Brent Minchew
Assistant Professor
Department of Earth, Atmospheric and Planetary Sciences
Massachusetts Institute of Technology

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Curriculum Vitae

Education

2016 Ph.D. Geophysics, California Institute of Technology
Thesis: Mechanics of deformable glacier beds
Advisor: Mark Simons

2010 M.S. Aerospace Engineering, University of Texas at Austin
Thesis: Polarimetric SAR decomposition of temperate ice cap Hofsjökull, Central Iceland
Advisors: Sean Buckley and Scott Hensley

2008 B.S. Aerospace Engineering, University of Texas at Austin

Research Interests

Mechanics of fluids and solids

Glaciology: Deformable glacier beds, ice-ocean interactions, ice rheology, subglacial hydrology, grounding zone dynamics, erosion and deposition of glacial sediments, ice-flow modeling, inverse theory

Landslides: Distribution, environmental and tectonic controls, granular flow

Remote Sensing

Geodesy: Kinematic observations of cryospheric and terrestrial systems, interferometric synthetic aperture radar, time-series analysis, data assimilation

Hazard response: Location and characterization of oil and hazardous chemical spills in marine environments using polarimetric synthetic aperture radar, extent and severity of wildfires using polarimetric synthetic aperture radar

Academic Positions

2018– Assistant Professor, Department of Earth, Atmospheric and Planetary Sciences, MIT
2016–2018 NSF Postdoctoral Fellow, British Antarctic Survey
2010–2015 Graduate Research and Teaching Assistant, Caltech
2009 & 2010 Graduate Research Fellow, Jet Propulsion Laboratory
2006–2010 Research and Teaching Assistant, University of Texas at Austin

Awards and Honors

2014 NSF Earth Sciences Postdoctoral Fellowship
2013–2015 ARCS and Albert Parvin Foundation Fellowship
2012 IEEE Transactions on Geoscience and Remote Sensing Editor's Choice Award
2011–2014 NASA Earth and Space Sciences Fellowship
2011–2013 ARCS Foundation Fellowship
2011 California Institute of Technology Graduate Fellowship

Publications

Refereed Publications (18)

Meyer, C. R., A. Yehya, B. M. Minchew, and J. R. Rice. "A model for the downstream evolution of temperate ice and subglacial hydrology along ice stream shear margins". *Journal of Geophysical Research - Earth Surface* 123.8 (2018), pp. 1682–1698.

Meyer, C. R. and B. M. Minchew. "Temperate ice in the shear margins of the Antarctic Ice Sheet: controlling processes and preliminary locations". *Earth and Planetary Science Letters* 498 (2018), pp. 17–26.

Minchew, B. M., C. R. Meyer, A. A. Robel, G. H. Gudumundsson, and M. Simons. "Processes controlling the downstream evolution of ice rheology in glacier shear margins: Case study on Rutford Ice Stream, West Antarctica". *Journal of Glaciology* 64.246 (2018), pp. 583–594.

Minchew, B. M., G. H. Gudmundsson, A. Gardner, F. S. Paolo, and H. A. Fricker. "Modeling the dynamic response of outlet glaciers to observed ice-shelf thinning in the Bellingshausen Sea Sector, West Antarctica". *Journal of Glaciology* 64.244 (2018), pp. 333–342.

Angelliaume, S., P. Dubois-Fernandez, C. E. Jones, B. Holt, B. M. Minchew, E. Amri, and V. Miegebielle. "SAR imagery for detecting sea surface slicks: Performance assessment of polarimetric parameters". *IEEE Transactions on Geoscience and Remote Sensing* 56.8 (2018), pp. 4237–4257.

Robel, A. A., V. C. Tsai, B. M. Minchew, and M. Simons. "Tidal modulation of ice shelf buttressing stresses". *Annals of Glaciology* 58.74 (2017), pp. 12–20.

Milillo, P., B. M. Minchew, P. Agram, B. Riel, and M. Simons. "Geodetic imaging of time-dependent three-component surface deformation: application to tidal-timescale ice flow of Rutford Ice Stream, West Antarctica". *IEEE Transactions on Geoscience and Remote Sensing* 55.10 (2017), pp. 5515–5524.

Angelliaume, S., B. M. Minchew, S. Chatiang, P. Martineau, and V. Miegebielle. "Multifrequency radar imagery and characterization of hazardous and noxious substances at sea". *IEEE Transactions on Geoscience and Remote Sensing* 55.5 (2017).

Minchew, B. M., M. Simons, B. V. Riel, and P. Milillo. "Tidally induced variations in vertical and horizontal motion on Rutford Ice Stream, West Antarctica, inferred from remotely sensed observations". *Journal of Geophysical Research: Earth Surface* 122 (2017), pp. 167–190.

Minchew, B. M., M. Simons, H. Björnsson, F. Pálsson, M. Morlighem, H. Seroussi, E. Larour, and S. Hensley. "Plastic bed beneath Hofsjökull Ice Cap, central Iceland, and the sensitivity of ice flow to surface meltwater flux". *Journal of Glaciology* 62.231 (2016), pp. 147–158.

Milillo, P., B. Riel, B. M. Minchew, S. H. Yun, M. Simons, and P. Lundgren. "On the synergistic use of SAR constellations' data exploitation for earth science and natural hazard response". *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 9.3 (2015), pp. 1095–1100.

Collins, M. J., M. Denbina, B. M. Minchew, C.E. Jones, and B. Holt. "On the use of simulated airborne compact polarimetric SAR for characterizing oil-water mixing of the Deepwater Horizon oil spill". *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 8.3 (2015), pp. 1062–1077.

Minchew, B. M., M. Simons, S. Hensley, H. Björnsson, and F. Pálsson. "Early melt-season velocity fields of Langjökull and Hofsjökull ice caps, central Iceland". *Journal of Glaciology* 61.226 (2015), pp. 253–266.

Scheingross, J. S., B. M. Minchew, B.H. Mackey, M. Simons, M.P. Lamb, and S. Hensley. "Fault zone controls on the spatial distribution of slow-moving landslides". *GSA Bulletin* 125.3-4 (2013), pp. 473–489.

Minchew, B. M., C.E. Jones, and B. Holt. "Polarimetric analysis of backscatter from the Deepwater Horizon oil spill using L-band synthetic aperture radar". *IEEE Transactions on Geoscience and Remote Sensing* 50.10 (2012), pp. 3812 –3830.

Minchew, B. M. "Determining the mixing of oil and seawater using polarimetric synthetic aperture radar". *Geophysical Research Letters* 39.16 (2012). L16607.

Tsai, V. C., B. M. Minchew, M. P. Lamb, and J. P. Ampuero. "A physical model for seismic noise generation from sediment transport in rivers". *Geophysical Research Letters* 39.2 (2012). L02404.

Jones, C. E., B. M. Minchew, B. Holt, and S. Hensley. "Studies of the Deepwater Horizon Oil Spill with the UAVSAR radar". *Monitoring and Modeling the Deepwater Horizon Oil Spill: A Record-Breaking Enterprise*. Vol. 195. Washington, DC: AGU, 2011, pp. 33–50.

Non-refereed Publications

Minchew, B. M. "Mechanics of deformable glacier beds". PhD thesis. California Institute of Technology, 2016.

Minchew, B. M. "Polarimetric SAR decomposition of temperate ice cap Hofsjökull, Central Iceland". MA thesis. University of Texas at Austin, 2010.

Invited Presentations

Minchew, B. M. "Insights into the mechanical properties of glacier beds from time-dependent surface velocity observations". *Smith Lecture, University of Michigan*. Oct. 2018.

Minchew, B. M. "Inferring the mechanical properties of glacier beds from time-dependent surface velocity observations". *Geophysics/Geochemistry Seminar, Woods Hole Oceanographic Institution*. July 2018.

Minchew, B. M. "Marine ice sheet dynamics". *PAOC Colloquium, Massachusetts Institute of Technology*. May 2018.

Minchew, B. M. "The evolution of ice rheology in glacier shear margins". *BiSEPPS Seminar, Harvard University*. Mar. 2018.

Minchew, B. M. "The evolution of ice rheology in glacier shear margins: Crystallographic fabric and thermoviscous effects". *DAMTP Geophysical and Environmental Processes Seminar, University of Cambridge*. Oct. 2017.

Minchew, B. M. "Oceans and ice: How ocean tides influence inland ice flow". *Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology*. May 2017.

Minchew, B. M. "The response of ice flow to ocean tidal loading". *Institute for Theoretical Geophysics Seminar, University of Cambridge*. Mar. 2017.

Minchew, B. M. "Oceans and ice: How ocean tides influence inland ice flow". *School of Earth and Atmospheric Sciences Seminar, Georgia Institute of Technology*. Mar. 2017.

Minchew, B. M. "Oceans and ice: How ocean tides influence inland ice flow". *Department of Earth Sciences Seminar, University of Oregon*. Jan. 2017.

Minchew, B. M. "Observing glaciers in a warming world". *Aerospace Engineering Seminar, University of Colorado Boulder*. May 2016.

Minchew, B. M. "Oceans and ice: How ocean tides influence inland ice flow". *Aerospace Engineering Seminar, University of Texas at Austin*. Feb. 2016.

Minchew, B. M. "Oceans and ice: How ocean tides influence inland ice flow". *CIRES Seminar, University of Colorado Boulder*. Feb. 2016.

Minchew, B. M. "Tidally induced variability in ice stream flow on Rutford Ice Stream, West Antarctica". *University of Washington Glaciology Seminar*. Jan. 2016.

Minchew, B. M. "Rapid changes in glacier flow and what they teach us about glacier mechanics". *Stanford Geophysics Department Seminar*. Dec. 2015.

Minchew, B. M. "Hourly to seasonal timescale changes in glacier flow: InSAR observations as constraints on numerical ice flow models". *Jet Propulsion Laboratory Radar Forum*. Nov. 2015.

Minchew, B. M., M. Simons, S. Hensley, H. Björnsson, F. Pálsson, and P. Milillo. "Multiple glacier surges observed with airborne and spaceborne interferometric synthetic aperture radar". *Geoscience and Remote Sensing Symposium (IGARSS), 2015 IEEE International*. July 2015, pp. 5316–5319.

Minchew, B. M. "Glacier flow over deformable beds". *Scripps GP Seminar*. May 2015.

Minchew, B. M., S. Hensley, and M. Simons. "Using UAVSAR to measure seasonal variations in surface velocities and constrain basal mechanics of an ice cap". *UAVSAR Workshop*. Oct. 2014.

Simons, M and B. M. Minchew. "Glacier dynamics in a changing climate". *University of Iceland and U.S. Embassy Iceland Public Outreach*. Feb. 2014.

Other Selected Presentations (first author only)

Minchew, B. M., S. H. Rosier, and R. Williams. "Inferring the sliding law exponent using time-dependent surface velocity observations". *WAIS workshop*. Sept. 2018.

Minchew, B. M., S. H. Rosier, and R. Williams. "On the dynamic response of laterally confined ice streams to sub-annual periodic forcing". *IGS International Symposium on Timescales, Processes, Glacier Dynamics*. June 2018.

Minchew, B. M. and C. R. Meyer. "Temperate ice in the shear margins of the Antarctic Ice Sheet". *AGU Fall Meeting Abstracts*. Dec. 2017.

Minchew, B. M., C. R. Meyer, A. A. Robel, G. H. Gudmundsson, and M. Simons. "Back to the basics: How ice rheology evolves in glacier shear margins". *IGS British Branch Meeting*. Sept. 2017.

Minchew, B. M., C. R. Meyer, A. A. Robel, G. H. Gudmundsson, and M. Simons. "On the evolution of ice rheology in glacier shear margins". *IGS International Symposium on Polar Ice, Polar Climate, Polar Change*. Aug. 2017.

Minchew, B. M., G. H. Gudmundsson, A. Gardner, F. Paolo, and H. Fricker. "Response of outlet glaciers to ice-shelf thinning in the Bellingshausen Sea Sector, West Antarctica". *AGU Fall Meeting Abstracts*. Dec. 2016.

Minchew, B. M., G. H. Gudmundsson, and A. Gardner. "Outlet glacier response to ice-shelf thinning in the Bellingshausen Sea Sector, West Antarctica". *International Glaciological Society British Branch Meeting*. Sept. 2016.

Minchew, B. M., M. Simons, B. Riel, A. Robel, V. Tsai, and P. Milillo. "Ice shelf buttressing and the response of ice stream flow to vertical ocean tidal motion". *International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean*. July 2016.

Minchew, B. M. "How ocean tides influence ice stream flow tens of kilometers inland". *ESA Living Planet Symposium*. May 2016.

Minchew, B. M. "Insights into ice shelf buttressing and ice rheology on Rutford Ice Stream, West Antarctica, from synoptic-scale observations of tidally driven ice flow variations". *EGU Meeting Abstracts*. Apr. 2016.

Minchew, B. M. "4D surface velocity fields of Rutford Ice Stream, West Antarctica, inferred from continuous synthetic aperture radar observations". *AGU Fall Meeting Abstracts*. Dec. 2015.

Minchew, B. M. "4D surface velocity fields inferred from continuous synthetic aperture radar observations: Applications to Rutford Ice Stream, West Antarctica". *WAIS Workshop*. Sept. 2015.

Minchew, B. M. "Iceland to Antarctica: Rapid changes in glacier flow and what they teach us about glacier mechanics". *PhD Defense*. Oct. 2015.

Minchew, B. M. "Ice flow over deformable beds". *Caltech Brown Bag Seminar*. Apr. 2015.

Minchew, B. M., M. Simons, M. Morlighem, H. Björnsson, F. Pálsson, S. Hensley, and E. Larour. "Inferring basal plasticity in a temperate ice cap from observationally constrained ice-flow models". *AGU Fall Meeting Abstracts*. Dec. 2014.

Minchew, B. M., M. Simons, M. Morlighem, H. Björnsson, F. Pálsson, S. Hensley, and E. Larour. "Basal plasticity and the influence of surface meltwater flux on glacier flow". *Northwest Glaciologists' Meeting*. Oct. 2014.

Minchew, B. M., M. Simons, M. Morlighem, H. Björnsson, F. Pálsson, S. Hensley, and E. Larour. "Ice flow over plastic beds". *WAIS Workshop*. Sept. 2014.

Minchew, B. M. "Insights into the basal mechanics of Icelandic ice caps". *Caltech Brown Bag Seminar*. Mar. 2014.

Minchew, B. M. "Insights into early melt season evolution of Hofsökull's subglacial hydrological system". *University of Iceland Glaciological Seminar*. Feb. 2014.

Minchew, B. M., M. Simons, S. Hensley, E. Larour, M. Morlighem, H. Björnsson, and F. Pálsson. "Temporal variation of basal stress in temperate Icelandic glaciers during the early melt season". *AGU Fall Meeting Abstracts*. Dec. 2013.

Minchew, B. M. "Subglacial mechanics of Iceland ice caps: Inferences from surface velocity measurements and numerical models". *Caltech Brown Bag Seminar*. Apr. 2013.

Minchew, B. M., C. E. Jones, and B. Holt. "Near real-time estimates of the mixing of oil and sea water using polarimetric synthetic aperture radar". *UAVSAR Workshop*. Mar. 2013.

Minchew, B. M., M. Simons, S. Hensley, H. Björnsson, F. Pálsson, and E. Y. Larour. "Inferring the surface velocity fields of glaciers in central Iceland using UAVSAR repeat-pass interferometry". *UAVSAR Workshop*. Mar. 2013.

Minchew, B. M., M. Simons, S. Hensley, H. Björnsson, F. Pálsson, and E. Y. Larour. "Influence of surface meltwater on the velocity of temperate glaciers in the early melt season inferred from collocated airborne InSAR, GPS, and *in situ* meteorological measurements". *AGU Fall Meeting Abstracts*. Dec. 2012.

Grants

2018–2023	Researcher – NSF-NERC: Processes, drivers, predictions: Modeling the history and evolution of Thwaites Glacier (PROPHET). Award number 1739031
2016–2018	PI – Spatiotemporal characteristics of basal resistance to ice flow in the West Antarctic Ice Sheet from satellite observations and numerical modeling. NSF Earth Sciences Postdoctoral Fellowship award 1452587
2013–2015	Research assistant – Subglacial mechanics using repeat-pass InSAR measurements and numerical models of temperate ice caps in Iceland. NASA Cryospheric Science award NNX14AH80G, with M. Simons (PI)
2011–2014	PI – Investigating the mechanics of subglacial till using airborne radar interferometry and numerical ice flow models. NASA Earth and Space Science Fellowship
2011–2012	Research assistant – Temperate glacier studies with UAVSAR. NASA Cryospheric Science, with M. Simons (PI)

Large-scale Collaborations: Past and present

- Ice Sheet Systems Model (ISSM)
- InSAR Scientific Computing Environment (ISCE)
- The Sleeping Giant: Measuring Ice Ocean Interactions in Antarctica

– Processes, drivers, predictions: Modeling the history and evolution of Thwaites Glacier (PROPHET)

Mentorship

2018– Postdoc advisor: Lizz Ultee, MIT EAPS
2018– PhD advisor: Joanna Millstein, MIT-WHOI Joint Program
2018– Project advisor: Julia Wilcots, MIT EAPS
2018– Project advisor: Kasturi Shah, MIT EAPS
2018– Project advisor: Fiona Clerc, MIT-WHOI Joint Program
2018– Project advisor: Meghana Ranganathan, MIT EAPS
2018– PhD thesis committee member: Jeffrey Mei, MIT-WHOI Joint Program
2016– PhD advisory committee member: Thomas Chudley, SPRI, University of Cambridge
2015 Project advisor: Benjamin Lauer, Université de Lorraine
2015 Project advisor: Christine Rains, DEVELOP-JPL
2015 Project advisor: Jerry Heo, DEVELOP-JPL
2015 Project advisor: Erika Higa, DEVELOP-JPL
2013 Project advisor: Sandia Akhtar, Caltech

Major Fieldwork

May 2015 UAVSAR deployment, Hofsjökull and Vatnajökull, Iceland
February 2014 UAVSAR and campaign GPS deployment, Langjökull and Hofsjökull, Iceland
June 2012 UAVSAR and campaign GPS deployment, Langjökull and Hofsjökull, Iceland

Selected Outreach Efforts

– *Adventure! Exploring with Technology* at the Boston Museum of Science
– NASA Climate Day presenter
– US Embassy Iceland outreach on Arctic climate
– Iridescent Learning: Teaching children about scientific concepts

Synergistic and Professional Activities

Scientific Editor: Annals of Glaciology
Reviewer: Geophysical Research Letters, Journal of Glaciology, Annals of Glaciology, The Cryosphere, Journal of Geophysical Research, IEEE Transactions on Geoscience and Remote Sensing, Earth System Science Data, NSF
Member: International Glaciological Society, International Association of Cryospheric Sciences, Association of Polar Early Career Scientists, American Geophysical Union, European Geosciences Union, American Association for the Advancement of Science
Notable external committees: Advisory board member, Boston Museum of Science

Military Service

Branch: U.S. Marine Corps
Dates: August 1996–February 2004 (active duty)
Units: HMX-1, HMH-461, HMM-264, 26th MEU (aboard USS Iwo Jima)