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Education: B.S. Geological Sciences, Tufts University, Medford, MA, 1982
M.Sc. Geological Sciences, University of Colorado, Boulder, CO, 1986
Ph.D. Geological Sciences, University of Colorado, Boulder, CO, 1989

Appointments:

University of Colorado, Boulder, CO:

08/06-08/09: Associate Professor, Department of Geological Sciences
02/02-8/06: Research Professor, Institute of Arctic and Alpine Research
1/96-1/99: Associate Research Professor, Department of Geological Sciences
1/95-present: Fellow, Institute of Arctic and Alpine Research

Woods Hole Oceanographic Institution, Woods Hole, MA:

6/93-6/95: Associate Scientist, Department of Geology and Geophysics
8/89-6/93: Assistant Scientist, Department of Geology and Geophysics
12/88-8/89: Postdoctoral Investigator, Department of Geology and Geophysics
11/87-11/88: Postdoctoral Scholar, Department of Geology and Geophysics

Professional Activities:

Co-coordinator, Atmospheric ¹⁴CO₂ Inter-Comparison Project 2005 – pres.
National Accelerator Planning Board, 2000-2002 (Chair in 2002)
Panel Member, NSF Earth System History (ESH) Program, 1998
National Research Council US National Committee of the International Union of
Quaternary Research (INQUA), 1997-2000
Greenland Ice Sheet Project II Advisory Council, 1994-1998
National Academy of Sciences' *Frontiers of Science* Steering Committee, 1995 & 1996
American Quaternary Association (AMQUA) Council (Marine Geoprocesses), 1994-1998
Associate Editor, *Geology Magazine*, 1994-1997
Panel Member, NSF Division of Ocean Sciences, Marine Geology and Geophysics
Program, 1992
Panel Member, NSF Division of Polar Programs, Polar Earth Sciences Program, 1991

Scholarships and Awards:

Post-Doctoral Scholar Award, Woods Hole Oceanographic Institution, MA: 1987
F. L. Olmsted Fellowship in the Natural Sciences, Tufts University: 1980
New York State Regents Scholarship (*unused*): 1976

Publications (present and former student, post-doc, and PRA co-authors are underlined):

- Quan, H., Turnbull J.C., Santos, G.M., Rakowski, A.J., Ancapichún, S., De Pol-Holz, R., Hammer, S., Lehman, S.J., Levin, I., Miller, J.B., Palmer, J.G. & C. S. M. Turney (2021) Atmospheric Radiocarbon for the Period 1950–2019. *Radiocarbon* 64, 723–745 DOI: <https://doi.org/10.1017/RDC.2021.95>, 23 pp.
- Miller, J.B., Lehman, S.J., Verhulst, K., Miller, C., Duren, R., Yadav, V., Newman, S., & C. Sloop (2020). Large and seasonally varying biospheric CO₂ fluxes in the Los Angeles megacity revealed by atmospheric radiocarbon. *Proc. Nat. Acad. Sci.* www.pnas.org/cgi/doi/10.1073/pnas.2005253117, 7 pp.
- Lee, H., Dlugokencky, E.J., Turnbull, J.C., Lee, S., Lehman, S.J., Miller, J.B., Petron, Lim, J., Lee, G., Lee, S., and Y. Park (2020) ¹⁴CO₂ observations in atmospheric CO₂ at Anmyeondo GAW station, Korea: Implications for fossil fuel CO₂ and emission ratios. *Atmos. Chem. Phys.* <https://doi.org/10.5194/acp-20-1-2020>
- Basu, S., Lehman S.J., Miller, J.B., Andrews, A.E., Sweeney, C., Gurney, K.R., Xu, Southon, J. and P. P. Tans (2020) Estimating US Fossil Fuel CO₂ Emissions from Measurements of ¹⁴C in Atmospheric CO₂. *Proc. Nat. Acad. Sci.* www.pnas.org/cgi/doi/10.1073/pnas.1919032117, 8 pp.
- Hoffecker, J.F., Holliday, V.T., Nehoroshev, P.E., Vishnyatsky, L.B., Ocherednoi, A.K., Salnaya, P., Goldberg, P., Southon, J., Lehman, S.J., Cappa, P.J., Giaccio, B. Forman, S.L., & J. Quade (2019) The dating of a Middle Paleolithic blade industry in southern Russia and the problem of modern human dispersal in Eastern Europe. *Journal of Paleolithic Archaeology* 2: 381–417. <https://doi.org/10.1007/s41982-019-00032-6>.
- Cui, X., Newman, S., Xu, X., Andrews, A.E., Miller, J.B., Lehman, S.J., Jeong, S., Zhang, J., Priest, C., Campos-Pineda, M., Gurney, K.R., Graven, H., Southon, J., & M. L. Fischer (2019) Atmospheric Observation-based Estimation of Fossil Fuel CO₂ Emissions from Regions of Central and Southern California. *Science of the Total Environment* 664, 381–391, <https://doi.org/10.1016/j.scitotenv.2019.01.081>.
- Pendleton S.L., Miller, G.H., Lifton, N., Lehman, S.J., Southon, J., Crump, S.E. & R. S. Anderson (2019) Rapidly receding Arctic Canada glaciers revealing landscapes continuously ice-covered for more than 40,000 years. *Nature Communications.* <https://doi.org/10.1038/s41467-019-08307-w>, 8 pp.
- Turnbull, J.C., Karion, A., Davis, K.J., Lauvaux, T., Miles, N.L., Richardson, S.J., Sweeney, C., McKain, K., Lehman, S.J., Gurney, K.R., Patarasuk, R., Liang, J., Shepson, P.B., Heimbürger, A., Harvey, R., Whetstone, J. (2019) Synthesis of urban CO₂ emission estimates from multiple methods from the Indianapolis Flux Project (INFLUX). *Environ. Sci. Technol.* 53, 287–295, [10.1021/acs.est.8b05552](https://doi.org/10.1021/acs.est.8b05552) (publ. online 6 Dec. 2018).
- Graven, H., M.L. Fischer, T. Leuker, S. Jeong, T.P. Guilderson, R.F. Keeling, B. Ray, K. Brophy, W. Callahan, X. Cui, C. Frankenberg, K.R. Gurney, B.W. Lafranchi, S. Lehman, H.A. Michelsen, J.B. Miller, S. Newman, W. Paplawsky, N.C. Parazoo, C. Sloop, and S.J. Walker (2018). CMS: Atmospheric CO₂ and C Isotopes, Fossil Fuel Contributions, California, 2014–2015. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1641>
- Graven, H., Fischer, M.L., Lueker, T., Jeong, S., Guilderson, T.P., Keeling, R.F., Bambha, R., Brophy, K., Callahan, W., Cui, X., Frankenberg, C., Gurney, K.R., LaFranchi, B.W., Lehman, S.J., Michelsen, H., Miller, J.B., Newman, S., Paplawsky, W., Parazoo, N.C., Sloop, C. & S.J. Walker (2018) Assessing Fossil Fuel CO₂ Emissions in California Using Atmospheric Observations and Models, *Environ. Res. Letts.* doi: 10.1088/1748-9326/aabd43, 7 pp.

- Sweeney, C., B. Baier, J.B. Miller, P. Lang, B. Miller, S.J. Lehman, S. Eglund-Michel, & M.M. Yang (2018) ACT-America: L2 *in situ* Atmospheric Gas Concentrations from Flasks, Eastern USA. ORNL DAAC, Oak Ridge, Tennessee, USA.
<https://doi.org/10.3334/ORNLDAAC/1575>
- Sparrow, K.J., Kessler, J.D., Southon, J.R., Garcia-Tigreros, F., K. M., Schreiner, K.M., Ruppel, C.D., Miller, J.B., Lehman, S.J. & X. Xu (2018) Limited contribution of ancient methane to surface waters of the U.S. Beaufort Sea shelf. *Science Advances*. doi: 10.1126/sciadv.aao4842, 7 pp.
- Hu, L., Montzka, S.A., Lehman, S.J., Godwin, D.S., Miller, B.R., Andrews, A.E., Thoning, K., Miller, J. B., Sweeney, C., Siso, C., Elkins, J.W., Hall, B.D., Mondeel, D.J., Nance, D., Nehrkorn, T., Mountain, M.E., Fischer, M.L., Biraud, S.C, Chen, H & P. P. Tans (2017) Considerable Contribution of the Montreal Protocol to Declining National Greenhouse Gas Emissions from the United States. *Geophysical Research Letters*. doi: 10.1002/2017GL074388, 9 pp.
- Lehman, S.J. and J.T. Andrews (2017) "John Trevor Hollin 1930–2016; *In Memoriam*" *Arctic, Antarctic, and Alpine Research* 49: 287–289.
- van der Kaars, S., Miller, G.H., Turney, C.S.M, Cook, E.J., Nürnberg, D., Schönfeld, J., Kershaw, A.P. & S.J. Lehman (2017) Humans rather than climate the primary cause of Pleistocene megafaunal extinction in Australia. *Nature Communications*. doi: 10.1038/ncomms14142, 7 pp.
- Miller, G.H., Landvik, J.Y., S.J. Lehman & J. R. Southon (2017) Episodic Neoglacial snowline descent and glacier expansion on Svalbard reconstructed from the 14C ages of ice-entombed plants. *Quaternary Science Reviews* doi:10.1016/j.quascirev.2016.10.023, 12 pp.
- Hammer, S., Friedrich, R., Kromer, B., Cherkinsky, A., Lehman, S.J., Meijer, H.A.J., Nakamura, T., V. Palonen. V., Reimer, R.W., Smith, A.M., Southon, J.R., Szidat, S., Turnbull, J., Uchida, M., and I. Levin (2017) Compatibility of atmospheric ¹⁴CO₂ measurements: comparing the Heidelberg low-level counting facility to international accelerator mass spectrometry (AMS) laboratories. *Radiocarbon*, doi:10.1017/RDC.2016.62, 9 pp.
- LaFranchi, B.W., McFarlane, K.J., Miller, J.B., Lehman, S.J., Phillips, C.L., Andrews, A.E., Tans, P.P., Chen, H.; Liu, Z., Turnbull, J.C., Xu, X., Guilderson, T.P. (2016) Strong regional atmospheric ¹⁴C signature of respired CO₂ observed from a tall tower over the mid-western United States. *J. Geophys. Res. Biogeosci.* 121, doi:10.1002/2015JG003271, 21 pp.
- Lindsay, C.M., Lehman, S.J., Marchitto, T T.M., Carriquiry, J.D. and J. D. Ortiz (2016) New constraints on deglacial marine radiocarbon anomalies from a depth transect near Baja California. *Paleoceanography* doi:10.1002/2015PA002878, 14 pp.
- Hu, L., Montzka, S.A., Miller, B.R., Andrews, A.E., Miller, J.B., Lehman, S.J., Sweeney, C., Miller, S., Thoning, K., Siso, C., Atlas, E., Blake, D., de Gouw, J.A., Gilman, J. B., Dutton, G., Elkins, J. W., Hall, B. D., Chen, H., Fischer, M. L., Mountain, M., Nehrkorn, T., Biraud, S. C., Moore, S. C. and P. Tans (2016) Continued emissions of carbon tetrachloride from the U.S. nearly two decades after its phase-out for dispersive uses. *Proceedings of the National Academy of Sciences* doi: 10.1073/pnas.1522284113, 6 pp.
- Basu, S., Miller, J.B., and S.J. Lehman (2016) Separation of biospheric and fossil fuel fluxes of CO₂ by atmospheric inversion of CO₂ and ¹⁴CO₂ measurements: Observation System Simulations. *Atmospheric Chemistry and Physics*. 16, 5665-5683, doi:10.5194/acp-2016-6, 18 pp.
- Miller, G.H., Magee, J., Smith, M., Baynes, A., Lehman, S.J., Fogel, M., Webb, S., Johnston, H., Williams. D., Clark, P., Florian, C., Holst, R., Spooner, N., and S. DeVogel (2016) Human predation contributed to the extinction of the Australian

- megafaunal bird *Genyornis newtoni* ~47 ka. *Nature Communications* 7:10496 doi: 10.1038/ncomms10496.
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- Lindsay, C.M., Lehman, S.J., Marchitto, T.M., and J. D. Ortiz (2015) The surface expression of radiocarbon anomalies near Baja California during deglaciation. *Earth Plan. Sci. Letts.* 422: 67-74, doi: 10.1016/j.epsl.2015.04.012.
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- Hu, L., Montzka, S.A., Miller, J.B., Andrews, A.E., Lehman, S.J., Miller, B.R., Thoning, K., Sweeney, C., Chen, H., Godwin, D., Masarie, K., Bruhwiler, L., Fischer, M.L., Biraud, S.C., Torn, M.S., Mountain, M., Nehrkorn, T., Eluszkiewicz, J., Miller, S., Draxler, R.R., Stein, A.F., Hall, B.D., Elkins, J.W., and P.P. Tans (2015) U.S. emissions of HFC-134a derived for 2008-2012 from an extensive flask-air sampling network. *J. Geophys. Res. Atmos.* 120 doi 10.1002/2014JD022617 (25 pp.).
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- Miller, G.H., Lehman, S.J., Refsnider, K.A., Southon, J.R., Y. Zhong (2013). Unprecedented recent summer warmth in Arctic Canada. *Geophys. Res. Letts.* 40: 1-7, doi: 10.1002/2013GL057188.
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- Lehman, S.J., Miller, J.B., Wolak, C., Southon J., Tans, P.P., Montzka, S.A., Sweeney, C., Andrews, A., LaFranchi, B., Guilderson, T.P., Fischer, M.A., Turnbull, J.C. (2013). Allocation of terrestrial carbon sources using $^{14}\text{CO}_2$; methods, measurement, and modeling. *Radiocarbon* 55, Nr 2-3, 1484-1495.
- Miller, J.B., Lehman, S.J. and 18 others (2013) Initial results of an Inter-comparison of AMS-based atmospheric $^{14}\text{CO}_2$ measurements. *Radiocarbon* 55, Nr 2-3, 1475-1483.

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- Miller, J.B.* , Lehman, S.J.* , Montzka, S.A., Sweeney, C., Miller, B.R., Karion, A., Wolak, C., Miller, L., Dlugokencky, E.J., Southon, J., Turnbull, J.C. and P. P. Tans (2012). Linking emissions of fossil fuel CO₂ and other anthropogenic trace gases using atmospheric ¹⁴CO₂. *Journal of Geophysical Research* 117, D08302, 23 pp., doi:10.1029/2011JD017048, (*these two authors contributed equally to the work).
- Miller, G.H., Geirsdóttir, Á., Zhong, Y., Larsen, D.J., Otto-Bliesner, B.L., Holland, M.M., Bailey, D.A., Refsnider, K.A., Lehman, S.J., Southon, J.R., Anderson, C., Bjornsson, H. & T. Thordarson (2012). Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks. *Geophys. Res. Lett.*, 39, 2, doi:10.1029/2011GL050168.
- Turnbull, J.C., Tans, P.P., Lehman, S.J., Baker, D., Conway, T.J., Chung, Y.S., Gregg, J., Miller, J.B., Southon, J.R., and L-X. Zhou (2011). Atmospheric observations of carbon monoxide and fossil fuel CO₂ emissions from East Asia. *Journal of Geophysical Research* 116, D24306, 14 pp., doi:10.1029/2011JD016691.
- Turnbull, J.C., Karion, A., Fischer, M.L., Faloona, I., Guilderson, T., Lehman, S.J., Miller, B.R., Miller, J.B., Montzka, S., Sherwood, T., Saripalli, S., Sweeney, C., and P.P. Tans (2011) Assessment of fossil fuel carbon dioxide and other anthropogenic trace gas emissions from airborne measurements over Sacramento, California in Spring 2009. *Atmos. Chem. Phys.* 11, 705-721, doi:10.5194/acp-11-705-2011.
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Reports:

- Fischer, M.L., Jeong, S., Keeling, R., Andrews, A.E., Bianco, L., Dlugokencky, E., Lehman, S.J., Miller, J.B., Montzka, S., Wilczak, J., and P. Tans (2012) "Atmospheric Measurements and Modeling for Verification of AB-32 Mandated Emissions Reductions", California Energy Commission CEC-XXX, Nov. 2012 (69 pp.).
- Lehman, S.J., Miller, J.B., Tans, P.P., Montzka, S.A., Sweeney, C., Andrews, A., Turnbull, J.C., and J. Southon (2012) ¹⁴CO₂ Processing and Measurement Activities at CU-INSTAAR and NOAA/ESRL. 16th WMO/IAEA Meeting on Carbon Dioxide, Other Greenhouse Gases, and Related Measurement Techniques (GGMT-2011), (Wellington, NZ, 25-28 Oct. 2011), *World Meteorological Organization Global Atmosphere Watch Report No. 206*, Geneva CH., p. 139-144.
- Lehman, S. J., J. B. Miller, J. C. Turnbull, J. R. Southon, P. P. Tans, and C. Sweeney (2011) ¹⁴CO₂ measurements in the NOAA/ESRL Global Co-operative Sampling Network: An update on measurements and data quality, in "15th WMO/IAEA Meeting of Experts on Carbon Dioxide, Other Greenhouse Gases and Related Tracer Measurement Techniques (Jena, GDR 7-10 Sept. 2009)", *World Meteorological Organization Global Atmosphere Watch Report No. 194*, W.A. Brand ed., Geneva CH, p. 315-318
- Lehman, S.J. (Chair, and lead author) "2002 Report to NSF of the National Accelerator Planning Board"
- "INSTAAR Strategic Plan", 2004 Self Study, (SJL Chair and lead author)

Manuscripts under review:

- Schwartz, S.E., Quan Hua, Q., Andrews, D.E., Keeling, R.F., Lehman, S.J., Turnbull, J.C., Reimer, P.J., Miller, J.B. and H. A. J. Meijer (in review) "Discussion: Presentation of Abundance of Atmospheric Radiocarbon" submitted to Radiocarbon 03/31/2023, 21 MS pp.
- Miller, G.H., Pendleton, S.L., Jahn, A., Zhong, Y., Andrews, J.T., Lehman, S.J., Briner, J.P., Raberg, J.H., Bueltmann, H., Reynolds, M., Geirsdóttir, A, and J. R. Southon (in review) "Moss kill-dates and modeled summer temperature track episodic snowline lowering and ice-cap expansion in Arctic Canada through the Common Era" submitted to *Climate of the Past* 04/13/2023 32, MS pp.

Selected Invited Lectures and Testimonies:

"The oceanographic and ice core record of abrupt climate change", **Ocean Studies Board, National Research Council**, NAS Beckman Center, Irvine, CA. April 1998

"Science at the Frontier: The Oceans and Climate", 1994 Annual Meeting (and induction ceremonies) of the **National Academy of Sciences**, Washington DC. 24 April 1994.

"Paleoceanography: Milankovitch and Beyond", 1993 Frontiers of Science Symposium, **National Academy of Sciences**, NAS Beckman Center, Irvine, CA. November 5, 1993

"The role of the ocean in abrupt climate changes 15,000 - 9,000 Years Ago". National Meeting of the **American Association for the Advancement of Science**, Boston, MA. February 12, 1993

"Variability of Atlantic Thermohaline Circulation on Sub-Millennial Time-Scales", **National Academy of Sciences, National Research Council** Board on Atmospheric Sciences and Climate, NAS Beckman Center, Irvine, CA. September, 1992

"Applications of AMS dating to studies of abrupt climate change" Presentation to the **National Science Board**, National Academy of Sciences' Woods Hole Facility. 23 July, 1992

"The Role of the Ocean in Rapid Climate Change: Evidence from Ice Cores and Marine Sediments", Presentation to staff of the **U.S. Congressional Committee on Science and Technology**. October 16, 1992

"The Role of the Ocean in Rapid Climate Change: Evidence from Ice Cores and Marine Sediments", Testimony given to the **U.S. Senate Committee on Commerce, Science and Transportation**, Senator Al Gore presiding. May 20, 1992

Teaching:

GEOL. 5760 Global Change Literature I: Anthropogenic influences on Earth's climate and sea level (Fall 1996)

GEOL. 5780 Topics in Quaternary Global Change Literature: Recent developments in Past Global Change Studies (Fall 1998)

GEOL. 5700-006 Topics in Global Change Literature: Quaternary paleoclimatology and paleochemistry (Spring 2002)

GEOL. 5700-010 Topics in Global Change Literature: Chemical and isotopic constraints on the recent carbon cycle (Spring 2003)

GEOL. 5700-010 Topics in Global Change Literature: Scientific Evaluation of the Kyoto Protocol (Spring 2005)

GEOL. 5840 Independent Study: Modeling atmospheric $^{14}\text{CO}_2$ using Transcom3 response functions (Jocelyn Turnbull, Spring 2004)

GEOL. 5700-080 Topics in Global Change Literature: Anthropogenic change in the oceans (Spring 2006)

GEOL. 1060 Global Change: An Earth Science Perspective (Spring 2007, Fall 2007)

GEOL. 5700-004 Super-Problems in Quaternary Climate (Fall 2008, co-taught w/ T. Marchitto)
GEOL./ENVS. 3520-002 Environmental Issues in Geosciences (Spring 2009)
GEOL. 5700-011 Super-Problems in Quaternary Climate (Spring 2010, co-taught w/ T. Marchitto)
GEOL. 5845-900 Independent Study Geochemistry (Fall 2010)
GEOL 5420 Quaternary Dating Methods (Spring 2011, co-taught w/ G. Miller and T. Marchitto, 3 credit hours)
GEOL 5800-007 Super-Problems in Quaternary Climate (Spring 2014 co-taught w/ T. Marchitto)

CU graduate student supervision:

Simon Pendleton, PhD Candidate, Geological Sciences (PhD. Thesis Committee)
Colin Lindsay, PhD., Geological Sciences (PhD. Thesis Co-supervisor, w/ T. Marchitto)
Caroline Alden, PhD, Geological Sciences (PhD. Thesis Committee)
Whitney Doss, PhD, Geological Sciences (PhD. Thesis Committee)
Sean Bryan, PhD., Geological Sciences (PhD. Thesis Co-supervisor, w/ T. Marchitto)
Jocelyn Turnbull, PhD., Geological Sciences (PhD. Thesis Supervisor)
Kathryn Hayo, MSc. Student, Geological Sciences (MSc. Supervisor)
Trevor Popp, PhD., Geological Sciences (PhD. Thesis Committee)
Katherine Dayem, PhD., Geological Sciences (PhD. Thesis, defense only)
Annalissa Schilla, PhD., Geological Sciences (PhD. Thesis Committee)
Sean Bryan, MSc., Geological Sciences (MSc. Thesis Committee)
M. Kaplan, PhD., Geological Sciences (PhD. Thesis Committee)
K. Huguen, PhD., Geological Sciences (PhD. Thesis Committee)
D. Lubinski, PhD., Geological Sciences (PhD. Thesis Committee)
L. Kuck, PhD., Chemistry and Biochemistry (PhD. Thesis Committee)

CU Postdoctoral Supervision:

Dr. Nazrul Islam (2020-present, now at CIRES, Univ. of Colorado)
Dr. Lei Hu (2014-2016, now at CIRES, Univ. of Colorado)
Dr. Sourish Basu (2013-2015, now at ESSIC, UMD)
Dr. Nicole Trahan (2012-2014)
Dr. Jocelyn Turnbull (2008-2010, now at National Isotope Ctr., NZ)
Dr. Timothy Barrows (2001, now at Australian National Univ., Canberra)
Dr. Julian Sachs (1997-1998, now at University of Washington)
Dr. Elsa Cortijo (1996-1997, now at LSCE/CRNS Gif sur Yvette, FR)