

CURRICULUM VITAE

Edward J. Brook
College of Earth, Ocean, and Atmospheric Sciences
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Oregon State University
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EDUCATION

Ph.D. Chemical Oceanography, 1993. MIT/Woods Hole Oceanographic Institution.
M.S. Geology, 1988. University of Montana.
B.S. Geology, 1985. Duke University.

POSITIONS

2018-present Distinguished Professor, Oregon State University, College of Earth Ocean, and Atmospheric Sciences.
2008-2018 Professor, Oregon State University, College of Earth Ocean, and Atmospheric Sciences.
2014-2017 Director for Graduate and Undergraduate Geology Programs
2004-2008 Associate Professor, Oregon State University, Department of Geosciences
2002-2004 Associate Professor, Washington State University, Department of Geology and Program in Environmental Science and Regional Planning.
1996-2002 Assistant Professor, Washington State University, Department of Geology and Program in Environmental Science and Regional Planning.
1996-1996 Post-Doctoral Investigator, Graduate School of Oceanography, University of Rhode Island. Supervisor: Dr. Michael Bender.
1993-1995 NOAA Climate and Global Change Post-Doctoral Fellow, Graduate School of Oceanography, University of Rhode Island. Supervisor: Dr. Michael Bender.
1988-1993 Research Assistant, MIT/Woods Hole Oceanographic Institution. Supervisor: Dr. Mark Kurz.
1985-1993 Teaching Assistant/Research Assistant, Geology Department, University of Montana.

HONORS

Outstanding Promise in Geology Award, Duke University Department of Geology, 1985.
Bertha Morton Graduate Scholarship, University of Montana, 1987.
Geological Society of America Outstanding Research Grant Proposal, 1988.
National Defense Science and Engineering Graduate Fellowship, 1988-1992.
NOAA Global and Climate Change Post-Doctoral Fellowship, 1993-1995.
Dean's Award for Research Excellence, WSU, 1999.
Editor's Citation for Excellence in Reviewing, *Journal of Geophysical Research*, 2001.
Fellow, National Academy of Sciences, *Frontiers in Science*, 2002.
Gary Comer Foundation Abrupt Climate Change Fellowship, 2004.
Brook Glacier, Antarctica, named for service to polar science, 2006.
Aldo Leopold Leadership Fellowship, 2008.
Milton Harris Award for Basic Research, OSU College of Science, 2009.
Google Science Communication Fellowship, 2011.
Fellow of the American Association for the Advancement of Science, 2012.
Jack Dymond Memorial Excellence in Mentoring Award, OSU-CEOAS, 2013.
Fellow of the American Geophysical Union, 2014.
Distinguished Professor, Oregon State University, 2018
Hans Oeschger Medal, European Geosciences Union, 2019

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PROFESSIONAL SOCIETIES

American Geophysical Union
American Association for the Advancement of Science
European Geosciences Union

GRADUATE ADVISEES AND CURRENT POSITION

Brent Goehring	M.S. 2004-2006	Assistant Professor, Tulane University
Logan Mitchell	Ph.D. 2007-2012	Postdoc, University of Utah
Thomas Bauska	Ph.D. 2007-2013	Postdoc, Cambridge University
Julia Rosen	Ph.D. 2008-2014	Independent Science Journalist
James Lee	Ph.D. 2011-2017	Los Alamos National Lab, Postdoct
Jon Edwards	Ph.D. 2011-present	
Andy Menking	Ph.D. 2013-present	
Jenna Epifanio	Ph.D. 2017-present	
Nick Mehmel	Ph.D. 2017-present	
Ben Young	Ph.D. 2018-present	

POSTDOCTORAL ADVISEES AND CURRENT POSITION

Susan Harder	1997-2002	Instructor, Washington State Univ. (ret.)
Henriette Linge	2002-2003	Asst. Professor, Univ. of Bergen, Norway
Hinrich Schaefer	2005-2007	Scientist, NIWA, New Zealand
Jinho Ahn	2005-2008	Asst. Professor, Seoul National Univ., Korea
Alexi Grachev	2005- 2008	Asst. Professor, Siberian Federal Univ.
Shaun Marcott	2011-present	Asst. Professor, University of Wisconsin
Rachael Rhodes	2011-present	Marie Curie Fellow, University of Cambridge
Adrian Schilt	2012-2013	Swiss Federal Office for the Environment
Christo Buizert	2012-2016	Assistant Professor, OSU
Aron Buffen	2015-2018	

UNDERGRADUATE AND HIGH SCHOOL RESEARCH ADVISEES SINCE 1998

Undergraduate: Vanessa Stevens, Kim Guess, Aaron Goldner, Logan Mitchell, Jeremy Vore, Lauren Foiles, Lacey Little, Kurt Winner, Amber Zandanel, Nicole Rocco (summer REU), Victoria Scherelis, Casey Armanetti (summer REU), Marika Stock, Nicole Bintliff.
High School: Claire Rodman

SERVICE ON GRADUATE THESIS COMMITTEES (OSU unless noted)

Joe Licciardi	Anders Carlson
Summer Praetorius	Jason Kenworthy
Shaun Marcott	Jeremy Shakun
Meredith Payne	Maureen Davies
Sarah Strano	Nilo Bill
Aaron Barth	Andrea Balbas
Jeremy Hoffman	Gaylen Sinclair
Cedric Hagen	Mark Sweeney (WSU)
Katharine Solada	
Peter Sperlich (University of Copenhagen)	Sarah Eggleston (University of Bern)
Jessica Lundin (University of Washington)	Aurel Persoiu (University of South Florida)
Hinrich Schaefer (University of Victoria)	Cecilia Macfarlane (University of Melbourne)
Christoph Nehrbass-Ahles (University of Bern)	OSU GCR service in other units not tracked (~ 1 per year)

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MAJOR PROFESSIONAL SERVICE

U.S. Ice Core Working Group 2000-2002 (Chair, 2001-2002).
International Partnerships in Ice Core Sciences, Steering Committee, 2003-present.
Co-Chair, International Partnerships in Ice Core Sciences, 2005-present.
West Antarctic Ice Sheet Divide Site Ice Core Project Executive Committee, 2004-present.
NSF Earth System History Panel for Abrupt Climate Change Research Plan, Oct. 20-21 2004.
Editor, Ice Core Section, Encyclopedia of Quaternary Sciences, 2005-2006.; 2010-2011.
Associate Editor, *Climate of the Past Discussions* (EGU Journal), 2005-present.
Associate Editor, *Quaternary Science Reviews*, 2005-2010.
Steering Committee, NSF Workshop on Paleoclimate Proxies, 2005.
Lead Author, for US Climate Change Science Program Synthesis and Assessment Product 3.4, Abrupt Climate Change, Chapter 5, Abrupt Changes in Atmospheric Methane.
NSF Office of Polar Programs Advisory Committee, 2005-2008.
Ice Drilling Program Office, Senior Advisory Board, 2008-Present.
NEEM Ice Core Steering Committee, co-chair Gas Consortium, 2007-present.
Lead PI, NSF PIRE Award: International Collaboration and Education in Ice Core Sciences, 2010-2016.
Canadian Ice Coring Program, International Advisory Board, 2015-present.
PAGES (Past Global Changes) Steering Committee, 2016-present.
Beyond EPICA Oldest Ice Project, Liaison and Advisory Group, 2016-present.

MAJOR UNIVERSITY, COLLEGE AND DEPARTMENT SERVICE (OSU Only)

Department of Geosciences, Curriculum Committee, AY 2007-2010.
Department of Geosciences, Search Committee for Office Specialist, 2007.
Department of Geoscience, Graduate Committee, AY 2005-2006.
Chair, Department of Geosciences Space Task Force, AY 2005-2006.
Department of Geosciences, Advisory Committee, AY 2006-2007 (chair), 2007-2008.
Faculty Hiring Committee CEOAS, 2011-2012.
Peer Review of Teaching Committee, CEOAS, 2013-2014.
Strategic Planning and Hiring Committee, CEOAS, 2014-2015.
Graduate Program Committee, CEOAS, 2014-present.
Undergraduate Program Committee, CEOAS, 2014-present.
Search Committee, High Latitude Cluster Hire, 2011-2012.
Search Committee, Earth System History Faculty Member, 2014, 2015.
Program Director for Geology, CEOAS, 2014-present.
Chair, Faculty Senate Faculty Economic Welfare and Retirement Committee, 2015-2017.
Search Committee, CEOAS Dean, 2015-2016.
Chair, CEOAS External Award Committee, 2016-present.
OSU Research Council, 2018-present.

SIGNIFICANT INVITED PRESENTATIONS AND KEYNOTE TALKS

AMQUA 1998 Biennial Meeting. Puerto Vallarta. Sept. 5-7, 1998.
American Museum of Natural History, Conference on Biodiversity and Climate Change: Conservation in the Face of an Uncertain Future. April 30-May 1, 1999.
Berkeley Atmospheric Sciences Center Atmospheric Sciences Symposium. Nov. 9, 2001.
Beckman/National Academy of Sciences 14th Annual Frontiers in Science Symposium. Nov. 14-16, 2002.

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University of South Florida, Eminent Scholars Lecture Series on Abrupt Climate Change.
Jan 27-28, 2004.

Leverhulme Symposium on Climate Change, invited speaker, Cambridge and London, UK,
March 10-13 2008.

Seoul National University, South Korea, Distinguished Visiting Lecturer, May 2013.

Lifto Amundson Phi Beta Kappa Memorial Lecture, University of South Dakota, April 20,
2015.

Plenary Lecture at the 2017 PAGES Open Science Meeting, May, 2017.

Carelyn Y. and William S. Reeburgh Endowed Earth System Science Lecture, UC Irvine,
May 24, 2018.

PUBLICATIONS

Publications in Peer Reviewed Journals and Books (Graduate Student and Postdoc Authors in Bold, *=student or postdoc collaborator for whom I was not major advisor)

Google Scholar: h index 53, i10 index 113 (Oct. 9 2018).

Bauska, T.K., Brook, E.J., Marcott, S.A., Baggenstos, D., Shackleton, S., Severinghaus, J.P. and Petrenko, V.V., 2018. Controls on millennial-scale atmospheric CO₂ variability during the last glacial period. *Geophysical Research Letters*.

Reusche, M.M.*, Marcott, S.A., Ceperley, E.G., Barth, A.M., Brook, E.J., Mix, A.C. and Caffee, M.W., 2018. Early to Late Holocene Surface Exposure Ages From Two Marine-Terminating Outlet Glaciers in Northwest Greenland. *Geophysical Research Letters*, 45(14), pp.7028-7039.

Brook, E.J. and Buizert, C., 2018. Antarctic and global climate history viewed from ice cores. *Nature*, 558(7709), p.200.

Prokopiou, M.*, Sapart, C. J., Rosen, J., Sperlich, P., Blunier, T., Brook, E., van de Wal, R. S. W., & Röckmann, T. (2018). Changes in the isotopic signature of atmospheric nitrous oxide and its global average source during the last three millennia. *Journal of Geophysical Research: Atmospheres*, 123. <https://doi.org/10.1029/2018JD029008>

Seltzer, A.M.*, Buizert, C., Baggenstos, D., Brook, E.J., Ahn, J., Yang, J.W. and Severinghaus, J.P., 2017. Does δ¹⁸O of O₂ record meridional shifts in tropical rainfall?. *Climate of the Past*, 13(10), pp.1323-1338.

Yang, J.W.*, Ahn, J., Brook, E.J. and Ryu, Y., 2017. Atmospheric methane control mechanisms during the early Holocene. *Climate of the Past*, 13(9), pp.1227-1242.

McConnell, J.R., Burke, A., Dunbar, N.W., Köhler, P., Thomas, J.L., ***Arienzo, M.M.**, ***Chellman, N.J.**, Maselli, O.J., Sigl, M., Adkins, J.F. and ***Baggenstos, D.**, Burkhardt, J., Brook, E., Buizert, C., Cole-Dai, J., Fudge, T.J., Knorr, G., Graf, H., Grieman, M., Iverson, N., McGwire, K., Mulvaney, R., Paris, G., Rhodes, R., Saltzman, S., Severinghaus, J., Steffensen, J., Taylor, K., Winckler, G., 2017, Synchronous volcanic eruptions and abrupt climate change~ 17.7 ka plausibly linked by stratospheric ozone depletion. *Proceedings of the National Academy of Sciences*, p.201705595.

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- Petrenko, V.V., Smith, A.M., Schaefer, H., Riedel, K., Brook, E., ***Baggenstos, D.**, Harth, C., Hua, Q., Buizert, C., ***Schilt, A.** and Fain, X., 2017. Minimal geological methane emissions during the Younger Dryas–Preboreal abrupt warming event. *Nature*, 548(7668), pp.443-446.
- Schmidt, G.A., Severinghaus, J., Abe-Ouchi, A., Alley, R.B., Broecker, W., Brook, E., Etheridge, D., Kawamura, K., Keeling, R.F., Leinen, M. and Marvel, K., 2017. Overestimate of committed warming. *Nature*, 547(7662), pp.E16-E17.
- *Lundin, J.M.**, ***Stevens, C.M.**, Arthern, R., Buizert, C., Orsi, A., Ligtenberg, S.R., Simonsen, S.B., Cummings, E., Essery, R., Leahy, W. and Harris, P., 2017. Firn Model Intercomparison Experiment (FirnMICE). *Journal of Glaciology*, 63(239), pp.401-422.
- Rhodes, R.H.**, Brook, E.J., McConnell, J.R., Blunier, T., Sime, L.C., Faïn, X. and Mulvaney, R., 2017. Atmospheric methane variability: Centennial-scale signals in the Last Glacial Period. *Global Biogeochemical Cycles*, 31(3), pp.575-590.
- *Seltzer, A.M.**, Buizert, C., ***Baggenstos, D.**, Brook, E.J., Ahn, J., ***Ji-Woong, Y.** and Severinghaus, J.P., 2017. Does $\delta^{18}O$ of O_2 record meridional shifts in tropical rainfall?. *Climate of the Past*, 13(10), p.1323.
- Bertler, N.A., Conway, H., Dahl-Jensen, D., ***Emanuelsson, D.B.**, Winstrup, M., Vallelonga, P.T., **Lee, J.**, E., Brook, E.J., Severinghaus, J.P., Fudge, T.J. and Keller, E.D., 2017, The Ross Sea Dipole-temperature, snow accumulation and sea ice variability in the Ross Sea Region, Antarctica, over the past 2,700 years. *Climate of the Past Discussions*, pp.1-31.
- *Baggenstos, D.**, **Bauska, T.K.**, Severinghaus, J.P., **Lee, J.E.**, Schaefer, H., Buizert, C., Brook, E.J., ***Shackleton, S.** and Petrenko, V.V., 2017. Atmospheric gas records from Taylor Glacier, Antarctica, reveal ancient ice with ages spanning the entire last glacial cycle. *Climate of the Past*, 13(7), p.943.
- *Ji-Woong, Y.**, Ahn, J., Brook, E.J. and ***Ryu, Y.**, 2017. Atmospheric methane control mechanisms during the early Holocene. *Climate of the Past*, 13(9), p.1227.
- *Yau, A.M.**, Bender, M.L., Robinson, A. and Brook, E.J., 2016, Reconstructing the last interglacial at Summit, Greenland: Insights from GISP2, *Proceedings of the National Academy of Sciences*, 113(35), pp.9710-9715.
- Bauska, T.K.**, **Baggenstos, D.***, Brook, E.J., Mix, A.C., **Marcott, S.A.**, Petrenko, V.V., Schaefer, H., Severinghaus, J.P. and **Lee, J.E.**, 2016, Carbon isotopes characterize rapid changes in atmospheric carbon dioxide during the last deglaciation. *Proceedings of the National Academy of Sciences*, 113, 3465–3470.
- Petrenko, V. J. Severinghaus, H. Schaefer, A. Smith, T. Kuhl, D. Baggenstos, Q. Hua, E. Brook, P. Rose, R. Kulin, **T. Bauska**, C. Harth, C. Buizert, A. Orsi, G. Emanuele, **J. Lee**, G. Brailsford, R. Keeling, R. Weiss, 2016, Measurements of ^{14}C in ancient ice from Taylor Glacier, Antarctica constrain in situ cosmogenic $^{14}CH_4$ and ^{14}CO production rates, *Geochimica et Cosmochimica Acta*, 177, 62–77.

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- Rhodes, R.** X. Faïn, E. J. Brook, J. R. McConnell, O. J. Maselli, M. Sigl, **J. Edwards, C. Buizert**, T. Blunier, J. Chappellaz, and J. Freitag, 2016, Local artifacts in ice core methane records caused by layered bubble trapping and in situ production: a multi-site investigation, *Clim. Past*, 12, 1061–1077, 2016.
- Shakun, J. P.** Clark E. Brook, N. Lifton, M. Caffee, and W. Shakun, 2015, Cosmogenic dating of Late-Pleistocene glaciation, southern tropical Andes, Peru, *Journal of Quaternary Science*. 30(8), 841-847.
- Higgins, J. A., A. V. Kurbatov, **N. E. Spaulding***, E. Brook, D. S. Introne, L. M. Chimiak, **Y. Yan***, P. A. Mayewski and M. L. Bender, 2015, Atmospheric composition 1 million years ago from blue ice in the Allan Hills, Antarctica, *Proceedings of the National Academy of Sciences*: 112, 6887-6991.
- Rhodes, R. H.**, E. J. Brook, J. C. Chiang, T. Blunier, O. J. Maselli, J. R. McConnell, D. Romanini and J. P. Severinghaus, 2015, Enhanced tropical methane production in response to iceberg discharge in the North Atlantic, *Science* 348(6238): 1016-1019.
- WAIS Divide Community Members (OSU post doc Christo Buizert first author, includes E. Brook)**, 2015, Precise inter-polar phasing of abrupt climate change during the last ice age, *Nature* 520(7549): 661-665.
- Buizert, C.**, K. Cuffey, J. Severinghaus, D. Baggenstos, T. Fudge, E. Steig, B. Markle, M. Winstrup, **R. Rhodes** and E. Brook, 2015, The WAIS Divide deep ice core WD2014 chronology—Part 1: Methane synchronization (68–31 ka BP) and the gas age–ice age difference, *Climate of the Past* 11(2): 153-173.
- Bauska, T. K.**, F. Joos, A. C. Mix, R. Roth, J. Ahn and E. J. Brook, 2015, Links between atmospheric carbon dioxide, the land carbon reservoir and climate over the past millennium, *Nature Geoscience*, 8, 383-387.
- Marcott, S., Bauska, T., Buizert, C.**, Steig, E., **Rosen, J.**, Cuffey, K., Fudge, T.J., Severinghaus, J., Ahn, J., Kalk, M., McConnell, J., Sowers, T., Taylor, K., White, J. and Brook, E., 2014, Centennial-scale changes in the global carbon cycle during the last deglaciation, *Nature*, 514, 616-619.
- Bauska, T.K.**, E. J. Brook, A. C. Mix, and A. Ross, 2014, High precision dual-inlet IRMS measurements of the stable isotopes of CO₂ and the N₂O/CO₂ ratio from polar ice core samples, *Atmos. Meas. Tech. Discuss.* 7, 6529-6564, 2014.
- Schilt, A.**, E. J. Brook, **T. K. Bauska**, D. Baggenstos*, H. Fischer, F. Joos, V. V. Petrenko, H. Schaefer, J. Schmitt and J. P. Severinghaus, 2014, Isotopic constraints on marine and terrestrial N₂O emissions during the last deglaciation, *Nature* 516(7530): 234-237.
- Buizert, C.**, V. Gkinis, J.P. Severinghaus, F. He, B. S. Lecavalier, P. Kindler, M. Leuenberger, A. Carlson, B. Vinther, V. Masson-Delmotte, J.W.C. White, Z. Liu, B. Otto-Bliesner and E.J. Brook, 2014, Greenland temperature response to climate forcing during the last deglaciation, *Science*, 45, 1093-1208.

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- Buizert, C.**, D. Baggenstos, W. Jiang, R. Purtschert, V. V. Petrenko, Z.-T. Lu, P. Müller, T. Kuhl, J. Lee and J. P. Severinghaus, 2014, Radiometric ^{81}Kr dating identifies 120,000-year-old ice at Taylor Glacier, Antarctica, *Proceedings of the National Academy of Sciences* 111(19): 6876-6881.
- Carlson, A. E., K. Winsor, D. J. Ullman, E. J. Brook, D. H. Rood, Y. Axford, A. N. LeGrande, F. S. Anslow and G. Sinclair, 2014, Earliest Holocene south Greenland ice sheet retreat within its late Holocene extent, *Geophysical Research Letters* 41(15): 5514-5521.
- Seierstad, I. K.**,* P. M. Abbott, M. Bigler, T. Blunier, A. J. Bourne, E. Brook, S. L. Buchardt, C. Buizert, H. B. Clausen and E. Cook, 2014, Consistently dated records from the Greenland GRIP, GISP2 and NGRIP ice cores for the past 104 ka reveal regional millennial-scale $\delta^{18}\text{O}$ gradients with possible Heinrich event imprint, *Quaternary Science Reviews* 106: 29-46.
- Ahn, J. and E.J. Brook, 2014, Siple Dome ice reveals two modes of millennial CO_2 change during the last ice age, *Nature Communications*, **5**, 3723, doi:10.1038/ncomms4723.
- Ahn, J., E.J. Brook, and **C. Buizert**, 2014, Response of atmospheric CO_2 to the abrupt cooling event 8200 years ago, *Geophysical Research Letters*. 41, 604–609.
- Fudge, T.J*., Eric J. Steig, Bradley R. Markle*, Kendrick C. Taylor, Joseph R. McConnell, Edward J. Brook, Todd Sowers, James W. C. White, Spruce W. Schoenemann* , Richard B. Alley, Hai Cheng, Gary D. Clow, Jihong Cole-Dai, Howard Conway, Kurt M. Cuffey, **Jon S. Edwards**, R. Lawrence Edwards, Ross Edwards, John M. Fegyveresi, David Ferris, Joan J. Fitzpatrick, Jay Johnson, Geoffrey Hargreaves, James E. Lee, Olivia J. Maselli, William Mason, Kenneth C. McGwire, **Logan E. Mitchell**, Nicolai Mortensen, Peter Neff, Anais J. Orsi, Andrew J. Schauer, Jeffrey P. Severinghaus, Michael Sigl, Matthew K. Spencer, Bruce H. Vaughn, Donald E. Voigt, Edwin Waddington, Xianfeng Wang, Gifford J. Wong, 2013, Deglacial warming in West Antarctica driven by both local orbital and Northern Hemisphere forcing, *Nature*, 500(7463), 440-444.
- Rosen, J.**, E. Brook, J. Severinghaus, T. Blunier, **L. Mitchell**, **J. Lee**, **J. Edwards**, and V. Gkinis, 2014, An ice core record of near-synchronous global climate changes at the Bolling transition, *Nature Geoscience*, 6, 459-463.
- Fischer, H. Jeff Severinghaus, Ed Brook, Eric Wolff, Mary Albert, Olivier Alemany, Rob Arthern, Charles Bentley, Donald Blankenship, Jerome Chappellaz, Timothy Creyts, Dorthe Dahl-Jensen, Michael Dinn, Massimo Frezzotti, Shuji Fujita, Hubert Gallee, Richard Hindmarsh, Don Hudspeth, Gerard Jugie, Kenji Kawamura, Vladimir Lipenkov, Heinz Miller, Hideaki Motoyama, Rob Mulvaney, Frank Pattyn, Catherine Ritz, Ted Scambos, Jakob Schwander, Daniel Steinhage, Tas van Ommen, Frank Wilhelms, 2013, Where to find 1.5 million yr old ice for the IPICS" Oldest-Ice" ice core, *Climate of the Past*, 9(6).
- Chappellaz, J., C. Stowasser*, T. Blunier, D. Baslev-Clausen, E.J. Brook, R. Dallmayr, X. Fain, J.E. Lee, **L.E. Mitchell**, O. Pascual, D. Romanini, **J. Rosen**, and S. Schupbach*,

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2013, High-resolution glacial and deglacial record of atmospheric methane by continuous-flow and laser spectrometer analysis along the NEEM ice core, *Climate of the Past*, 9, 2579-2953.

Mitchell, L., Ed Brook, **James E. Lee**, **Christo Buizert**, and Todd Sowers, 2013, Constraints on the Late Holocene Anthropogenic Contribution to the Atmospheric Methane Budget, *Science*, 342 (6161), 964-966.

Rasmussen, Sune, O., Peter Abbott, Thomas Blunier, Anna Bourne, Ed Brook, Susanne Lilja Buchardt, **Christo Buizert**, Jérôme Chappellaz, Henrik B. Clausen, Eliza Cook, Dorthe Dahl-Jensen, Siwan Davies, Myriam Guillevic, Sepp Kipfstuhl, Thomas Laepple, Inger K. Seierstad, Jeffrey P. Severinghaus, J.P. Steffensen, Christopher Stowasser, Anders Svensson, Paul Vallelonga, Bo M. Vinther, Frank Wilhelms, Mai Winstrup, 2013, A first chronology for the NEEM ice core, *Climate of the Past*, 9, 2713–2730.

Faïn, X. J Chappellaz, **RH Rhodes**, **C Stowasser***, T Blunier, JR McConnell, EJ Brook, S Preunkert, M Legrand, T Desbois, D Romanini, 2013, High resolution measurements of carbon monoxide along a late Holocene Greenland ice core: evidence for in-situ production, *Climate of the Past Discussions*, 9(3), 2817-2857.

Brook, E.J., 2013, Leads and lags at the end of the last ice age, *Science*, 339 (6123), 1042-1043.

Landvik, J., E. Brook, L. Gualtieri, H. Linge, G. Raisbeck, and O. Salvigsen, 2013, ¹⁰Be exposure age constraints on the Late Weichselian ice sheet geometry and dynamics in inter ice-stream areas, western Svalbard, *Boreas*, 42, 43-56

Rhodes, R., X. Fain, C. Stowasser, T. Blunier, J. Chappellaz, J. McConnell, **L. Mitchell**, and E. Brook, 2013, Continuous ice core methane measurements from a late Holocene Greenland ice core: atmospheric and in-situ signals, *Earth and Planetary Science Letters*, 368, 9–19

NEEM Project Members (includes Ed Brook, **Julia Rosen**, **Christo Buizert** and **Adrian Schilt** from OSU), 2013 Eemian interglacial reconstructed from Greenland folded NEEM ice core strata, *Nature* 493, 489-494.

Ahn, J., Brook, E. J., Schmittner, A., & Kreutz, K., 2012, Abrupt change in atmospheric CO₂ during the last ice age, *Geophysical Research Letters* 39(18), L18711.

Ahn, J., E. Brook, L. Mitchell, **J. Rosen**, J. McConnell, K. Taylor, D. Etheridge, and M. Rubino, 2012, Atmospheric CO₂ over the last 1000 years: A high-resolution record from the West Antarctic Ice Sheet (WAIS) Divide ice core. *Global Biogeochemical Cycles* 26, GB2027.

Clark, P.U., **Shakun, J.D.***, Baker, P.A., Bartlein, P.J., Brewer, S., Brook, E.J., Carlson, A.E., Cheng, H., Kaufman, D.S., Liu, Z., Marchitto, T.M., Mix, A.C., Morrill, C., Otto-Bliesner, B., Pahnke, K., Russell, J.M., Whitlock, C., Adkins, J.F., Blois, J.L., Clark, J., Colman, S.C., Curry, W.B., Flower, B.P., He, F., Johnson, T.C., Lynch-Stieglitz, J., Markgraf, V., McManus, J.F., Mitrovica, J.X., Moreno, P.I., Williams, J.W., 2012, Global climate evolution during the last deglaciation. *Proceedings of the National Academy of*

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Sciences, 109(19), E1134-E1142.

Buizert, C., Petrenko, V. V., Kavanaugh, J. L., Cuffey, K. M., Lifton, N. A., Brook, E. J., & Severinghaus, J. P., 2012, In situ cosmogenic radiocarbon production and 2-D ice flow line modeling for an Antarctic blue ice area. *Journal of Geophysical Research*, 117(F2), F02029.

Brook, E., 2013, Correlations Between Greenland and Antarctic Ice Core Records, in Elias, S. (ed.), *Encyclopedia of Quaternary Science 2nd ed.*, Elsevier.

Brook, E., 2013, Overview of ice core research, in Elias, S. (ed.), *Encyclopedia of Quaternary Science 2nd ed.*, Elsevier.

Brook, E. and J. Severinghaus, 2011, Comment on “Methane emissions from extinct Megafauna, by F. Smith, S. Elliott, and S. Lyons, *Nature Geoscience* 4, 271–272 doi:10.1038/ngeo1140.

Mitchell, L., E. Brook, T. Sowers, J. McConnell, and K. Taylor, 2011, Multidecadal variability of atmospheric methane, 1000-1800 C.E, *Journal of Geophysical Research* 116, G02007, doi:10.1029/2010JG001441.

Severinghaus, J., E. W. Wolff, and E. J. Brook, 2010, Searching for the Oldest Ice, *EOS Transactions* 91, 357-358.

Brook, E., M. Kurz, and J. Curtice, 2009, Flux and size fractionation of ³He in interplanetary dust from Antarctic ice core samples, *Earth and Planetary Science Letters* 286, 565-569.

Brook, E., 2009, Atmospheric carbon footprints, *Nature Geoscience* 2, 170-172.

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RESEARCH GRANTS. Total since 1990 ~\$15.4M

- Tracing Past Methane Variations with Stable Isotopes in Antarctic Ice Cores, NSF Antarctic Glaciology, 8/18 to 7/22, \$489,383.

CURRICULUM VITAE

Collaborative Research: Snapshots of Early and Mid-Pleistocene Climate and Atmospheric Composition from the Allan Hills Blue Ice Area, NSF Antarctic Glaciology, 8/18 to 7/22, \$446,229.

Inter-Hemispheric Climate Teleconnections in response to Massive Iceberg Discharge in the North Atlantic. NSF P2C2, 4/17 to 3/20, \$460,716. Co-PI with Christo Buizert, OSU.

Advanced Light Isotope Mass Spectrometers for Environmental Research. Murdock Charitable Trust, 12/17, \$345,000. Co-PI with Alan Mix, OSU.

A high-resolution atmospheric methane record from the South Pole Ice Core, NSF Antarctic Glaciology, 1/17 to 12/19. \$184,956.

Collaborative research: Kr-86 as a proxy for barometric pressure variability and movement of the SH westerlies during the last deglaciation. NSF Antarctic Glaciology, 4/2016 to 3/19, \$159,999. Co-PI with Christo Buizert, OSU.

Collaborative Research: Inert gas and methane based climate records throughout the South Pole deep ice core, NSF Arctic Natural Sciences, 1/15 to 12/17. Co-PI with Jeff Severinghaus, Scripps Institution of Oceanography and Todd Sowers, Penn State University, Brook budget \$166,785.

Collaborative Research: Window into the World with 40,000-year Glacial Cycles from Climate Records in Million Year-old Ice from the Allan Hills Blue Ice Area, NSF Antarctic Glaciology, 8/15 to 7/18, \$104,379.

Carbon dioxide and nitrous oxide dynamics during the Holocene Epoch, NSF Arctic Natural Sciences, 4/15 to 3/18. Brook budget \$432,111.

Collaborative Research: POISE (Petermann Ocean Ice Shelf Experiment)-Paleo Context for Ocean Ice Interactions, NSF Arctic System Science, 8/13 to 7/17. Brook budget \$358,802. Co-PI with Alan Mix and Joe Stoner, OSU.

Completing the WAIS Divide CO2 record, NSF Polar Programs, 1/2013 to 12/2016, \$479,981.

Collaborative Research: The Taylor Glacier, Antarctica, horizontal ice core: exploring changes in the natural methane budget in a warming world and expanding the paleo-archive, NSF Polar Programs, 7/2013 to 6/2017 \$394,742.

Collaborative Research: Investigating the potential of carbon-14 in polar firn and ice as a tracer of past cosmic ray flux and an absolute dating tool, NSF Polar Programs, 7/12 to 6/16, \$184,061. Co PI with Vas Petrenko, University of Rochester and Jeff Severinghaus, UC San Diego.

Collaborative Research: Continuous records of greenhouse gases and aerosol deposition over the Holocene epoch: testing the fidelity of new methods for reconstructing atmospheric change, NSF Polar Programs, 10/12 to 9/15, \$263,141. Co Pi with Joe McConnell Desert Research Institute.

CURRICULUM VITAE

Collaborative Research: Investigating Upper Pleistocene Rapid Climate Change using Continuous, Ultra-High-Resolution Aerosol and Gas Measurements in the WAIS Divide Ice Core, NSF Polar Programs, 9/2012 to 8/2015, \$80,027. Co-PI with Joe McConnell, Desert Research Institute.

Collaborative Research: Applications of advanced laser spectroscopy to the ice core record of changes in climate and methane biogeochemistry, NSF Polar Programs, 1/10 to 12/13, \$670,020.

Collaborative Research: Ice core studies reconstructing Greenland climate during the Eemian and beyond, NSF Polar Programs, 7/11 to 6/14, \$85,397 to OSU. Co-PI with Michael Bender, Princeton University.

Collaborative Research: Replicate Coring at WAIS Divide to Obtain Additional Samples at Events of High Scientific Interest, NSF Polar Programs, 7/11 to 6/15, \$327,079 to OSU. Co-PI with Jeff Severinghaus, UC San Diego.

Collaborative Research: Completing an ultra-high resolution methane record from the WAIS Divide ice core, NSF Polar Programs, 1/11 to 12/13, \$351,834 to OSU. Co-PI with Todd Sowers, Penn State University.

PIRE: ICE-ICS: International Collaboration and Education in Ice Core Science, NSF Partnerships in International Research and Education, 9/1/10 to 8/31/15, \$4,500,000.

Collaborative Research: Deglaciation of the Ross Sea Embayment, constraints from Roosevelt Island, NSF Office of Polar Programs, 9/1/10 to 8/31/13, \$200,729. Co PI with Ed Waddington and Howard Conway, University of Washington.

Toward a Glacial-Interglacial Record of $\delta^{13}\text{C}$ of Atmospheric CO_2 from the WAIS Divide Ice Core. Comer Science and Education Foundation, 6/15/08 to 6/14/10, \$50,678.

Developing a record of the stable carbon isotopic composition of atmospheric CO_2 from the LGM to the Holocene, NSF Office of Polar Programs, 1/1/09-12/31/12, \$411,238. Co-PI with Alan Mix, OSU.

Collaborative Research: A "horizontal ice core" for large-volume samples of the past atmosphere, Taylor Glacier, Antarctica, NSF Office of Polar Programs, 7/1/09 to 6/30/12, \$294,755 Co-PI with Jeff Severinghaus, UC San Diego.

IPY: Collaborative Research: The NEEM Deep Ice Core. NSF OPP, 5/08-4/13, \$517,034 to OSU (collaborative effort with University of Colorado, Scripps Institution of Oceanography, Penn State University).

Atmospheric carbon dioxide and climate change: the WAIS Divide record, NSF Office of Polar Programs, 1/08-12/10, \$708,340.

CURRICULUM VITAE

- Developing a Rapid Method for Measuring Greenhouse Gases (CO₂, CH₄, N₂O) in Ice Cores, OSU College of Science Ventures Fund, \$10,370. Co-PI with Alexi Grachev, OSU.
- Collaborative Research: Project PALEOVAR -- Past Climate Variability: Understanding Mechanisms and Interactions with the Mean State, NSF-ATM, 6/06-5/11, \$228,693 to Brook. Co-PI with P. Clark, A. Mix, A. Schmittner, N. Pias, S. Hostetler at OSU, P. Bartlein, U of O, and Larry Edwards, Univ. of Minn. Total award to OSU=\$3,100,000.
- Ice core trace gas records and abrupt climate change, Gary Comer Science and Education Foundation, 3/06-2/08, \$220,000.
- Collaborative Research: Constructing an ultra-high resolution atmospheric methane record for the last 140,000 years from the WAIS Divide Ice Core, NSF Office of Polar Programs, 9/06 to 8/10, \$274,466. Co PI with Todd Sowers, Penn State.
- Acquisition of a Noble Gas Mass Spectrometer at Oregon State University, MRI from NSF OCE, 9/06-8/08, \$611,930. Co-PI with D. Graham, J. Lupton, and R. Duncan, OSU.
- REU Supplement: High Resolution Records of Atmospheric Methane in Ice Cores and Implications for Late Quaternary Climate Change, \$4,035, 4/10/05 to 4/09/06.
- Collaborative Research: New insights into the Holocene methane budget from dual isotope systematics and the interpolar gradient, NSF Office of Polar Programs, 8/15/05-8/15/08. \$149,085 to OSU, \$382,391 total. Co-PI with Todd Sowers, Penn State.
- Collaborative research: Gases in firn air and shallow ice at the proposed WAIS drilling site, NSF Office of Polar Programs, 6/1/05-5/31/07. \$176,706 to WSU, ~\$1M total Co-PI w with Todd Sowers, Penn State, Eric Saltzman, UCI, Jeff Severinghaus, UCSD, Mark Battle, Bowdoin College, and Jim White, CU.
- Constraining natural changes in the methane budget through stable isotope analysis, Petroleum Research Fund of the American Chemical Society, \$80,000, 4/1/05-8/31/07.
- Improving ice core records of greenhouse gas variations, Gary Comer Foundation, 8/04-7/07, \$330,000.
- Developing dry extraction of ice core gases and application to millennial-scale CO₂ variability, NSF Office of Polar Programs, 6/04-5/07, \$444,125.
- Collaborative Research: Determining methane sources during the last deglaciation with large-volume air samples from Pakitsoq, West Greenland, NSF Office of Polar Programs, 1/02–12/05, \$175,474 to WSU, \$445,000 total. Co PI with J. Severinghaus, Scripps Institute of Oceanography.
- Global Climate Change: A Workshop for 6-12 Teachers (with S. Harder, WSU), Eisenhower Professional Development Program, 12/1/02-8/31/02, \$30,365.

CURRICULUM VITAE

- Measurement of Carbon Dioxide in Ice Cores (with Kirk Soule, Sunset High School, Portland, OR), Murdoch Charitable Trust Partners in Science Program, 6/02-6/04, \$14,000.
- High-resolution records of atmospheric methane in ice cores and implications for late Quaternary climate change, NSF, Office of Polar Programs, Antarctic Glaciology Program, 1/02-12/05, \$304,701.
- Ice core records of atmospheric carbon monoxide, NSF, Office of Polar Programs, Antarctic Glaciology Program, 1/02-12/02, \$98,128.
- Collaborative research: Development of an in situ fossil air melt extraction device (proto-INFAMED) for recovering large volumes of air and microparticles from polar ice sheets, NSF, Office of Polar Programs, Polar Instrumentation and Technology Development Program, 1/01-12/02, \$66,059 to WSU, \$137,300 total. Co PI with J. Severinghaus, Scripps Institute of Oceanography.
- Collaborative Research: Thickness, extent, and basal conditions of the Scandinavian Ice Sheet around the time of the last glacial maximum NSF Geology and Paleontology Program, 5/01-4/04, \$40,441 to WSU, \$333,341 total. Co PI with D. Mickelson, University of Wisconsin.
- Collaborative Research: Developing an improved chronology of the southern margin of the Fennoscandian ice sheet, NSF Paleoclimatology Program, 7/99-6/02, \$74,295 to WSU, \$350,935 total. Co PI with Peter Clark, OSU.
- Collaborative Research: Accretion of interplanetary dust: a new record from ^3He in polar ice cores, NSF Office of Polar Programs, Antarctic Glaciology Program, 1/00-12/0, \$49,478 to WSU \$123,653 total. Co-PI with M. Kurz, WHOI.
- Accretion of interplanetary dust: a new record from ^3He in polar ice cores, and, Climate change workshop for K-12 teachers, NASA Cosmochemistry Program, 1/00-12/01, \$60,000.
- Ice Core Records of Atmospheric Carbon Monoxide, NSF Earth System History Program 6/99-5/01, \$169,730.
- Collaborative Research: Thermal Fractionation of firm air and the ice core record of abrupt interstadial climate change, NSF Office of Polar Programs, Antarctic Glaciology Program, 1/98-1/01, \$72,711 to WSU, \$408,607 total. Co PI with Jeff Severinghaus, UC San Diego.
- Atmospheric methane variations from 800-1800 AD, NSF Office of Polar Programs, REU Supplement, 9/98-8/99, \$5,883.
- Collaborative Research: Testing models of Fennoscandian Ice Sheet Thickness Using Cosmogenic Nuclides, NSF, Division of Earth Sciences, Geology and Paleontology Program, 1/98-1/01, \$152,234 to WSU, \$202,291 total. Co PI with Scott Lehman, University of Colorado.

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Collaborative Research: Cosmogenic nuclide chronology of ice sheet boundaries and weathering limits in the Torngat Mountains, northern Labrador: a pilot study, NSF Office of Polar Programs, Arctic Natural Sciences Program, 6/96-6/98, \$43,322 to URI/WSU, \$72,151 total. Co PI with Peter Clark, OSU.

Climate studies using Antarctic deep ice cores and firn air samples, NSF Office of Polar Programs, Antarctic Glaciology Program 4/95-4/00, \$725,000. Co PI with Michael Bender, University of Rhode Island, Graduate School of Oceanography.

Scandinavian Ice Sheet History using Cosmogenic Nuclides, National Geographic Society, 4/95-4/98, \$26,743.

Exposure Age Dating of Late Weichselian Ice Sheet Boundaries in Western Norway, NSF International Programs, 1993-1994, \$10,000.

Collaborative measurements of ^{10}Be , ^{26}Al , and ^3He in Antarctic Glacial Deposits, NSF International Programs, 1992-1993, \$12,100. Co PI with Mark Kurz, Woods Hole Oceanographic Institution.