden, co-PI's: D. K. Perovich, C. Strong and B. Alali, $628,206.

2014–15 NSF Grant DMS-1434212, "Conference Proposal: Thirteenth International Conference on Continuum Models and Discrete Systems," U. of Utah, PI: K. M. Golden, co-PI's: A. Cherkaev, Y. Epshteyn, G. W. Milton (Dept. of Mathematics), $35,000.

2014–17 NSF Grant DMS-1413454, "Homogenization for Sea Ice," PI: K. M. Golden, co-PI's: E. Cherkaev (Dept. of Mathematics) and C. Strong (Atmospheric Sciences), $320,000.

2015 Pacific Institute for Mathematical Sciences Conference Grant, "Conference on the Mathematics of Sea Ice," PI: K. M. Golden, CA$20,000.

2015–16 ONR Grant N00014-15-1-2455, Applied and Computational Analysis Program, "Conference on the Mathematics of Sea Ice," PI: K. M. Golden, $25,000.

2017–20 NSF Grant DMS-1715680, "Random Matrix Theory for Homogenization of Composites," PI: K. M. Golden, co-PI's: E. Cherkaev and T. Alberts, $353,794.

2017–18 ONR Grant, Applied and Computational Analysis Program, "Newton Institute Workshop on Multiscale Modeling for Ice Characteristics and Behavior," PI: K. M. Golden, $10,000.

2017–20 ONR Grant, Applied and Computational Analysis Program, "Multiscale Homogenization for Sea Ice," PI: K. M. Golden, co-PI's: E. Cherkaev (Dept. of Mathematics) and C. Strong (Atmospheric Sciences), under review.

TOTAL FUNDING: $13.8 M

Undergraduate Research Students

1992–94 Eric Bair (Mathematics), *Bounds on the complex permittivity of sea ice.*

2001–04 Troy Finlayson (Physics), *Thermal conductivity of sea ice.* Traveled to the Arctic, and lectured on this research. Received M.D. from U. of Utah Medical School in 2008.

2002–05 Amy Heaton (Chemistry), *Fluid permeability of sea ice.* Traveled to the Arctic twice for research. Gave numerous lectures on her research, including an Undergraduate Math Research Conf. at Ohio State (2003), the Physics Dept. at Victoria University, New Zealand (2004), the Utah State Legislature (2004), and with Golden at an exhibition in the US Congress in June 2003. Finished a Ph.D. in Chemistry at U. of Utah in 2008.

2002–04 Ben Murphy (Mathematics, Physics), *Statistical mechanics of phase transitions.*

2002–03 Rhett Hadley (Biology), *Enzymatic foraging of sea ice bacteria.* Traveled to the Arctic for this research.

2002–05 Ali Jabini (Electrical and Computer Engineering, Mathematics), *Network model for fluid flow in sea ice.* Traveled to the Arctic for research. Gave numerous lectures, and subsequently received an M.S. in Electrical Engineering at Columbia University.

2004–07 Olakunle Eso (Mathematics, Electrical and Computer Engineering), *Numerical solutions of the Helmholtz equation for electromagnetic waves in layered composites.*

2004–08 Megan Morris (Mathematics, Biomedical Engineering), *Network models for fluid flow in sea ice and air flow in lungs.* Traveled to the Arctic for research. Gave numerous lectures on her research.

2004–08 Adam Gully (Mathematics), *Complex permittivity of sea ice; recovery of microstrucural characteristics; fluid flow in sea ice.* Traveled to the Arctic for research. Assisted in experiments on fluid and electrical transport in sea ice in Antarctica, Sept.–Oct. 2007. Gave numerous presentations on his research, and interviews on the expedition. In 2008 Adam won the Research Scholar Award, the highest research honor given to an undergraduate in the College of Science at the University of Utah.

2006–07 Kellen Petersen (Mathematics, Physics), *Fluid connectivity in rock microstructures.* Gave numerous research lectures. In 2007 Kellen won the College of Science Research Scholar Award. Currently in the Math Ph.D. program at Courant Inst., NYU.

2006–07 Dave Arcilesi (Mathematics, Physics), *Lee-Yang theory in lattice statistical mechanics.*

2007–09 Peter Sommerkorn (Mechanical Engineering, Mathematics), *Experiments on the dynamic behavior of electrorheological (ER) fluids* (led a team of 5 other senior mechanical engineering students in design and implementation of the experiments).

2007–10 Christian Sampson (Mathematics, Physics), *Electrical conductivity of sea ice: analysis of surface impedance tomography data and direct measurements on vertical cores.*

2008–10 Stephen Greene (Mathematics), *Diffusion limited aggregation models for ER fluid microstructures, theory and numerical simulations.*

2009 Ginger Dobie (Mathematics), *Modeling ice-albedo feedback in the Arctic ocean.*

2009 Jonathan Ng (Mathematics, Physics), *Modeling sea ice albedo.*

2009–10 Bryan Scharman (Electrical and Computer Engineering), main advisor Professor Cynthia Furse, *Development of techniques for measuring the DC conductivity of sea ice.*

2010 Kevin Hammonds (Atmospheric Sciences), *Melt pond evolution.*

2010–11 Erik Gamez and Jacob Hansen (Electrical and Computer Engineering), main advisor Professor Cynthia Furse, *Development of field techniques for measuring the complex permittivity of sea ice.*

2010–11 Kyle Steffen (Mathematics), *Qualitative structure of melt pond geometry.*

Undergraduate Research Students (continued)

2010–2012 David Lubbers (Electrical and Computer Engineering), co-advised with Professor Cynthia Furse, *Development of field techniques for measuring the electromagnetic properties of sea ice*, traveled to Antarctica in 2010 and 2012 and to the Arctic in 2011, 2012, and 2013.

2011–2013 Rajath Thekkedath (Mechanical Engineering), *Ising model for melt pond evolution.*

2011–2012 Sam Preston (Electrical and Computer Engineering), main advisor Professor Cynthia Furse, *Development of methods for measuring the complex permittivity of sea ice.*

2012–2016 Brady Bowen (Mathematics and Physics), *Continuum percolation model for melt pond evolution.*

2012–2015 Boya Song (Computer Engineering), *Network models for melt pond configurations.*

2012 Daniel Khoury (Computer Engineering), *Complex permittivity of random networks.*

2013 Erik Johnson (Mathematics and Physics), *Arctic melt ponds.*

2014–2015 Sarath Thekkedath (Applied Math and Electrical and Computer Engineering), *Complex permittivity of sea ice.*

2014 Kasey Leavitt (Applied Math and Physics), *Cheeger constants for Arctic melt ponds.*

2014–2016 Hanna Kim (Applied Math and Biology), *Sea ice ecology and under-ice algal blooms.*

2015–2016 Mohammad Jabini (Mathematics), *Lattice models for sea ice processes.*

2015–2016 Dallas Taylor (Mathematics), *Width of the marginal ice zone.*

2015 Ethan Carr (Mathematics), *Random matrix theory for composites.*

2015–2017 Ethan Hamilton (Mathematics, Metallurgical Eng.), *Inverse methods for bone.*

2016– Rebecca Hardenbrook (Mathematics), *Advection diffusion in sea ice.*

2016– Ruby Bowers (Applied Mathematics), *Exploring habitability in the sea ice on Europa.*

2017– Matteo Sogne (Mathematics), *Transport in quasiperiodic media.*

2017– McKenzie McLean (Mathematics), *Inverse methods for polycrystalline media.*

2017– Chantel Lapins (Mechanical Engineering, Applied Mathematics), *Inverse homogenization for human bone.*

High School Students

2009–2011 Ryan Baker, Hillcrest High School, *Complex permittivity of sea ice.*

2011–2013 Rebecca Nickerson, West High School, *Lattice models for melt pond evolution.*

2013–2014 Sarah Silcox, West High School, *Fractal geometry of Arctic melt ponds.*

2013–2014 Daniel Liu, West High School, *Thermal conductivity of sea ice; advection–diffusion.*

2014–2015 Mohammad Jabini, West High School, *Lattice models for sea ice processes.*

2014–2016 Anthony Cheng, Hillcrest High School, *Percolation threshold for Arctic melt ponds.*

2014–2016 Everest Fang, Skyline High School, *Advection–diffusion in the sea ice pack.*

2016–2017 Dylan Webb, Skyline High School, *Melt pond percolation on Arctic sea ice.*

2016–2017 Titus Quah, West High School, *Thermal conductivity of sea ice; advection–diffusion.*

Graduate Students

- Romuald Sawicz, Ph.D. 1995, *Bounds on the complex permittivity of multiphase composite materials by analytic continuation.*
- Kelly Macarthur, M.S. 1996, *Inversion of electromagnetic data to recover microstrucural parameters of sea ice.*
- Chris Orum, 1998–2000, *Rigorous inverse bounds on microstructural parameters of composites by complex variable methods* (completed Ph.D. in probability at Oregon State).
- Megan Morris, M.S. 2010, *Sea ice bacteria and extracellular polymeric substances (EPS); fluid permeability of sea ice.*
- Zhu Wang, M.S. 2011, *Analytic continuation bounds for advection−diffusion processes.*
- Ben Murphy, Ph.D. 2012, *Statistical mechanics of electrorheological fluids; spectral measures and random matrix theory for composite structures.*
- Adam Gully, B.S./M.S. 2008, Ph.D. 2012, *Theory and experiments on fluid and electrical transport in sea ice; analytic continuation bounds for polycrystalline composites.* Traveled to the Arctic and Antarctic for research.
- Christian Sampson, Ph.D. 2017, *Multiscale models for sea ice.* Traveled to the Arctic (3 times) and Antarctic for research.
- Kyle Steffen, Ph.D. 2018 (expected), University of Utah Global Change and Ecosystem Center Fellow 2011−2012, *Fluid flow through porous media; evolution of Arctic melt pond geometry.* Traveled to the Arctic for research.
- Huy Dinh, 2014− , *Anomalous diffusion and sea ice dynamics.*
- David Morison (Physics Department, U. of Utah), 2016− , *Random matrix theory for quasiperiodic media; remote sensing and electromagnetic waves in sea ice.*
- Ryleigh Moore, 2017− , *Percolation theory for Arctic melt ponds.*
- Served on Ph.D. and M.S. committees in Mathematics, Physics, Biomedical Engineering, Mechanical Engineering, Chemistry, Meteorology, and Atmospheric Sciences.

Postdoctoral Fellows

- Richard McLaughlin, 1994−1996, NSF Mathematical Sciences Postdoctoral Fellow, Ph.D., Princeton 1994, *Convection enhanced diffusion.*
- Yury Grabovsky, 1995−1997, Ph.D., NYU 1995, *Homgenization for composite materials.*
- Bacim Alali, 2009−2012, Wylie Postdoctoral Fellow (Research Asst. Professor), Ph.D., Louisiana State University 2008, *Fractal structure of polar sea ice packs and melt ponds.* Traveled to the Arctic for research.
- Joyce Lin, 2009−2012, NSF VIGRE Postdoctoral Fellow (Research Asst. Professor), Ph.D., U. North Carolina Chapel Hill 2009, *Modeling the properties of sea ice and ER fluids; measuring the fluid and electrical transport properties of sea ice.* Traveled to the Arctic (2 times) and Antarctic for research.
- Chris Orum, 2011−12, NSF Ed Lorenz Postdoctoral Fellow in the Mathematics of Climate, Ph.D., Oregon State University, 2004, *Inverse algorithms for recovering sea ice microstructure.*

- Ivan Sudakov, 2012−15, NSF Ed Lorenz Postdoctoral Fellow in the Mathematics of Climate, Ph.D., Novgorod State University, St. Petersburg 2012, *Climate bifurcations, melt ponds, and ice-albedo feedback; Ising model for Arctic melt ponds.* Traveled to the Arctic for research.
- Noa Kraitzman, 2015−18, University of Utah Math Department Instructorship, NSF Ed Lorenz Postdoctoral Fellow in the Mathematics of Climate, Ph.D., Department of Mathematics, Michigan State Univ. 2015; *Advection diffusion processes; fluid convection in sea ice, low order models for marginal ice zone dynamics.*

Graduate Courses: Methods of Applied Mathematics, Applied Linear Operator and Spectral Methods, Theory of Inhomogeneous Materials, Percolation Theory, Statistical Mechanics, Analytic Functions of Several Complex Variables, Sea Ice and the Climate System.

Undergraduate Courses: Calculus I, II, and III, Engineering Math, Ordinary Differential Equations, Partial Differential Equations, Mathematics and Climate. Since 2001, I have taught over 5,500 students in 37 sections of Calculus I, II, or III. Since arriving at the University of Utah in 1991, I have taught over 7,500 students in calculus, mostly freshmen and sophomores.

Fall semester 2015: 190 students in two sections of Math 2210, Calculus III.
Spring semester 2016: 15 students in Math 5750/6880, Mathematics and Climate.
Spring semester 2017: 200 students in two sections of Math 1220, Calculus II.
Fall semester 2017: 16 students in Math 5750/6880, Mathematics and Climate.
Spring semester 2018: two sections of Math 2210, Calculus III.

Selected Invited Lectures (from over 400 conference, university, and general lectures)

1989 AMS-SIAM Summer Seminar on the Mathematics of Random Media, Blacksburg, VA
1989 Conference on Random Partial Differential Equations, Oberwolfach
1990 Workshop on Random Partial Differential Equations, Trieste
1991 Homogenization Workshop, MSRI, Berkeley
1992 Sea Ice Electromagnetics Workshop, Cold Regions Research and Eng. Lab (CRREL), N.H.
1993 Invited Address, American Mathematical Society Meeting, Salt Lake City
1993 Progress in Electromagnetics Research Symposium (PIERS93), CalTech
1993 Third International Conference on Electrical Transport and Optical Properties of Inhomogeneous Materials (ETOPIM3), Guanajuato, Mexico
1993 Second Workshop on Composite Media and Homogenization Theory, Trieste
1994 Conference on Emerging Issues in Math. and Comp. from Materials Science, Pittsburgh
1994 Prager Medal Symposium on Heterogeneous Solids, Society for Engineering Science Annual Meeting, Texas A&M
1994 Workshop on Sea Ice Electromagnetics, CRREL, NH
1994 Workshop on Waves in Complex and Random Media, Institute for Mathematics and Applications (IMA), U. of Minn.
1995 PIERS95, Seattle
1995 Workshop on Sea Ice Electromagnetics, CRREL, NH
1995 Tutorial for the Workshop on Disordered Media and Percolation, IMA, Minn.
1996 Fall Meeting of the American Geophysical Union (invited poster), San Francisco
1996 Workshop on the Antarctic Zone Flux (ANZFLUX) Experiment, Barcelona
1996 International Geoscience and Remote Sensing Symposium, Lincoln, NE
1996 Conference on Homogenization and Random Media in Honor of Serguei Kozlov, Marseille
1996 PIERS96, Innsbruck
1996 Applied Mathematics Workshop for Materials Studies and Industrial Applications, Penn State
1996 Sea Ice Electromagnetics Workshop, University of Kansas, Lawrence
1997 PIERS97, Hong Kong
1997 Gordon Conference on Sea Ice Ecology (invited poster), Ventura, CA
1997 The International Society for Optical Engineering (SPIE) 4th Annual Symposium on Smart Structures and Materials, San Diego
1997 First Congress, Intl. Society for Analysis, Applications and Computation, U. of Deleware
1997 Plenary Address, Joint Assemblies of the Intl. Association for the Physical Sciences of the Oceans, and the Intl. Association of Meteorolgy and Atmospheric Sciences, Melbourne
1997 Fourth International Conference on Composites Engineering, Hawaii
1998 American Mathematical Society Meeting, Penn State
1999 International Union of Theoretical and Applied Mechanics Symposium 99/4: Mechanical and Electromagnetic Waves in Structured Media, Sydney
1999 Fifth International Conference on Electrical Transport and Optical Properties of Inhomogeneous Materials (ETOPIM5), Hong Kong
2000 Plenary Address, Third SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia
2000 Statistical Mechanics Conference in Honor of Joel Lebowitz' 70th Birthday, Rutgers Univ.
2000 International Glaciological Society Symposium on Sea Ice and its Interactions with the Ocean, Atmosphere and Biosphere, Fairbanks, Alaska
2000 International Conference on Homogenization and Materials Science, Akron
2000 Distinguished Lecture Series in Mathematical and Physical Sciences, NSF, Wash. D.C.
2001 Plenary Address, Hong Kong Mathematical Society, Hong Kong

2002 Sixth International Conference on Electrical Transport and Optical Properties of Inhomogeneous Materials (ETOPIM6), Snowbird, UT
2003 Random Phenomena in Applied Mathematics, A Conference in Honor of George Papanicolaou's 60th Birthday, Stanford
2003 Applied Mathematics and Applications of Mathematics, European Mathematical Society (EMS) and the French Mathematical Societies (SMAI - SMF), Nice
2004 International Workshop on Nonlinear Waves, Hong Kong
2004 Society for Engineering Science, Prager Medal Symposium, Lincoln, NE
2005 International Glaciological Society Symposium on Sea Ice, Dunedin, New Zealand
2006 International Conference on Antarctic Sea Ice Thickness, Hobart, Tasmania
2006 Seventh International Conference on Electrical Transport and Optical Properties of Inhomogeneous Materials (ETOPIM7), Sydney
2007 SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe
2007 American Mathematical Society Congressional Luncheon Briefing, Capitol Hill, Wash. D.C.
2007 Fall Meeting of the American Geophysical Union, San Francisco
2008 Conference on the Frontiers of Climate Science, Kavli Institute for Theoretical Physics, Santa Barbara
2008 Invited Guest Lecture at the Climate Change Summer School, Mathematical Sciences Research Institute (MSRI), Berkeley, CA
2008 Keynote Address, International Polar Year (IPY) Forum, Society for Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference, Salt Lake City, UT
2009 The SIAM Invited Address at the Joint Math Meetings (AMS, MAA, SIAM), Wash. D.C.
2009 Gordon Research Conference in Polar Marine Science, Lucca (Barga), Italy
2009 Workshop on Antarctic Sea Ice in the International Polar Year, Lucca (Barga), Italy
2009 Workshop on Flows and Networks in Complex Media, Institute for Pure and Applied Mathematics (IPAM), UCLA, Los Angeles
2009 Public Lecture on Climate Change and the Mathematics of Sea Ice, IPAM/UCLA
2009 Houghton Lectures on "Sea Ice, Climate, and Multiscale Composites," Department of Earth, Atmospheric and Planetary Sciences, MIT
2009 SIAM Conference on Dynamical Systems, Minisymposium on Mathematical Challenges in Climate Change: Some Examples, Snowbird, UT
2009 Eighth International Conference on Electrical Transport and Optical Properties of Inhomogeneous Media (ETOPIM8), Crete
2009 Mathematics of Climate Change, First Pacific Rim Mathematical Assoc. Congress, Sydney
2009 Kieval Lecture, Humboldt State University, Arcata, CA
2010 Plenary Lecture, Harvey Mudd College Annual Mathematics Conference: The Mathematics of Environmental Sustainability and Green Technology, Claremont, CA
2010 The Brown Symposium for Undergraduates in the Mathematical Sciences, Math and the Environment, Brown University, Providence, R.I.
2010 Special Session on Random Matrix Theory and Applications, American Mathematical Society Spring Western Section Meeting, Albuquerque
2010 The First Workshop on Bone Tissue: Hierarchical Simulations for Clinical Applications, UCLA/Orthopedic Hospital, Department of Orthopedic Surgery and UCLA's Institute of Pure and Applied Mathematics (IPAM), Los Angeles
2010 Mini-Workshop on Mathematics of Sea Ice in the Climate System (two lectures), Institute of Pure and Applied Mathematics (IPAM), UCLA, Los Angeles
2010 SCAR/AGCS Antarctic Sea Ice Workshop II, Tromsø, Norway
2010 Intl. Symposium on Sea Ice in the Physical and Biogeochemical System, Tromsø, Norway

2010 Plenary Science Lecture on Mathematics and Climate, Conference on Emerging Topics in Dynamical Systems and Partial Differential Equations, DSPDE's 10, SIAM, RSME (Real Sociedad Matemática Española), SCM (Societat Catalana de Matemátiques) and SEMA (Sociedad Española de Matemática Aplicada), Barcelona

2010 MSRI-NCAR Summer School on Mathematics of Climate Change, National Center for Atmospheric Research (NCAR), Boulder

2010 Workshop on The Multi-Phase Physics of Sea Ice: Growth, Desalination and Transport Processes, Santa Fe

2011 Public Lecture, Conference on Probability Theory, Statistical Physics, and Applications, NYU Abu Dhabi, United Arab Emirates

2011 Simon Fraser University Seminar Series on Global Warming, a Scientific Perspective, Invited Lecture on Evidence for Warming in the Arctic and Antarctic, Burnaby, Canada

2011 Public Lecture on Climate Change and the Melting Polar Ice Caps, Antarctic Lecture Series, University of Utah Marriott Library, Salt Lake City

2011 Invited Plenary Address, Spring Eastern Sectional Meeting of the American Mathematical Society, College of the Holy Cross, Worcester, MA

2011 Ocean Ecologies and their Physical Habitats in a Changing Climate (two lectures), Mathematical Biosciences Institute (MBI), Ohio State University, Columbus

2011 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011), Minisymposium on Composites and Inversion: Asymptotic and Computational Methods, Vancouver

2011 NSF-SIAM Workshop on Collaborations in Mathematical Geoscience, Washington DC

2011 AMS Fall Western Section Meeting, Minisymposium on *Electromagnetic Wave Propagation in Complex and Random Environments*, Salt Lake City

2011 Keynote Address, Annual Conference of the American Mathematical Association for Two-Year Colleges, Austin, TX

2011 Neal Thorpe Memorial Lecture, Twentieth Regional Conference on Undergraduate Research, Murdock Charitable Trust, Seattle

2012 Public Lecture, Pacific Institute for the Mathematical Sciences, Vancouver

2012 European Geosciences Union General Assembly 2012, Session on Interactions among Biology, Structure and Processes in Sea Ice, Vienna

2012 Arctic Ocean Ecosystem Workshop (pre-conference presentation), Barrow, AK

2012 9th AIMS Conf. on Dynamical Systems, Differential Equations and Applications, Session on Mathematical Modeling of Upwelling Ocean Currents and Related Phenomena, Orlando

2012 IUGG Conference on Mathematical Geophysics, Edinburgh

2012 White Nights Workshop: Exotic Structures and Homogenization, St. Petersburg, Russia

2012 Plenary Lecture, Ninth International Conference on Electrical Transport and Optical Properties of Inhomogeneous Media (ETOPIM9), Marseille

2012 Invited Lecture, Applied Computational Analysis Program and Arctic and Global Prediction Program, Office of Naval Research, Arlington, VA

2012 IPAM Conference on Climate Modeling, UCLA, Lake Arrowhead, CA

2013 MAA-AMS-SIAM Gerald and Judith Porter Public Lecture, Joint Mathematics Meetings, San Diego

2013 Special Session on Recent Advances and New Challenges in Applied Analysis, Joint Mathematics Meetings, San Diego

2013 Recent Developments in Applied Mathematics, A Conference to Honor George Papanicolaou's 70th Birthday, Stanford University, CA

2013 College of Science Invited Public Lecture, Weber State University, Ogden, UT

2013 IMA Workshop on Stochastic Modeling of the Oceans and Atmos., U. Minnesota, Minneapolis
2013 Focus on Mathematics, Brigham Young University, Provo, UT
2013 IMA Public Lecture, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis
2013 Distinguished Lecturer Series, Inaugural Lecture, Department of Mathematics, University of Memphis, TN
2013 Christie Public Lecture, co-hosted by the Department of Mathematics and the Bowdoin College Museum of Art, coinciding with a museum exhibition April 4, 2013 - June 2, 2013, entitled, "Sense of Scale, Measure by Color: Art, Science, and Mathematics of Planet Earth," featuring paintings and sculpture by Per Kirkeby, images of rocks, some of my Antarctic sea ice photos, and other ice images. Bowdoin College, Maine
2013 First SIAM Public Lecture, Department of Mathematical Sciences, Florida Institute of Technology, Melbourne, FL
2013 Minisymposium on *Multiscale Modeling, Microstructure, and Local Field Props. of Heterogeneous Media*, SIAM Conf. on Mathematical Aspects of Materials Sci., June, Philadelphia
2013 Minisymposium on *Stochastic Homogenization: Quantitative Theory and Application to Materials Science*, SIAM Conf. on Mathematical Aspects of Materials Sci., June, Philadelphia
2013 Distinguished Lecture Series, California COSMOS Summer High School Program, UC Davis
2013 Inaugural Bernoulli Society Public Lecture, 36th Conference on Stochastic Processes and their Applications, Boulder
2013 34th Progress in Electromagnetics Research Symposium (PIERS), Stockholm, Sweden
2013 G. Milton Wing Lectures, University of Rochester, Rochester, NY
2013 Public Lecture, University of North Carolina, Chapel Hill
2013 Guest of Honor and Presenter, Institut des Hautes Études Scientifiques (IHÉS) Gala, Theme of *Mathematics of Planet Earth 2013*, New York City
2013 Keynote Speaker, Mathematics of Planet Earth 2013, Platform for Mathematics in The Netherlands, Utrecht
2013 Invited Speaker, Fall Meeting of the American Geophysical Union (AGU), December 2013, Union Session on *Mathematics of Planet Earth*, San Francisco
2014 Special Session on Fractal Geometry: Mathematics of Fractals and Related Topics, Joint Mathematics Meetings, Baltimore
2014 Science at Breakfast, College of Science, University of Utah, Salt Lake City
2014 Invited Speaker, Inaugural KOzWaves Conference (Kiwi-Aussi Waves), Newcastle, Australia
2014 Invited Address, Session on *Physics of Climate*, American Physical Society, Denver
2014 Math Encounters, Public Presentation Series (sponsored by the Simons Foundation), National Museum of Mathematics, New York City
2014 International Glaciological Society Symposium, Hobart, Tasmania
2014 Minisymposium on *Mesoscale and nonlocal models of materials with microstructure*, SIAM Annual Meeting, Chicago
2014 Public Lecture, 13^{th} Continuum Models and Discrete Systems Symposium, Salt Lake City
2014 Lorentz Center Workshop on *Spatio-temporal dynamics in ecology*, Leiden, Netherlands
2014 Workshop on *Random matrix theory, algorithms & applications* at the Conference on Foundations of Computational Mathematics, Montevideo, Uruguay
2015 Invited Session on *Mathematics of Planet Earth* at the 2015 Joint Math Meetings, San Antonio, TX
2015 Public Lecture, National Festival of Mathematics, Smithsonian Institution, Washington D.C.
2015 Invited Lecture, 113th Rutgers Statistical Mechanics Conference, New Brunswick, NJ
2015 Invited Speaker, Frontiers in Applied and Computational Mathematics, Session on Pattern Formation in Geoscience, New Jersey Institute of Technology

2015 Lecturer (and organizer), American Mathematical Society Mathematics Research Community on Differential Equations, Probability, and Sea Ice, Two lectures: *Introduction to Sea Ice*, and *Mathematics of Sea Ice*, Snowbird, UT

2015 Invited Lecture, Session on *Mathematics and Observations of Earth Systems*, 26th International Union of Geodesy and Geophysics General Assembly, Prague

2015 Invited Lecture, Minisymposium on *Applied Dynamical Systems*, Univ. of Leiden, NL

2015 Minisymposium Lecture, *Mathematics of Climate: From the Tropics to Antarctica*, International Congress on Industrial and Applied Mathematics (ICIAM), Beijing

2015 Plenary Lecture, *PIMS Conference on the Mathematics of Sea Ice*, Pacific Institute for the Mathematical Sciences (PIMS), Vancouver

2015 Columbia University Chapter of the Society for Industrial and Applied Mathematics

2015 KOZWaves, The 2nd Australasian Conference on Wave Science, Adelaide, Australia

2016 Opening Invited Lecture, Special Session on Differential Equations, Probability and Sea Ice, Joint Mathematics Meetings, Seattle, Washington

2016 Invited Lectures (2), Workshop 2: *From the Grain to the Continuum: Two Phase Dynamics of a Partially Molten, Polycrystalline Aggregate*, Programme on *Melt in the Mantle*, Isaac Newton Institute for Mathematical Sciences, U. Cambridge, UK

2016 Carl J. Rees Distinguished Lecture, College of Arts and Sciences, and Mathematics Department Rees Colloquium, University of Delaware, Newark, DE

2016 Invited Lecture, Minisymposium on "Complex Analysis, Optimization, and Herglotz Functions in Passive Electromagnetics and Composite Media," SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia

2016 Invited Lecture, Minisymposium on "Inverse Problems in Materials Science" SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia

2016 Invited Lecture, Session on *Fractal Geometry, Dynamical Systems, and Their Applications*, 11th AIMS Conf. on *Dynamical Systems, Differential Equations and Applications*, Orlando

2016 26th International Union of Pure and Applied Physics Conference on Statistical Physics, STATPHYS26, contributed lecture, Lyon, France

2016 37th Progress in Electromagnetics Research Symposium (PIERS), Shanghai, China

2016 Natural Sciences Colloquium, Colgate University, Hamilton, NY

2016 Boeing Distinguished Colloquium in Applied Mathematics, University of Washington, Seattle

2016 Fall American Geophysical Union Meeting, Special Session on *Integrating Observations and Models to Better Understand a Changing Arctic Sea Ice Cover*, San Francisco

2017 42nd Conference of the Middle European Cooperation in Statistical Physics, Lyon, France

2017 SIAM Conference on Computational Science and Engineering, Minisymposium on *New Approaches to Complex Coupled Multiscale Systems*, Atlanta

2017 ICERM Public Lecture, NSF Institute for Computational and Experimental Research in Mathematics, Brown University, Providence, RI

2017 Invited Lecture, Conference on Herglotz-Nevanlinna Functions and Their Applications, Mittag-Leffler Institute, Stockholm

2017 Invited Lecture, Memorial Conference in Honor of Joseph B. Keller, Stanford

2017 Invited Talk, Focus Session on "Metamaterials and Transformation Optics," Progress in Electromagnetics Research Symposium (PIERS2017), St. Petersburg, Russia

2017 Invited Plenary Speaker, SIAM Annual Meeting, Pittsburgh

2017 Future of Ice Seminar, Applied Physics Laboratory, University of Washington, Seattle

2017 Invited Speaker, Les Houches Summer School on *Fundamental Aspects of Turbulent Flows in Climate Dynamics*, Les Houches, France

2017 US-China Cooperative Workshop on *Impacts of a changing cryosphere on high elevation climate, weather, and aquatic ecosystems*, Qinghai Lake, China

2017 Invited Lecture, AMS Fall Southeastern Sectional Meeting, Special Session on *Fractal Geometry, Dynamical Systems, and Their Applications*, Orlando

2017 Invited Speaker, International Conference and Expo on Condensed Matter Physics, Valencia, Spain

2017 Invited Talk, Isaac Newton Institute Workshop on *Multi-scale modelling of ice characteristics and behaviour*, Cambridge University, UK

2018 Guest Speaker, U. of Utah Research Administration NAKAMA Program, Salt Lake City

2018 KOZWaves, The 3rd Australasian Conference on Wave Science, Auckland, NZ

2018 Minisymposium on *Multiscale Solids and Homogenisation*, 10th European Solid Mechanics Conference, Bologna, Italy

2018 Minisymposium on *Applications of Herglotz-Nevanlinna Function Theory to Electromagnetics, Composites, and Dirichlet-to-Neumann maps*, SIAM Conference on Mathematical Aspects of Materials Science, Portland

2018 Oberwolfach Workshop on *Calculus of Variations*, Germany

Selected Colloquia and Seminars

Aurora Australis - Australian Icebreaker while in Antarctic pack ice ('99,'07,'12)

Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Tasmania ('09)

Bell Labs ('84)

CalTech ('91,'02)

Chinese University of Hong Kong ('98)

Columbia University ('90)

Columbia College Chicago, Science and Mathematics Colloquium ('08)

CRREL – US Army Cold Regions Research and Engineering Laboratory, NH ('79, '85, '87)

Courant Institute, New York University ('84, '89, '91, '93, '94, '97, '00, '05, '09)

Duke University ('87,'01)

École Normale Supérieure ('84)

École Supérieure de Physique et Chimie Industrielle ('96)

Georgia Tech ('95)

Harvard University Climate Seminar ('10)

Science Talk aboard US Coast Guard Icebreaker *Healy* in Arctic pack ice ('14)

Hong Kong University of Science and Technology ('97,'98,'01,'08,'16)

Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janiero ('96)

Ioffe Physical Institute, St. Petersburg ('91)

Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan ('08)

Los Alamos National Laboratory, Climate, Ocean and Sea Ice Modeling (COSIM) ('07,'09)

Lorentz Centre, Analysis Seminar, University of Leiden, Netherlands ('15)

Loyola University, Colloquium Series on Applications of Mathematics ('14)

MIT Department of Earth, Atmospheric and Planetary Sciences Seminar (EAPS) ('08)

MIT Physical Applied Math Seminar ('09)

Moscow Civil Engineering Institute ('91)

National Space Development Agency of Japan, Tokyo ('98)

NASA/Goddard Space Flight Center, Greenbelt, MD ('07, '09)

Northwestern University ('08)

Penn State University ('92, '00)

Princeton University, Departments of Mathematics ('87,'89), Physics ('87, '91, '96), Chemical Engineering ('89), Civil Engineering ('91, '96)

Roma Tre University, Dept. of Mathematics and Physics, Mathematical Physics Seminar ('15)

RPI ('93, '98)

Rutgers University, Mathematical Physics Seminar ('84,'86,'87,'95,'00,'09)

Rutgers University, Institute for Marine and Coastal Sciences Seminar ('09)

Schlumberger ('94)

Stanford University ('86,'96,'01,'09)

Tulane University ('02)

United States Naval Academy ('95)

Universidade de Saõ Paulo ('95,'97)

Université de Paris Nord ('01)

Université de Provence ('93)

Université de Toulon ('92)

Université P. & M. Curie ('84)

University of Alaska, Fairbanks ('05)

University of Arizona, Applied Mathematics Colloquium ('95, '05)

University of California, Davis, Applied Math Seminar ('88, '91)

University of California, Davis, Special Fall Colloquium ('11)

UCLA, Applied Mathematics Seminar ('89, '98)

UCLA, Joint Atmospheric and Oceanic Sciences and Applied Math Colloquium ('09)

University of California, San Diego ('91)

University of Chicago, Mathematics ('89, '90, '00)

University of Chicago, Joint Geophysical Sciences and Mathematics Seminar ('08)

University of Delaware ('89)

University of Houston ('09)

University of Maryland, Center for Scientific Computation and Math. Modeling Seminar ('09,'12)

University of Minnesota ('90,'13)

University of Michigan ('91)

University of North Texas, Denton, Undergraduate Colloquium ('16)

University of Pennsylvania, Applied Math and Computational Science Colloquium ('10)

University of Reading, UK, Polar Climate Seminar ('16)

University of Tasmania, Dept. of Mathematics and Antarctic Cooperative Research Center ('97)

University of Texas, Austin ('09)

University of Utah: Department of Math ('91,'93,'01,'03,'08); Department of Geophysics Distinguished Lecture ('09); Mathematical Biology Seminar ('14), Physics ('97), Geophysics ('94), Materials Science ('91); College of Science Insider Tour Lecture ('08,'09); Science Night Live ('09), Science for the Community ('10); Global Change and Ecosystem Center (GCEC) Seminar ('12), High School Summer Math Program ('12,'13,'14,'16, '17).

University of Virginia ('91)

University of Washington ('99, '16)

Utah State University ('99)

Virginia Tech ('85, '92)

Publications

1. S. F. Ackley, A. J. Gow, K. R. Buck and K. M. Golden, Sea ice studies in the Weddell Sea aboard USCGC *Polar Sea*, *Antarctic Journal of the United States*, 15, pp. 84–86, 1980.
2. K. M. Golden and S. F. Ackley, Modeling of anisotropic electromagnetic reflection from sea ice, *Journal of Geophysical Research C (Oceans)*, 86, pp. 8107–8116, 1981.
3. K. Golden and G. Papanicolaou, Bounds for effective parameters of heterogeneous media by analytic continuation, *Communications in Mathematical Physics*, 90, pp. 473–491, 1983.
4. G. W. Milton and K. Golden, Thermal conduction in composites, *Proceedings of the 18th International Thermal Conductivity Congress*, Rapid City, S.D., pp. 571–582, 1983.
5. K. Golden and G. Papanicolaou, Bounds for effective parameters of multicomponent media by analytic continuation, *Journal of Statistical Physics*, 40, pp. 655–667, 1985.
6. K. Golden, S. Goldstein and J. L. Lebowitz, Classical transport in modulated structures, *Physical Review Letters*, 55, pp. 2629–2632, 1985.
7. K. Golden, Bounds on the complex permittivity of a multicomponent material, *Journal of Mechanics and Physics of Solids*, 34, pp. 333–358, 1986.
8. S. F. Ackley, A. J. Gow, K. R. Buck and K. M. Golden, Physical and structural characteristics of Weddell Sea pack ice, Cold Regions Research and Engineering Laboratory (CRREL) Report 87–14, 70 pp., 1987.
9. K. Golden, S. Goldstein and J. L. Lebowitz, Nash estimates and the asymptotic behavior of diffusions, *Annals of Probability*, 16, pp. 1127–1146, 1988.
10. K. Golden, S. Goldstein and J. L. Lebowitz, Diffusion in a periodic potential with a local perturbation, *Journal of Statistical Physics*, 51, pp. 637–656, 1988.
11. K. Golden and S. Goldstein, Arbitrarily slow decay of correlations in quasiperiodic systems, *Journal of Statistical Physics*, 52, pp. 1113–1118, 1988.
12. K. Golden, Convexity in random resistor networks, in *Random Media and Composites*, R.V. Kohn and G.W. Milton (Eds.), Society for Industrial and Applied Mathematics, pp. 149–170, 1989.
13. K. Golden, S. Goldstein and J. L. Lebowitz, Discontinuous behavior of effective transport coefficients in quasiperiodic media, *Journal of Statistical Physics*, 58, pp. 669–684, 1990.
14. G. W. Milton and K. Golden, Representations for the conductivity functions of multicomponent composites, *Communications on Pure and Applied Mathematics*, 43, pp. 657–671, 1990.
15. O. Bruno and K. Golden, Interchangeability and bounds for the effective conductivity of the square lattice, *Journal of Statistical Physics*, 61, pp. 361–382, 1990.
16. K. Golden, Convexity and exponent inequalities for conduction near percolation, *Physical Review Letters*, 65, pp. 2923–2926, 1990.
17. K. Golden, Classical transport in quasiperiodic media, in *Proceedings of AMS-SIAM Summer Seminar on the Mathematics of Random Media*, Blacksburg, Va., June 1989, W. Kohler and B. White (Eds.), American Mathematical Society, pp. 359–373, 1991.
18. K. Golden and S. Goldstein, Arbitrarily slow approach to limiting behavior, *Proceedings of the American Mathematical Society*, 112, pp. 109–119, 1991.

19. K. Golden, Bulk conductivity of the square lattice for complex volume fraction, *International Series of Numerical Mathematics*, 102, pp. 71-83, 1991.

20. K. Golden, Exponent inequalities for the bulk conductivity of a hierarchical model, *Communications in Mathematical Physics*, 143, pp. 467-499, 1992.

21. K. Golden, Scaling law for conduction in partially connected systems, *Physica A*, 207, pp. 213–218, 1994, (special issue for *Proceedings of the Conference on Electrical Transport and Optical Properties of Inhomogeneous Materials, Mexico 1993*, refereed).

22. L. Berlyand and K. Golden, Exact result for the effective conductivity of a continuum percolation model, *Physical Review B*, 50, pp. 2114-2117, 1994.

23. K. M. Golden, Statistical mechanics of conducting phase transitions, *Journal of Mathematical Physics*, 36, pp. 5627-5642, 1995.

24. K. Golden, Bounds on the complex permittivity of sea ice, *Journal of Geophysical Research C (Oceans)*, 100, pp. 13,699-13,711, 1995.

25. R. Sawicz and K. Golden, Bounds on the complex permittivity of matrix – particle composites, *Journal of Applied Physics*, 78, pp. 7240-7246, 1995.

26. V. I. Lytle and K. M. Golden, Microwave backscatter measurements from first year pack ice in the eastern Weddell Sea, *Antarctic Journal of the United States*, 30, pp. 125-127, 1995.

27. S. F. Ackley, V. I. Lytle, K. M. Golden, M. N. Darling, and G. A. Kuehn, Sea ice measurements during ANZFLUX, *Antarctic Journal of the United States*, 30, pp. 133-135, 1995.

28. K. M. Golden, Percolation models for porous media, in *Homogenization and Porous Media,* U. Hornung (Ed.), Springer - Verlag, pp. 27-43, 1997.

29. K. M. Golden, Critical behavior of transport in lattice and continuum percolation models, *Physical Review Letters*, 78, pp. 3935-3938, 1997.

30. K. M. Golden, The interaction of microwaves with sea ice, in *Wave Propagation in Complex Media, IMA Volumes in Mathematics and its Applications, Vol. 96*, G. Papanicolaou (Ed.), Springer-Verlag, pp. 75-94, 1997.

31. K. M. Golden, Critical behavior of transport in percolation-controlled smart composites, in *Mathematics and Control in Smart Structures, SPIE Proc. Vol. 3039*, V. V. Varadan and J. Chandra (Eds.), Society of Photo-Optical Instrumentation Engineers, pp. 571-581, 1997.

32. K. M. Golden, Electrical transport properties of high contrast composite materials, in *Proceedings of the Fourth International Conference on Composites Engineering*, D. Hui (Ed.), International Community of Composites Engineering, pp. 363-364, 1997.

33. E. Cherkaeva and K. M. Golden, Inverse bounds for microstructural parameters of composite media derived from complex permittivity measurements, *Waves in Random Media*, 8(4), pp. 437-450, 1998.

34. K. M. Golden, M. Cheney, K. H. Ding, A. K. Fung, T. C. Grenfell, D. Isaacson, J. A. Kong, S. V. Nghiem, J. Sylvester, and D. P. Winebrenner, Forward electromagnetic scattering models for sea ice, *IEEE Transactions on Geoscience and Remote Sensing*, 36(5), pp. 1655-1674, 1998.

35. K. M. Golden, D. Borup, M. Cheney, E. Cherkaeva, M. S. Dawson, K. H. Ding, A. K. Fung, D. Isaacson, S. A. Johnson, A. K. Jordan, J. A. Kong, R. Kwok, S. V. Nghiem, R. G. Onstott, J. Sylvester, D. P. Winebrenner and I. H. H. Zabel, Inverse electromagnetic scattering models for sea ice, *IEEE Transactions on Geoscience and Remote Sensing*, 36(5), pp. 1675-1704, 1998.

36. K. C. Jezek, D. K. Perovich, K. M. Golden, C. Luther, D. Barber, P. Gogineni, T. C. Grenfell, A. K. Jordan, C. D. Mobley, S. V. Nghiem, and R. Onstott, A broad spectral, interdisciplinary investigation of the electromagnetic properties of sea ice, *IEEE Transactions on Geoscience and Remote Sensing*, 36(5), pp. 1633-1641, 1998.

37. R. Kwok, S. V. Nghiem, S. Martin, D. P. Winebrenner, A. J. Gow, D. K. Perovich, C. T. Swift, D. G. Barber, K. M. Golden, and E. Knapp, Laboratory measurements of sea ice: connections to microwave remote sensing, *IEEE Transactions on Geoscience and Remote Sensing*, 36(5), pp. 1716-1730, 1998.

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Please visit www.math.utah.edu/∼golden/publications.html for PDF versions of the articles.

Proceedings Edited

1. *Mathematics of Multiscale Materials*, K. M. Golden, G. R. Grimmett, R. D. James, G. W. Milton, and P. N. Sen (Eds.), *IMA Volumes in Mathematics and its Applications*, Vol. 99, 280 pp., Springer-Verlag, 1998.

2. *Proceedings of the Sixth International Conference on Electrical Transport and Optical Properties of Inhomogeneous Media, ETOPIM6*, G. W. Milton, K. M. Golden, D. Dobson, and Z. V. Vardeny (Eds.), *Physica B, Condensed Matter*, Vol. 338, Nos. 1-4, 374 pp., October 2003.

3. *Sea Ice in a Changing Environment, Proceedings of the 2014 International Glaciological Society Symposium, Hobart, Tasmania*, P. Heil, D. Lannuzel, G. Dieckmann, H. Enomoto, S. Gerland, K. M. Golden, S. Kern, P. J. Langhorne, P. Uotila, J. Renwick, R. A. Massom, S. Stammerjohn, and J. C. Stroeve (Eds.), *Annals of Glaciology*, Vol. 56, No. 69, 455 pp., October 2015.

4. *East Antarctic sea-ice physics and ecosystem processes*, K. M. Meiners, K. M. Golden, P. Heil, J. Lieser, R. Massom, B. Meyer and G. D. Williams (Eds.), *Deep Sea Research Part II: Topical Studies in Oceanography*, Vol. 131, 202 pp., September 2016.

Video Productions on Antarctic Research Expeditions

1. *The Antarctic Zone Flux Experiment (ANZFLUX)*, by K. M. Golden, 1994.
2. *Voyage into the Antarctic Winter: The Mertz Glacier Polynya Experiment*, by K. M. Golden, with production assistance from Joe Prokop, Media Solutions, KUED (Public Television), University of Utah, 1999.
3. *SIPEX: The Sea Ice Physics and Ecosystem eXperiment*, by K. M. Golden, with production assistance from Gordon Jones, Media Solutions, KUED, University of Utah, 2008.
4. *Sea Ice Research at Tim Haskell's Field Camp, Antarctica New Zealand*, by K. M. Golden, with production assistance from Gordon Jones, Media Solutions, KUED, U. of Utah, 2011.
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Selected Media Coverage

- Radio, Television, and Web Interviews:

  2007 KUER Radio (Public Radio), via satellite phone from Antarctica.

  2008 KJZZ TV (KUTV2, CBS), *Morning News* (live).

  2009 KEUD TV (Public TV), *Utah Conversations with Ted Capener*, 30 minute show covering my climate change research and Antarctic expeditions.

  2010 KSL Radio, Five interviews of U of U team via satellite phone from Antarctica and NZ.

  2011 103.8 FM Dubai Eye Radio, Interview about Public Lecture, United Arab Emirates.

  2012 KSL Television, One interview and two additional stories on our Antarctic expedition.

  2012 Australian Broadcasting Corp., *Australia's Antarctic supply ship icebound* (three stories).

  2012 Barrow Arctic Science Consortium (BASC) Presents Ken Golden, Produced by Nokinba Acker, 15 minute video, BASC Saturday Talk in the field with Ken Golden and team, doing science off the coast of Barrow Alaska, on the frozen Arctic Ocean.

  2013 WCME Radio, Maine, interviewed about sea ice and climate change by R. Kazimer.

  2013 Swiss Public Radio, *Trip to Alaska: On the trail of climate change*, T. Häusler, Three half-hour segments on our sea ice field work in the Arctic Ocean off Barrow, AK.

  2014 *NSF Science Nation* (video): "Mathematician combines love for numbers and passion for sea ice to forecast melting."

  2014 NBC News/NBC Learn video on *Science and Engineering of the 2014 Olympic Winter Games*, featured in "Science of Ice."

  2015 The Weather Channel, Interviewed on Weatherman Al Roker's show *Wake Up with Al*, about sea ice, math, and the First National Math Festival in Washington D.C.

  2015 First National Math Festival, Featured in 2 minute video synopsis of the event.

  2015 NSF *Science360* Radio, 10 minute interview, "NSF-funded Ken Golden, mathematician and adventurer, explains the mathematics of sea ice and how his findings relate to climate change," provided by the American Mathematical Society as an AMS *Mathematical Moment*.

  2015 NSF Discoveries Video: "On Golden's Melt Pond - Math on Ice." (9 min., plus article)

  2016 *Emerald Planet* Television Show (one hour) on our NSF Math Climate Research Network; including 15 minute interview of Golden on *Sea ice and its role in the climate system*.

  2017 SIAM Video: Math Behind Sea Ice and our Changing Planet, featuring Dr. Emily Shuckburgh of the British Antarctic Survey and Golden (3 min.)

- News Articles:

  Deseret News, September 1994

  The Salt Lake Tribune: September 1994, December 1998, December 1999, January 2011.

  Accounts of an engine room fire on the *Aurora Australis* in Antarctic sea ice, July 1998, in *Sydney Morning Herald*, *Canberra Times*, etc. and magazines *NewScientist* and *Science*.

  SIAM News (Soc. for Industrial and Applied Math.), Mathematics and Climate, March 2009.

  The National, Global warming expert to speak in Abu Dhabi, UAE, January 2011.

  SIAM News, Mathematics of Planet Earth 2013 Set to Debut at JMM, November 2012.

  Union Tribune San Diego, Polar treks add up for mathematician, January 2013.

  Loyola Phoenix, Meet Ken Golden: Arctic adventurer and mathematician, October 2014.

- Magazine Articles:

  Earth, On thin ice, Ruth Flanagan and Tom Yulsman, pp. 44-51, April 1996.

  Science News, Mathematician on ice, Ivars Peterson, pp. 106-108 (and cover), August 2000.

  Geotimes, Water pours through pores in sea ice, Nicole Branan, pp. 16-18, November 2007.

  Continuum (U. of Utah), The Golden yardstick, John Blodgett, pp. 18-22, Fall 2008.

  Science, Cold equations (Profile: Ken Golden), Dana Mackenzie, pp. 32-33, 3 April 2009.

  Science News, Melting at the microscale: Studying sea ice close-up may improve climate models, by Alexandra Witze, Vol. 177, No. 13, p. 22-25, June 2010.

  Australian Antarctic Mag., The Golden Rule of Sea Ice Permeability, W. Pyper, Oct. 2013.

  Zeit Magazin, Wenn hier nichts mehr ist, ist es vorbei, T. Häusler, pp. 76-80, November 2013.

- Website Articles:

  American Mathematical Society, Congressional presentations, June 2003, November 2007.

  ScienceDaily, *Newswise*, *PhysOrg*, *EurekAlert*, *Ars Technica*, *EE Times, EE Times Asia*, etc., coverage of fluid flow in sea ice results, on cover of *Geophys. Res. Lett.*, September 2007.

  ABC News (Australian Broadcasting Corporation), SIPEX Expedition, October 2007.

  ScienceDaily, NSF News Service *Science360*, *EurekAlert*: Mathematics and Climate Change - Gaining Insights into the Nature of Sea Ice, Allyn Jackson (AMS), April 2009.

  Wired.com, In Mysterious Pattern, Math and Nature Converge, N. Wolchover, Feb. 2013.

  livescience.com, Doing the math on polar sea ice melt, Tanya Lewis, March 2014.

  ScientificAmerican.com, Mathematical patterns in sea ice reveal melt dynamics, Geoffrey Giller, March 2014.

  YahooNews, Polar ice may hold secrets of futuristic materials, Amina Khan, November 2015.

  Physics Today, Q&A, What is a mathematical physicist doing out in the cold? Kenneth Golden puts numbers to sea ice, melt ponds, and massive waves. Toni Feder, March 2016.

  EurekAlert (AAAS), newswise, ScienceDaily, ScienceNewsline, AGU Geospace, Arctic Update (US Arctic Research Comm.), etc., Arctic melt ponds form when meltwater clogs ice pores; Pond formation mechanism previously unknown, Paul Gabrielsen (U. of Utah), January 2017.