PRINCETON UNIVERSITY

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Positions Held

2013 – present	Associate Research Scholar, Princeton University
2010 – 2013	Postdoctoral Research Associate, Princeton University
2006 – 2010	Research Assistant, University of Colorado at Boulder
2004 – 2006	Teaching Assistant, University of Colorado at Boulder
2000 – 2004	Lab Assistant, GIS Lab, Cornell University

Education

12/2010 University of Colorado at Boulder, Boulder, CO
Ph.D., Geophysics, Department of Geological Sciences
Advisors: Peter Molnar and Shijie Zhong
Topic: The effects of lithospheric thickness variations on the dynamics of the Earth's upper mantle.

5/2004 Cornell University, Ithaca, NY
B.S., Geological Sciences, Department of Earth and Atmospheric Sciences

Research Funding

2014	NOAA GFDL, Princeton CICS Grant Awardee, 6 months salary support
2012	NSF, *Mapping the evolution of Antarctica's mass balance* [NSF–1245788], $284,392, 2013–2015 (Co-I with F. J. Simons)
2012	NOAA GFDL, Princeton CICS Grant Awardee, 6 months salary support

Teaching Experience

Fall 2015	Instructor, *State of the Earth: Shifts and Cycles*, course by A. C. Maloof and F. J. Simons, Princeton FRS 135. Introduced freshmen to the tools of scientists, with hands on data collection, analysis, MATLAB programming exercises, and scientific writing in LaTeX.
Fall 2015	Instructor, *Data, Models, and Uncertainty in the Natural Sciences*, course by F. J. Simons, Princeton GEO 422.
Fall 2013	Guest Lecturer, *Global Geophysics*, course by F. J. Simons, Princeton GEO 371
Spring 2012	Instructor, *Origin and Evolution of the Continental Lithosphere*, with F. J. Simons and B. Schoene, Princeton GEO 556
Spring 2005 – 2006	Instructor, Geol 1030: *Introduction to Geology* Lab University of Colorado Led two ∼20-student sections per week each semester (3 semesters total), preparing lectures, labs, and exams.
Fall 2004	Instructor, Geol 3120 Lab: *Structural Geology* Lab University of Colorado Two ∼20-student lab sections each week. Presented weekly hour–long lectures and generated lab exercises and exams.

Publications

Manuscripts

I publish papers, not progress reports, and I wait until the science is ripe and ready, and the results robust — some of my articles have attracted media attention which slows my pace but widens my reach. My h-index is 4, and growing, while my g-index is 7. My total number of citations is on Google `http://goo.gl/sNDvUD`

Harig, C. and F. J. Simons.
Earth structure and the local geoid.
In preparation.

Bevis, M., **C. Harig** and Others
The 2013 pause in the deglaciation of Greenland. In Preparation.

Harig, C. and F. J. Simons.
Ice mass loss in the North American Arctic.
Submitted, In Review.

Mordret, A., D. Mikesell, **C. Harig**, B. P. Lipovsky, and G. A. Prieto.
Monitoring South-West Greenland's ice sheet melt with ambient seismic noise.
Submitted, In Review at *Nature Publishing Group*.

Harig, C. and F. J. Simons.
Accelerated West Antarctic ice mass loss continues to outpace
East Antarctic gains.
Earth Planet. Sci. Let., 415, 134–141, 2015.
`http://dx.doi.org/10.1016/j.epsl.2015.01.029`
Covered by over 15 media outlets worldwide, including *The Guardian*.
In the top 1% of all articles scored by Altmetric `http://goo.gl/ZSU5PN` and ranked #4 of 1277 of articles from *Earth Planet. Sci. Let.*

Harig, C., K. W. Lewis, A. Plattner, and F. J. Simons.
A suite of software analyzes data on the sphere,
Eos, 96, 2015. `http://dx.doi.org/10.1029/2015EO025851`

Morrow, E., J. X. Mitrovica, M. G. Sterenborg, and **C. Harig**.
A test of recent inferences of net polar ice mass balance based on
long-wavelength gravity.
Journal of Climate, 26, 6535–6540, 2013.
`http://dx.doi.org/10.1175/JCLI-D-13-00078.1`

Harig, C. and F. J. Simons.
Mapping Greenland's mass loss in space and time.
Proc. Natl. Acad. Sc., 109(49), 19934–19937, 2012.
`http://dx.doi.org/10.1073/pnas.1206785109`
Covered by over 20 media outlets worldwide, including *CBSNews.com*.
In the top 2% of all articles scored by Altmetric `http://goo.gl/0iXsd2` and in the 93rd percentile of articles from *Proc. Natl. Acad. Sc.*

Harig, C., S. Zhong, and F. J. Simons.
Constraints on upper mantle viscosity from the flow-induced pressure gradient across the Australian continental keel.
Geochem., Geophys., Geosyst., 11(6), Q06004, 2010.
`http://dx.doi.org/10.1029/2010GC003038`

Harig, C., P. Molnar, and G. A. Houseman.
Lithospheric thinning and localization of deformation during Rayleigh-Taylor instability with nonlinear rheology and implications for intracontinental magmatism.
J. Geophys. Res., 115, B02205, 2010.
http://dx.doi.org/10.1029/2009JB006422

Harig, C., P. Molnar, and G. A. Houseman.
Rayleigh-Taylor instability under a shear stress free top boundary condition and its relevance to removal of mantle lithosphere from beneath the Sierra Nevada.
Tectonics, 27, TC6019, 2008.
http://dx.doi.org/10.1029/2007TC002241

Published Software: Main Author

SLEPIAN_Delta: *Analysis of time-variable gravity from the GRACE satellite mission using Spherical Harmonics and spherical Slepian functions*, version 1.0, 2014.
http://csdms.colorado.edu/wiki/Model:SLEPIAN_Delta
http://dx.doi.org/10.5281/zenodo.15707

Published Software: Contributing Author

SLEPIAN_Alpha: *Computation of Spherical Harmonics, Slepian functions, and transforms*, version 1.0, 2014.
http://csdms.colorado.edu/wiki/Model:SLEPIAN_Alpha
http://dx.doi.org/10.5281/zenodo.15704

SLEPIAN_Bravo: *Linear inverse problems using Spherical Harmonics and spherical Slepian functions*, version 1.0, 2014.
http://csdms.colorado.edu/wiki/Model:SLEPIAN_Bravo
http://dx.doi.org/10.5281/zenodo.15705

SLEPIAN_Charlie: *Spectral estimation problems using Spherical Harmonics and spherical Slepian functions*, version 1.0, 2014.
http://csdms.colorado.edu/wiki/Model:SLEPIAN_Charlie
http://dx.doi.org/10.5281/zenodo.15706

Meeting Abstracts

Harig, C. and F. J. Simons.
Ice Sheet Mass Loss From GRACE, 2002–2014.
Poster, presented at CIDER Conference, 2015.

Harig, C. and F. J. Simons.
Talk: Earth structure, Ice Mass Changes, and the local dynamic geoid.
Abstract, G44A-04, presented at 2014 Fall Meeting, AGU, San Francisco, Calif.

Harig, C. and F. J. Simons.
Talk: Mapping ice mass loss on Greenland and Antarctica, in space and time
Abstract, 1875, presented at 2014 Joint Mathematics Meeting, AMS MAA, Baltimore, MD, 17 Jan., 2014.

Harig, C. and F. J. Simons.
Greenland Ice Sheet Mass Loss From GRACE.
Poster, presented at PARCA Meeting, 2014.

Harig, C. and F. J. Simons.
Earth structure and the dynamic geoid: beyond one-dimensional

sensitivity kernels.
Abstract, T51E-2523, presented at 2013 Fall Meeting, AGU, San Francisco, Calif.

Simons, F. J. and **C. Harig** (presenting author).
Antarctic mass loss from GRACE from space- and time-resolved modeling with Slepian functions.
Abstract, G23A-0773, presented at 2013 Fall Meeting, AGU, San Francisco, Calif.

Harig, C. and F. J. Simons.
Updated Greenland Ice Sheet Mass Loss From GRACE.
Poster, presented at PARCA Meeting, 2013.

Harig, C., F. J. Simons, L. Wang, and C. K. Shum.
Localized inversion of GRACE level 1B data over Greenland using Slepian functions.
Abstract, G33A-0938, presented at 2012 Fall Meeting, AGU, San Francisco, Calif.

Harig, C. and F. J. Simons.
Mass loss over the Greenland ice sheet from GRACE: A reappraisal.
Abstract, presented at 2012 EGU annual meeting, 2012.

Harig, C. and F. J. Simons.
On the characterization of noise in GRACE models and its effect on ice sheet mass loss estimates using spherical Slepian functions.
Abstract, T13B-1874, presented at 2011 Fall Meeting, AGU, San Francisco, Calif.

Harig, C., S. Zhong, and F. J. Simons. Constraints on upper-mantle viscosity inferred from the flow-induced pressure gradient across a continental keel.
Eos Trans. AGU, 90(52), Abstract T13B–1874, 2009.

Harig, C., P. Molnar, and G. A. Houseman.
Thinning and localization of deformation during Rayleigh-Taylor instability and its implication for intracontinental magmatism.
Eos Trans. AGU, 89(53), Abstract T11C–1881, 2008.

Harig, C., P. Molnar, and G. A. Houseman.
The growth of Rayleigh-Taylor instability under a shear-stress free top boundary condition.
Eos Trans. AGU, 88(52), Abstract T33A–1134, 2007.

Harig, C. and S. Zhong.
Pressure difference across continental keel and their implications on upper mantle viscosity.
Eos Trans. AGU, 87(52), Abstract T53D–1646, 2006.

Technical Skills

Scientific	Accomplished in the fields of climate science, satellite gravimetry, and geodynamics. Expertise in fluid dynamics, rheology and deformation of Earth's lithosphere and upper-mantle, Earth's potential (gravitational) field, mass balance of polar ice sheets, and applied mathematical methods for spatiospectral analysis on the sphere. Familiar with seismic and geodetic observational methods.
Technology	Expert in finite element methods and analysis relating to fluid dynamics. Proficient with C and MATLAB programming, Unix scripting/operating environments, and LaTeXdocument preparation. Experience with parallel computing environments (mpi), FORTRAN, Python, Generic Mapping Tools, ArcGIS, and standard office programs.

Awards

2012, 2014	NOAA GFDL, Princeton CICS Grant Awardee
2010	University of Colorado Summer Graduate School Fellowship
2008 – 2009	CIRES Graduate Student Fellow
2008	W. O. Thompson Fund Awardee (University of Colorado)
2006 Fall AGU	Outstanding Student Paper Award

Invited Presentations

1/2016	University of Houston, Houston, TX
7/2015	CIDER Summer Program (short talk, open solicitation), Berkeley, CA `http://youtu.be/Cq3w3a_NaRY`
4/2015	Lamont-Doherty Earth Observatory, NY
1/2015	Southwest Research Institute, Boulder, CO
4/2014	The Center for Sea-Level Change Annual Workshop, NYU Abu Dhabi, UAE *Measuring Ice Mass Changes Using Time Variable Gravity from* GRACE *and Slepian Functions - 1 - Gravity localization on the sphere*
4/2014	The Center for Sea-Level Change Annual Workshop, NYU Abu Dhabi, UAE *Measuring Ice Mass Changes Using Time Variable Gravity from* GRACE *and Slepian Functions - 2 - Mass changes in ice sheets*
3/2014	Carnegie Institution for Science, Department of Terrestrial Magnetism, Washington, D.C. *Ice Caps Melting on a Deforming Earth: New Constraints from Satellite Gravity* `http://youtu.be/4GbcFsgFC1A`
1/2014	2014 Joint Mathematics Meeting, SIAM Minisymposium on Frontiers in Geomathematics, Baltimore, MD *Mapping ice mass loss on Greenland and Antarctica, in space and time*
9/2013	Princeton University Solid Earth Brownbag *Changing Polar Ice in the Modern Climate*
9/2013	Concordia Science Club, Princeton, NJ *Mass changes of polar ice sheets*
2/2012	Regional Gravity and Geomagnetic Field Modelling Workshop, Bavarian Academy of Sciences & Humanities (BAdW) Munich, Germany *Spatiospectral localization on the sphere with Slepian functions*
4/2010	Princeton University Solid Earth Brownbag

Community

Refereeing	National Science Foundation, Annals of Glaciology, The Cryosphere, Earth and Planetary Science Letters, Geophysical Journal International, Journal of Geophysical Research – Solid Earth
2015	AGU Fall Meeting Session Convener (SEDI - *Constraints on Heterogeneities in Earth's Mantle*)
2015	*Teaching Geoscience with MATLAB* workshop, by SERC at Carleton College. Creation of some community hosted teaching activities using MATLAB.
2012 – 2015	NASA Program for Arctic Regional Climate Assessment (PARCA) meeting participant
2015	Co-Founder, Princeton Department of Geosciences Post-doc council
2014	National Academy of Sciences (NAS), Antarctica Science Priorities Committee, Community outreach meeting participant
2014	Princeton Department of Geosciences, Advisory Council Post-doc representative
2011	Organizer, Princeton Solid Earth Brownbag Seminar series
2008	CIRES Graduate Student Fellow Organized student seminar series and events for ∼100 students
2008	New Graduate Student Mentor
2006 – Present	American Geophysical Union Member
2014 – Present	American Mathematical Society Member

Advising

Senior Papers	Alyson Beveridge (Princeton, Geosciences, '16): Expected May 2016
Junior Papers	Mrinalini Basu (Princeton, Physics, '15): *Modeling mass changes in California with* GRACE (2014)

Field Experience

2006: 4 weeks	Sierra Nevada EarthScope Project Seismic station installation and removal
2003: 6 weeks	Cornell University / University of Buenos Aires Central Andes Geologic Field Camp

Media

On "*Accelerated West Antarctic ice mass loss continues to outpace East Antarctic gains*":

Ice loss in west Antarctica is speeding up, by John Abraham
The Guardian, 05/11/2015 (web)

Melting Antarctic: Failure to act now on emissions could raise oceans by metres, by Graham Readfearn
The Guardian, 05/05/2015 (web)

Scientists horrified by speed of glaciers melting, by Russell Jackson
The Scotsman, 05/04/2015 (web)

Gravity data shows Antarctic ice sheet is melting much faster
Delhi Daily News, 05/02/2015 (web)

Antarctica is melting ever faster, by Jenna Iacurci
Nature World News, 05/01/2015 (web)

Satellite data helps pinpoint Antarctic ice loss, by Bob Berwyn
Summit County Voice, 05/01/2015 (web)

Gravity data show that Antarctic ice sheet is melting increasingly faster, by M. Kelly, *News@Princeton*, 04/30/2015 (web)
Also reported in,
Phys.org, 04/30/2015 (web)
Science 2.0, 05/01/2015 (web)
e Science News, 05/01/2015 (web)
Daily News and Analysis, 05/01/2015 (web)
ENCmag.com, 05/01/2015 (web)
R & D Magazine, 05/01/2015 (web)
Sierra Leone Times, 05/01/2015 (web)
Web India, 05/01/2015 (web)
Deccan Herald, 05/01/2015 (web)
Reporting Climate Science.com, 05/03/2015 (web)
Noticiasdelaciencia.com, 05/04/2015 (web, in Spanish)

Climat : la Terre perd son congélateur, by Sylvestre Huet
Libération, 04/02/2015 (web and print, in French)

On "*Mapping Greenland's mass loss in space and time*":

Climate Change 2013: The Physical Science Basis,
Intergovernmental Panel on Climate Change, Fifth Assessment Report (AR5-WG1), 2013

New science upsets calculations on sea level rise, climate change, by Lewis Page,
The Register, 11/28/2012 (web)

El hielo de Groenlandia no se derrite tan rápidamente como se había estimado,
cienciaaldia.com, 11/28/2012 (in Spanish)

Embracing data 'noise' bring Greenland's complex ice melt into focus, by M. Kelly,
News@Princeton, 11/27/2012 (web)

Änderungen in der Schwerkraft verraten Eisschmelze,

derStandard.at, 11/24/2012 (in German)

Le Groenland fond avec gravité, by Sylvestre Huet,
Libération, 11/22/2012 (in French)

De rafelranden van de ijskap, by Elmar Veerman,
Wetenschap24.nl, 11/21/2012 (In Dutch)

Eisschild schrumpft jährlich um 200 Mrd. Tonnen,
Science@ORF.at, 11/20/2012 (in German)

Schwerkraft-Messung zeigt massive Eisschmelze,
Die Welt, 11/20/2012 (In German)

Greenland ice loss is accelerating, by Sunanda Creagh,
TheConversation.edu.au, 11/20/2012 (web)

Greenland ice is melting at ever faster rates, by Laura Sinpetru,
Softpedia.com, 11/20/2012 (web)

Geoscientists report Greenland ice sheet melting rate is increasing, by Bob Yirka,
Phys.org, 11/20/2012 (web)

Greenland ice melt accelerating, by Larry O'Hanlon,
ABC.net.au, 11/20/2012 (web)

Coste della Groenlandia sempre più povere di ghiacci, Sciolti 200 miliardi di tonnellate in 10 anni,
Meteoleontinoi, 11/20/2012 (in Italian)

Degelo na Gronelåndia mapeado,
CienciaHoje, 11/20/2012 (in Portuguese)

Groenlandia ha perdido 200.000 millones de toneladas de hielo en la última década,
ABC.es, 11/20/2012 (in Spanish)

Wechselnde Schwerkraft zeigt Schmelzen des Grönlandeises,
Focus.de, 11/19/2012 (in German)

Eispanzer Grönlands schmilzt ungleichmässig ab,
Südostschweiz.ch, 11/19/2012 (in German)
Blick.ch, 11/19/2012 (in German)

Greenland ice melt is accelerating, by Douglas Main,
CBSNews.com, 11/19/2012 (web)
OurAmazingPlanet.com, 11/19/2012 (web)

Greenland is losing 200 billion tons of ice every year, by Randy Astaiza,
BusinessInsider.com, 11/19/2012 (web)

Greenland loses 200 billion tons ice per year, by Larry O'Hanlon,
MSNBC.msn.com, 12/03/2012 (web)
Discovery.com, 11/19/2012 (web)
LiveScience.com, 11/19/2012 (web)

General Media Appearances:	'Stable' region of Antarctica is melting; Radar data from Cryosat-2 probe show sudden ice loss on southern Antarctic Peninsula, by Jeff Tollefson *Nature*, 05/21/2015 http://dx.doi.org/10.1038/nature.2015.17606