Last updated Oct 10, 2019

Vasilii Victorovich Petrenko

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Education

Ph.D. Earth Sciences, Scripps Institution of Oceanography, University of California, San Diego, March 2008.
Topic: "Using measurements of carbon-14 of methane from glacial ice to constrain the methane budget during the last glacial termination and test the clathrate hypothesis"
Advisor: Jeffrey P. Severinghaus

M. Ed. Individualized Focus on Science Teaching, Harvard University, June 2000.

B. A. Chemistry, University of New Hampshire, May 1997
Summa Cum Laude. Minor in Physics.

Appointments

Jul 2017 – Present	*Associate Professor*, Department of Earth and Environmental Sciences, University of Rochester
Jul 2014 -- Jun 2016	*Wilmot Assistant Professor,* Department of Earth and Environmental Sciences, University of Rochester
Jul 2011 -- Jun 2017	*Assistant Professor*, Department of Earth and Environmental Sciences, University of Rochester
Jan – Jun 2011	*Postdoctoral Scholar* with Dr. James White, INSTAAR, University of Colorado
Sept 2010 – Dec 2010	*Postdoctoral Scholar* with Dr. Jeffrey Severinghaus, Scripps Institution of Oceanography, University of California San Diego
July 2008 – Aug 2010	*NOAA Postdoctoral Fellow in Climate and Global Change* with Dr. James White, INSTAAR, University of Colorado
Apr – June 2008	*Staff Research Associate*, Scripps Institution of Oceanography, University of California San Diego
Sep-Oct 2004, Feb-Jul 2006	*Visiting Scientist* with Dr. Dave Lowe, National Institute of Water and Atmospheric Research, Wellington, New Zealand
Jun, Aug-Sep 2006	*Visiting Scientist* with Dr. Andrew Smith, Australian Nuclear Science and Technology Organisation, Menai, Australia

2000 – 2001 *Science Teacher,* The Rivers School, Weston, MA

1997 – 1999 *Science Teacher,* The International School of Düsseldorf, Düsseldorf, Germany

Publications

(*first author is a supervised or co-supervised student or postdoc)

30. BenZvi, S., **V.V. Petrenko**, B. Hmiel, M. Dyonisius, A.M. Smith, B. Yang, Q. Hua. Obtaining a History of the Flux of Cosmic Rays using In Situ Cosmogenic ^{14}C Trapped in Polar Ice. *Proceedings of the 36th International Cosmic Ray Conference - ICRC2019.* https://arxiv.org/abs/1909.07994.
29. Mühle, J., C.M. Trudinger, L. M. Western, M. Rigby, M.K. Vollmer, S. Park, A.J. Manning, D. Say, A. Ganesan, L.P. Steele, D.J. Ivy, T. Arnold, S. Li, A. Stohl, C.M. Harth, P.K. Salameh, A. McCulloch, S. O'Doherty, M. Park, C. Ok Jo, D. Young, K.M. Stanley, P.B. Krummel, B. Mitrevski, O. Hermansen, C. Lunder, N. Evangeliou, B. Yao, J. Kim, B. Hmiel, C. Buizert, **V.V. Petrenko**, J. Arduini, M. Maione, D.M. Etheridge, E. Michalopoulou,M. Czerniak, J.P. Severinghaus, S. Reimann, P.G. Simmonds, P.J. Fraser, R.G. Prinn, R.F. Weiss. 2019. Perfluorocyclobutane (PFC-318, c-C4F8) in the global atmosphere. *Atmospheric Chemistry and Physics*, 19, 10335–10359.
28. *Vimont, I.J., J.C. Turnbull, **V.V. Petrenko**, P.F. Place, C. Sweeney, N. Miles, S. Richardson, B.H. Vaughn, J.W.C. White. 2019. An improved estimate for the $\delta^{13}C$ and $\delta^{18}O$ signatures of carbon monoxide produced from atmospheric oxidation of volatile organic compounds. *Atmospheric Chemistry and Physics*, **19**, 8547 – 8562.
27. Menking, J.A., E.J. Brook, S.A. Shackleton, J.P. Severinghaus, M. Dyonisius, **V.V. Petrenko**, J.R. McConnell, R.H. Rhodes, T.K. Bauska, D. Baggenstos, S. Marcott, S. Barker. 2019. Spatial pattern of accumulation at Taylor Dome during Marine Isotope Stage 4: stratigraphic constraints from Taylor Glacier. *Climate of the Past*, **15**, 1537–1556.
26. Aydin M. and **Petrenko, V.V.**, History of Carbon Monoxide and Other Ultra-Trace Level Ice Core Gas Measurements, *Reference Module in Earth Systems and Environmental Sciences*, Elsevier, 2018. doi: 10.1016/B978-0-12-409548-9.11687-2.
25. Bauska, T.K., E.J. Brook, S.A. Marcott, D. Baggenstos, S. Shackleton, J.P. Severinghaus, **V.V. Petrenko**. 2018. Controls on atmospheric CO_2 during the last glacial period. *Geophysical Research Letters*. **45**, https://doi.org/10.1029/2018GL077881
24. Baggenstos, D., T.K. Bauska, J.P. Severinghaus, J.E. Lee, H. Schaefer, C. Buizert, E.J. Brook, S. Shackleton, **V.V. Petrenko**. Atmospheric gas records from Taylor Glacier, Antarctica, reveal ancient ice with ages spanning the entire last glacial cycle. 2017. *Climate of the Past.* **13**, 943–958.
23. *Vimont, I.J., J.C. Turnbull, **V.V. Petrenko,** P.F. Place, A. Karion, N.L. Miles, S.J. Richardson, K. Gurney, R. Patarasuk, C. Sweeney, B. Vaughn, J.W.C. White. Carbon monoxide isotopic measurements in Indianapolis constrain urban source isotopic signatures and support mobile fossil fuel emissions as the dominant wintertime CO source. 2017. *Elementa: Science of the Anthropocene.* **5**: 63.

22. **Petrenko, V.V.**, A.M. Smith, H. Schaefer, K. Riedel, E.J. Brook, D. Baggenstos, C. Harth, Q. Hua, C. Buizert, A. Schilt, X. Fain, L. Mitchell, T. Bauska, A. Orsi, R.F. Weiss, J.P. Severinghaus. Minimal geological methane emissions during the Younger Dryas – Preboreal abrupt warming event. 2017. *Nature*. **548**, 443 – 446.
21. Bauska, T., D. Baggenstos, E.J. Brook, A. Mix, S. Marcott, **V.V. Petrenko**, H. Schaefer, J.P. Severinghaus, J.E. Lee. 2016. Carbon isotopes characterize rapid changes in atmospheric carbon dioxide during the last deglaciation. *Proceedings of the National Academy of Sciences,* **113**, 3465–3470.
20. **Petrenko, V.V.**, J.P. Severinghaus, H. Schaefer, A.M. Smith, T. Kuhl, D. Baggenstos, Q. Hua, E.J. Brook, P. Rose, R. Kulin, T. Bauska, C. Harth, C. Buizert, A. Orsi, G. Emanuele, J. E. Lee, G. Brailsford, R. Keeling, R.F. 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.
19. Schilt, A., E.J. Brook, T.K. Bauska, D. Baggenstos, H. Fischer, F. Joos, **V.V. Petrenko**, H. Schaefer, J. Schmitt, J.P. Severinghaus, R. Spahni, T.F. Stocker. 2014. Isotopic constraints on marine and terrestrial N_2O emissions during the last deglaciation. *Nature*, **516**, 234 – 237.
18. Buizert, C**.**, D. Baggenstos, W. Jiang, R. Purtschert, **V.V. Petrenko**, Z.-T. Lu, P. Müller, T. Kuhl, J. Lee, J. P. Severinghaus and E. J. Brook. 2014. Radiometric ^{81}Kr dating identifies 120,000 year old ice at Taylor Glacier, Antarctica. *Proceedings of the National Academy of Sciences,* **111**, 6876-6881.
17. Helmig, D., **V.V. Petrenko**, P. Martinerie, E. Witrant, T. Roeckmann, A. Zuiderweg, R. Holzinger, J. Hueber, C. Stephens, J. White, W. Sturges, A. Baker, T. Blunier, D. Etheridge, M. Rubino and P. Tans. 2014. Reconstruction of Northern Hemisphere 1950 – 2010 atmospheric non-methane hydrocarbons*. Atmospheric Chemistry and Physics,* **14**, 1463–1483.
16. **Petrenko, V.V.,** P. Martinerie, P. Novelli, D. M. Etheridge, I. Levin, Z. Wang, G. Petron, T. Blunier, J. Chappellaz, J. Kaiser, P. Lang, L. P. Steele, F. Vogel, M. A. Leist, J. Mak, R. L. Langenfelds, J. Schwander, J. P. Severinghaus, G. Forster, W. Sturges, M. Rubino, J.W.C. White. 2013. A 60 yr record of atmospheric carbon monoxide reconstructed from Greenland firn air. *Atmospheric Chemistry and Physics,* **13**, 7567 - 7585**.**
15. **Petrenko, V.V.** Ice Core Records: Ice Margin Sites. 2013. In *Encyclopedia of Quaternary Science, 2nd ed.* S.A. Elias, ed. Elsevier. Vol 2, 416 – 430.
14**. Petrenko, V.V.**. J. Severinghaus, A.M. Smith, K. Riedel, D. Baggenstos, C. Harth, A. Orsi, Q. Hua, P. Franz, Y. Takeshita, G. Brailsford, R.F. Weiss, C. Buizert, A. Dickson, and H. Schaefer. High-precision ^{14}C measurements demonstrate production of in situ cosmogenic $^{14}CH_4$ and rapid loss of in situ cosmogenic ^{14}CO in shallow Greenland firn. 2013. *Earth and Planetary Science Letters,* **365**, 190-197.
13. Arnold, T., C.M. Harth, J. Mühle, P.K. Salameh, J. Kim, A.J. Manning, D.J. Ivy, L.P. Steele, **V.V. Petrenko**, J.P. Severinghaus, D. Baggenstos and R.F. Weiss. Nitrogen trifluoride global emissions estimated from revised and updated atmospheric measurements. 2013. *Proceedings of the National Academy of Sciences,* **110**, 2029-2034.
12. Zuiderweg, A., R. Holzinger, P. Martinerie, R. Schneider, J. Kaiser, E. Witrant, D. Etheridge, M. Rubino, **V. Petrenko**, T. Blunier, and T. Röckmann. 2013. Extreme ^{13}C depletion of CCl_2F_2 in firn air samples from NEEM, Greenland. *Atmospheric Chemistry and Physics*, **13**, 599 - 609.

11. *Buizert, C., **V.V. Petrenko**, J. L. Kavanaugh, K.M. Cuffey, N.A. Lifton, E.J. Brook, J.P. Severinghaus. 2012. In-situ cosmogenic radiocarbon production and 2-D ice flow line modeling for an Antarctic blue ice area. *Journal of Geophysical Research – Earth Surface,* **117**, F02029, doi:10.1029/2011JF002086.
10. Wang, Z., J. Chappellaz, P. Martinerie, K. Park, **V.V. Petrenko**, E. Witrant, T. Blunier, C. A. M. Brenninkmeijer, J. E. Mak. 2012. The isotopic record of Northern Hemisphere atmospheric carbon monoxide since 1950, implications for the CO budget. *Atmospheric Chemistry and Physics*, **12**, 4365–4377.
9. *Buizert, C., P. Martinerie, **V.V. Petrenko**, J.P. Severinghaus, C.M. Trudinger, E. Witrant, J.L. Rosen, A.J. Orsi, M. Rubino, D.M. Etheridge, L.P. Steele, C. Hogan, J. C. Laube, W.T. Sturges, V.A. Levchenko, A.M. Smith, I. Levin, T.J. Conway, E.J. Dlugokencky, P.M. Lang, K. Kawamura, T.M. Jenk, J.W.C. White, T. Sowers, J. Schwander, and T. Blunier. 2012. Gas transport in firn: multiple tracer characterization and model intercomparison for NEEM, Northern Greenland. *Atmospheric Chemistry and Physics,* **12**, 4259–4277.
8. **Petrenko, V.V.,** D.M. Etheridge, R.F. Weiss, E.J. Brook, H. Schaefer, J.P. Severinghaus, A.M. Smith, D. Lowe, Q. Hua, K. Riedel. 2010. Methane from the East Siberian Arctic Shelf. *Science*, **329** (5996), 1146–1147.
7. **Petrenko, V.V.**, A.M. Smith, J.P. Severinghaus, E.J. Brook, D. Lowe, K. Riedel, G. Brailsford, Q. Hua, H. Schaefer, N. Reeh, R.F. Weiss and D. Etheridge. 2009. $^{14}CH_4$ measurements in Greenland ice: investigating last glacial termination CH_4 sources. *Science*, **324** (5926), 506-508.
6. Schaefer, H., **V.V. Petrenko**, E.J. Brook, J.P. Severinghaus, N. Reeh, J.R. Melton, L. Mitchell. 2009. Ice stratigraphy at the Pakitsoq West Greenland ice margin derived from gas records. *Journal of Glaciology*, **55** (191), 411-421.
5. **Petrenko, V.V.**, J.P. Severinghaus, E.J. Brook, J. Mühle, M. Headly, C.M. Harth, H. Schaefer, N. Reeh, R.F. Weiss, D. Lowe and A.M. Smith. 2008. A novel method for obtaining very large ancient air samples from ablating glacial ice for analyses of methane radiocarbon. *Journal of Glaciology,* **54** (185), 233-244.
4. **Petrenko, V.V.**, A.M. Smith, G. Brailsford, K. Riedel, Q. Hua, D. Lowe, J.P. Severinghaus, V. Levchenko, T. Bromley, R. Moss, J. Mühle and E.J. Brook. 2008. A new method for analyzing ^{14}C of methane in ancient air extracted from glacial ice. *Radiocarbon,* **50** (1), 53-73.
3. Smith, A.M., **V.V. Petrenko**, Q. Hua, J. Southon, and G. Brailsford. 2007. The effect of N_2O, catalyst, and means of water vapor removal on the graphitization of small CO_2 samples. *Radiocarbon*, **49** (2), 245-254.
2. **Petrenko, V.V.**, J.P. Severinghaus, E.J. Brook, N. Reeh, and H. Schaefer. 2006. Gas records from the West Greenland ice margin covering the Last Glacial Termination: a horizontal ice core. *Quaternary Science Reviews*, **25** (9-10), 865-875.
1. Schaefer, H., M.J. Whiticar, E.J. Brook, **V.V. Petrenko**, D.F. Ferretti, and J.P. Severinghaus. 2006. Ice record of delta C-13 for atmospheric CH_4 across the Younger Dryas-Preboreal transition. *Science*, **313** (5790), 1109-1112.

Competitive Research Grants Received

NSF Atmospheric Chemistry award no. AGS-1920602. “Assessing the ability of measurements of Carbon-14 of atmospheric carbon monoxide in a global network to improve understanding of spatial and temporal hydroxyl radical

variability." Lead PI. $824,193. 08/1/2019 – 07/31/2022.

NSF Polar Programs award no. OPP-1643669. "Collaborative Research: Reconstructing Carbon-14 of Atmospheric Carbon Monoxide from Law Dome, Antarctica to Constrain Long-term Hydroxyl Radical Variability". Lead PI. $517,161. July 1, 2018 – June 30, 2022.

NSF Polar Programs award no. PLR-1443267. "Collaborative Research: Using stable isotopes to constrain the atmospheric carbon monoxide budget over the last 20,000 years". Co-PI. $120,000. March 1, 2015 – February 28,2019.

NSF Polar Programs award no. ARC-1406236. "Collaborative Research: Reconstruction of Carbon Monoxide in the Pre-Industrial Arctic Atmosphere from Ice Cores at Summit, Greenland". Lead PI. $231,385. January 1, 2015 – December 31, 2018.

Packard Fellowship for Science and Engineering. "Using Ultra-Trace Gas Isotopes in the Past and Modern Atmosphere to Investigate Changes in Biogeochemical Cycles and Atmospheric Chemistry ". Lead PI. $875,000. November 2013 – October 2018.

NSF Polar Programs award no. PLR-1245659. "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". Lead PI. $520,000. August 1, 2013 – July 31, 2018.

NSF Office of Polar Programs award no. ARC-1203779. "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". Lead PI. $541,174. August 1, 2012 – July 31, 2017.

NOAA Postdoctoral Fellowship in Climate and Global Change. "Reconstruction of atmospheric carbon monoxide in the Northern Hemisphere for the last 1000 years and investigation of in-situ carbon monoxide production in glacial ice." Approx. $112,000. July 1, 2008 – August 31, 2010.