

Frank J. Pavia (he/him)

CONTACT INFORMATION

School of Oceanography
University of Washington
Seattle, WA 98105

E-mail: fjpvavia@uw.edu
Website: <https://frankpavia.com>

EMPLOYMENT

University of Washington School of Oceanography

Assistant Professor, Jan. 2024-present

California Institute of Technology

Stanback Postdoctoral Fellow, Dec. 2019-Nov. 2023

EDUCATION

Columbia University, New York, NY

Ph.D., Earth and Environmental Sciences, October 2019

Thesis: Biogeochemical Studies of the South Pacific Ocean Using Thorium and Protactinium Isotopes

Columbia University, New York, NY

M.A., Earth and Environmental Sciences, May 2016

Columbia University, New York, NY

B.A. (*cum laude*), Earth Science and Chemistry (Dept. Honors)

HONORS AND AWARDS

Caltech Foster and Coco Stanback Postdoctoral Fellowship, 2019

Department of Defense NDSEG Fellowship, 2015 (Declined)

NSF Graduate Research Fellowship, 2015

Alaska Geological Society Scholarship, 2013

SUBMITTED PAPERS * *Indicates Student Advisee* ** *Indicates Authors Contributed Equally*

[1] Osorio-Rodriguez, D., **F.J. Pavia**, D.R. Utter, K. Landry, M. Gomes, N.D. Dalleska, V.J. Orphan, W.M. Berelson, J.F. Adkins. Microbial cycling of sulfur and other redox-sensitive elements in porewaters of San Clemente Basin, California, and Cocos Ridge, Costa Rica. *In Review, Geobiology.*

[2] Cooperdock, E.H.G., J.C. de Obeso, **F.J. Pavia**. Uranium Addition and Loss in Serpentinites Controlled by Fe-Oxide Stability. *In Revision, Geochemistry, Geophysics, Geosystems.*

[3] Costa, K.M., F. Ossa Ossa, A. Dunlea, **F.J. Pavia**, L. Tegler, M. Auro, M. Andersen, S. Nielsen. Global sedimentation rates of oxic pelagic clays refined with sedimentary thorium isotope compositions. *In Revision, Geochemistry, Geophysics, Geosystems.*

[4] Cetiner, J.E., W.M. Berelson, N.E. Rollins, X. Liu, **F.J. Pavia**, A.R. Waldeck, S. Dong, K. Fleger, H.A. Barnhart, M. Quinan, R.P. Wani, P.A. Rafter, A.D. Jacobsen, R.H. Byrne, J.F. Adkins. Carbonate dissolution fluxes in deep-sea sediments as determined from in situ porewater profiles in a transect across the saturation horizon. *In Revision, Geochimica et Cosmochimica Acta*

[5] Dong, S., **F.J. Pavia**, A.V. Subhas, W.R. Gray, J.F. Adkins, W.M. Berelson. Carbon Cycling in Marine Particles Based on Inorganic and Organic Stable Isotopes. *Accepted, Geochimica et Cosmochimica Acta.*

[6] Bian, X., S. Yang, R.J. Raad, A.M. Lunstrum, S. Dong, H. Meng, N. Kemnitz, N.E. Rollins, J. Pittman, **F.J. Pavia**, D.E. Hammond, W.M. Berelson, J.F. Adkins, S.G. John. A benthic source of isotopically heavy Ni from continental margins and implications for global ocean Ni isotope mass balance. *Accepted, Earth and Planetary Science Letters*.

[7] Houchin, S.K., F.L.H. Tissot, M. Ibanez-Mejia, M. Newville, A. Lanzirrotti, **F.J. Pavia**, G. Rossman. Uranium Oxidation States in Zircon and Other Accessory Phases. *Accepted, Geochimica et Cosmochimica Acta*.

PUBLICATIONS

[27] Costa, K.M. **F.J. Pavia**, C.G. Piecuch, J.F. McManus, G.A. Weinstein (2024). Pelagic sedimentation rates in the North Pacific using Thorium-230 depth profiling. *Geochimica et Cosmochimica Acta*, 369, 126-140. <https://doi.org/10.1016/j.gca.2023.11.020>.

[26] **Pavia, F.J.**, J.T. Abell, J.L. Middleton, A. Leal, S.M. Vivancos, M.Q. Fleisher, G. Winckler, R.F. Anderson (2024). Discrepant mass accumulation rates of sediment in the South Pacific Ocean from ^{230}Th and ^3He measurements. *Geochimica et Cosmochimica Acta*, 365, 215-228. <https://doi.org/10.1016/j.gca.2023.11.019>.

[25] **Pavia, F.J.**, E.H.G. Cooperdock, J.C. de Obeso, K.W.W. Sims, F.L.H. Tissot, F. Klein (2023). Uranium isotopes as tracers of serpentinite weathering. *Earth and Planetary Science Letters*, 623, 118434. <https://doi.org/10.1016/j.epsl.2023.118434>.

[24] Abell, J.T., G. Winckler, A. Pullen, C.W. Kinsley, P.A. Kapp, J.L. Middleton, **F.J. Pavia**, D. McGee, H.L. Ford, M.E. Raymo (2023). Evaluating the drivers of Quaternary dust fluxes to the western North Pacific: East Asian dustiness and Northern Hemisphere gustiness. *Paleoceanography and Paleoclimatology*, 38, e2022PA004571. <https://doi.org/10.1029/2022PA004571>.

[23] Subhas, A.V.** , **F.J. Pavia**** , S. Dong, P.J. Lam (2023). Global Trends in the Distribution of Biogenic Minerals in the Ocean. *Journal of Geophysical Research: Oceans*, 128, e2022JC019470. <https://doi.org/10.1029/2022JC019470>.

[22] Phillips, A.A., M.E. White, M. Seidel, F. Wu, **F.J. Pavia**, P.C. Kemeny, A.C. Ma, L.I. Aluwihare, T. Dittmar, A.L. Sessions (2022). Novel sulfur isotope analyses constrain sulfurized porewater fluxes as a minor component of marine dissolved organic matter. *Proceedings of the National Academy of Sciences*, 119, e2209152119. <https://doi.org/10.1073/pnas.2209152119>.

[21] Moore, K.R., T.M. Present, **F.J. Pavia**, J.P. Grotzinger, J.R. Hollis, S. Sharma, D. Flannery, T. Bosak, M. Tuite, A.H. Knoll, K. Williford (2022). Biosignature preservation aided by organic-cation interactions in Proterozoic tidal environments. *Palaios*, 37, 486-498. <https://doi.org/10.2110/palo.2022.017>.

[20] S. Rahman, A.M. Shiller, R.F. Anderson, M.A. Charette, C.T. Hayes, M. Gilbert, K.R. Gissom, P.J. Lam, D.C. Ohnemus, **F.J. Pavia**, B.S. Twining, S.M. Vivancos (2022). Dissolved and particulate barium distributions along the US GEOTRACES North Atlantic and East Pacific Zonal Transects: Global Implications for the marine barium cycle. *Global Biogeochemical Cycles* 36, e2022GB007330. <https://doi.org/10.1029/2022GB007330>.

[19] **Pavia, F.J.**** , C.S. Jones** , S.K.V. Hines** (2022). Geometry of the Meridional Overturning Circulation at the Last Glacial Maximum. *Journal of Climate*, 35, 5465-5482. <https://doi.org/10.1175/JCLI-D-21-0671.1>

[18] Dong, S., X. Wang, A. Subhas, **F.J. Pavia**, J.F. Adkins, W. Berelson (2022). Suspended carbon and nitrogen along a North Pacific transect: concentrations, isotopes, and C/N ratios. *Limnology and Oceanography*, 67, 247-260. <https://doi.org/10.1002/lno.11989>.

- [17] **Pavia, F.J.**, S. Wang*, J.E. Middleton, R.W. Murray, R.F. Anderson (2021). Trace Metal Evidence for Deglacial Ventilation of the Abyssal Pacific and Southern Oceans. *Paleoceanography and Paleoclimatology*, 36 e2021PA004226. <https://doi.org/10.1029/2021PA004226>.
- [16] Hayes, C.T. et al. (27 co-authors including **F.J. Pavia**, 2021). The Composition and Flux of Seafloor Sediments in the Global Ocean. *Global Biogeochemical Cycles*, 35, e2020GB006769. <https://doi.org/10.1029/2020GB006769>.
- [15] Lee, J.M., P.J. Lam, S.M. Vivancos, **F.J. Pavia**, R.F. Anderson, Y. Lu, H. Cheng, P. Zhang, R.L. Edwards, Y. Xiang, S.M. Webb (2021). Changing chemistry of particulate manganese in the near- and far-field hydrothermal plumes from 15°S East Pacific Rise and its influence on metal scavenging. *Geochimica et Cosmochimica Acta*, 300, 95-118. <https://doi.org/10.1016/j.gca.2021.02.020>.
- [14] Pinedo-Gonzalez, P., R.F. Anderson, S.M. Vivancos, **F.J. Pavia**, M.Q. Fleisher (2021). A new method to extract ^{232}Th , ^{230}Th , and ^{231}Pa from seawater using a bulk-extraction technique with Nobias PA-1 chelating resin. *Talanta*, 223, 121734. <https://doi.org/10.1016/j.talanta.2020.121734>.
- [13] **Pavia, F.J.**, R.F. Anderson, P. Pinedo-Gonzalez, M.Q. Fleisher, M.A. Brzezinski, R.S. Robinson (2020). Isopycnal Transport and Scavenging of ^{231}Pa and ^{230}Th in the Pacific Southern Ocean. *Global Biogeochemical Cycles*, 34, e2020GB006760. <https://doi.org/10.1029/2020GB006760>. (GEOTRACES IPO Highlight).
- [12] **Pavia, F.J.**, R.F. Anderson, G. Winckler, M.Q. Fleisher (2020). Atmospheric Dust Inputs, Iron Cycling, and Biogeochemical Connections in the South Pacific Ocean from Thorium Isotopes. *Global Biogeochemical Cycles*, 34, e2020GB006562. <https://doi.org/10.1029/2020GB006562>. (GEOTRACES IPO Highlight).
- [11] Costa, K.M., C.T. Hayes, R.F. Anderson, **F.J. Pavia**, and 30 others (2020). ^{230}Th -normalization: New insights on an essential tool for quantifying sedimentary fluxes in the modern and Quaternary ocean. *Paleoceanography and Paleoclimatology*, 35, e2019PA003820. <https://doi.org/10.1029/2019PA003820>.
- [10] Middleton, J.E., S. Mukhopadhyay, K.M. Costa, **F.J. Pavia**, G. Winckler, J.F. McManus, M. D'Almeida, C.H. Langmuir, P.J. Huybers (2020). The spatial footprint of hydrothermal scavenging on $^{230}\text{Th}_{xs}$ -derived mass accumulation rates. *Geochimica et Cosmochimica Acta*, 272, 218-234. <https://doi.org/10.1016/j.gca.2020.01.007>.
- [9] Jacobel, A.W., R.F. Anderson, S.L. Jaccard, J.F. McManus, **F.J. Pavia**, G. Winckler (2020). Deep Pacific Storage of Respired Carbon during the Last Ice Age: Perspectives from bottom water oxygen reconstructions. *Quaternary Science Reviews*, 230, 106065. <https://doi.org/10.1016/j.quascirev.2019.106065>.
- [8] Seltzer, A.M., **F.J. Pavia**, J. Ng, J.P. Severinghaus (2019). Heavy Noble Gas Isotopes as New Constraints on the Ventilation of the Deep Ocean. *Geophysical Research Letters*, 46, 8926-8932. <https://doi.org/10.1029/2019GL084089>.
- [7] **Pavia, F.J.**, R.F. Anderson, P.J. Lam, B.B. Cael, S.M. Vivancos, M.Q. Fleisher, Y. Lu, H. Cheng, P. Zhang, R.L. Edwards (2019). Shallow Particulate Organic Carbon Regeneration in the South Pacific Ocean. *Proceedings of the National Academy of Sciences*, 42, 9753-9758. <https://doi.org/10.1073/pnas.1901863116>. (GEOTRACES IPO Highlight). (OCB Highlight)
- [6] Jacobel, A.W., R.F. Anderson, G. Winckler, K.M. Costa, J. Gottschalk, J.L. Middleton, **F.J.**

Pavia, E.M. Shoenfelt, Y. Zhou (2019). No evidence for equatorial Pacific dust fertilization. *Nature Geoscience*, 12, 154-155. <https://doi.org/10.1038/s41561-019-0304-z>

[5] Lund, D.C., **F.J. Pavia**, E.I. Seeley, S. McCart, P.A. Rafter, K.A. Farley, P.D. Asimow, R.F. Anderson (2019). Hydrothermal Scavenging of ^{230}Th on the Southern East Pacific Rise During the Last Deglaciation. *Earth and Planetary Science Letters*, 510, 64-72. <https://doi.org/10.1016/j.epsl.2018.12.037>

[4] **Pavia**, **F.J.**, R.F. Anderson, E. Black, L. Kipp, S.M. Vivancos, M.Q. Fleisher, M.A. Charette, V. Sanial, W. Moore, M. Hult, Y. Lu, H. Cheng, P. Zhang, R.L. Edwards (2019). Timescales of Hydrothermal Scavenging in the South Pacific Ocean from ^{234}Th , ^{230}Th , and ^{228}Th . *Earth and Planetary Science Letters*, 506, 146-156. <https://doi.org/10.1016/j.epsl.2018.10.038>. (GEOTRACES IPO Highlight)

[3] Hayes, C.T., E.E. Black, R.F. Anderson, M. Baskaran, K.O. Buesseler, M.A. Charette, H. Cheng, J.K. Cochran, R.L. Edwards, P. Fitzgerald, P.J. Lam, Y. Lu, S.O. Morris, D.C. Ohnemus, **F.J. Pavia**, G. Stewart, Y. Tang (2018). Flux of Particulate Elements in the North Atlantic Ocean Constrained by Multiple Radionuclides. *Global Biogeochemical Cycles*, 32, 1738-1758. <https://doi.org/10.1029/2018GB005994>. (OCB Highlight) (EOS Highlight)

[2] Schlitzer, R. et al. (including **F. J. Pavia**) (2018). The GEOTRACES Intermediate Data Product 2017. *Chemical Geology*, 493, 210-223. <https://doi.org/10.1016/j.chemgeo.2018.05.040>

[1] **Pavia**, **F.J.**, R.F. Anderson, S.M. Vivancos, M.Q. Fleisher, P.J. Lam, Y. Lu, H. Cheng, P. Zhang, R.L. Edwards (2018). Intense Hydrothermal Scavenging of ^{230}Th and ^{231}Pa in the Deep Southeast Pacific. *Marine Chemistry*, 201, 212-228. <https://doi.org/10.1016/j.marchem.2017.08.003>

BOOK CHAPTERS (PEER-REVIEWED) [2] Dunlea, A., J.E. Middleton, **F.J. Pavia** The Marine Sediment Archive of Hydrothermal Activity. In review at *AGU Monographs*.

[1] Bell, J.E., **F.J. Pavia** (2021). Time Bomb: Pessimistic Approaches to Climate Change Studies. In *Timescales* (eds B. Wiggin, C. Fornoff, P.E. Kim). University of Minnesota Press, Minneapolis. <https://doi.org/10.5749/j.ctv1cdxg76.4>

FUNDING National Science Foundation - Arctic Natural Sciences. Collaborative Research: New Proxy Estimates of Arctic Sea Ice Coverage and its Biogeochemical Impacts in a Warmer World (Pending). \$534,819 to UW.

National Science Foundation - Chemical Oceanography. Collaborative Research: Particle scavenging controls on trace element distributions (2021-2024). \$139,554 to Caltech.

National Science Foundation - Chemical Oceanography. Collaborative Research: U.S. GEOTRACES GP17-OCE and GP17-ANT: ^{230}Th , ^{232}Th , and ^{231}Pa tracers of trace element supply and removal (2021-2024). \$162,511 to Caltech.

MENTORING

Student Committees

Stevie Walker, Ph.D. Student, University of Washington. 2024-Present
Reese Barrett, Ph.D. Student, University of Washington. 2024-Present
Jade Sauve, Ph.D. Student, University of Washington. 2024-Present

Staff

Jakub Sliwinski, TraceLab Manager, University of Washington. 2024-Present

TEACHING

Ocean 520 Marine Chemistry, Autumn 2024
Ocean 220 Introduction to Field Oceanography, Spring 2024

INVITED
PRESENTATIONS

- Texas A&M Geology and Geophysics Colloquium, April 2024
- University of Washington Chem Lunch, March 2024
- University of Victoria SEOS Seminar, January 2024
- University of Arizona Geosciences Colloquium, August 2023
- University of California Santa Cruz Whole Earth Seminar, May 2023
- Colorado School of Mines Van Tuyl Lecture, December 2022
- University of Colorado Boulder Geological Sciences Colloquium, November 2022
- University of Washington School of Oceanography, June 2022
- Lawrence Livermore National Lab, June 2021.
- Caltech Environmental Science and Engineering Seminar, June 2021.
- North Carolina State MEAS Seminar, January 2021.
- Caltech Geoclub Seminar, October 2020.
- University of Southern California Paleoenvironmental Seminar, April 2020.
- Scripps Marine Chemistry and Geochemistry Seminar, April 2019.
- Lamont-Doherty Geochemistry Seminar, November 2018.
- WHOI Marine Chemistry and Geochemistry Seminar, November 2018.
- MIT EAPS Seminar, November 2018.
- UCONN Avery Point Marine Sciences Seminar, October 2018.
- UC Berkeley Isotope Geochemistry Seminar, May 2018.

CONFERENCE
PRESENTATIONS
(PRESENTING
AUTHOR ONLY)

F.J. Pavia, L. Gemery, J. Farmer, T. Cronin, J. Treffkorn, K.A. Farley. Sea ice history of the Central Arctic from Marine Isotope Stage 3 to present using sedimentary helium isotopes. International Conference on Paleoceanography, 2022.

F.J. Pavia, W. Wang, J.K. Moore. Constraints on Global Dust Inputs and Iron Cycling from Measurements and Models of Thorium Isotopes (Invited). Goldschmidt Conference, 2022.

F.J. Pavia, K.A. Farley. A New Proxy for Arctic Sea Ice Coverage over the last 50,000 years. Comer Climate Conference, 2021.

F.J. Pavia, E.H.G. Cooperdock, J.C. de Obeso, F. Tissot, P.B. Kelemen, K.W.W. Sims, F. Klein. Uranium Isotopes in Serpentinites as Tracers of Redox Conditions and Weathering. AGU Fall Meeting, 2021.

F.J. Pavia, Z. Baumann, C.H. Lamborg. The LGM to Present Mercury Cycle. Comer Climate Conference, 2020.

F.J. Pavia, R.F. Anderson, G. Winckler, M.Q. Fleisher. Atmospheric Dust Inputs, Iron Cycling, and Biogeochemical Connections in the South Pacific Gyre. Ocean Sciences Meeting, 2020.

M.Q. Fleisher, **F.J. Pavia**, R.F. Anderson, S.M. Vivancos, G. Winckler, J.T. Abell. Near-Bottom ^{230}Th and ^{231}Pa Scavenging and Anomalous ^{230}Th Burial Rates in the South Pacific. Ocean Sciences Meeting, 2020.

F.J. Pavia, J.T. Abell, G. Winckler, R.F. Anderson. Reconstruction of Modern Dust Deposition in the South Pacific from Water Column and Sedimentary Methods. AGU Fall Meeting, 2019.

F.J. Pavia, S. Wang, R.F. Anderson, R.W. Murray. Trace Metal Indicators of Abyssal Ventilation

During the Last Deglaciation. Comer Climate Conference, 2019.

Pavia, F.J., R.F. Anderson, M.Q. Fleisher, G. Winckler. Supply and Removal of Trace Elements in the South Pacific Gyre from Long-Lived Thorium and Protactinium Isotopes. Chemical Oceanography Gordon Conference, 2019.

Pavia, F.J., P.J. Lam, J.K. Bishop, L.J. Gloege, R.F. Anderson. A global database of size-fractionated POC and PIC concentrations compared to satellite-based estimates. OCB Summer Workshop, 2019.

Pavia, F.J., R.F. Anderson, P.J. Lam, B.B. Cael, S.M. Vivancos, M.Q. Fleisher, P. Zhang, Y. Lu, H. Cheng. Distinct POC regeneration regimes in the Peru OMZ compared to oxic waters of the eastern Tropical South Pacific, ASLO Aquatic Sciences Meeting, 2019.

Pavia, F.J., R.F. Anderson, S. Wang. Abyssal Ventilation in the Pacific Sector of the Southern Ocean During the Last Ice Age, AGU Fall Meeting, 2018.

Pavia, F.J., R.F. Anderson, P.J. Lam, M. Martin, R. Fine, S.M. Vivancos, M.Q. Fleisher, P. Zhang, Y. Lu, H. Cheng, R.L. Edwards. Vertical POC Flux Profiles and Oxygen Utilization Rates from Particulate ^{230}Th -Normalization, Goldschmidt Conference, 2017.

Pavia, F.J., R.F. Anderson, M.Q. Fleisher, S.M. Vivancos, Y. Lu, P. Zhang, H. Cheng, R.L. Edwards. Continuous, Rapid Scavenging of Thorium and Protactinium During Westward Advection of the East Pacific Rise Hydrothermal Plume, AGU Ocean Sciences Meeting, 2016.

Pavia, F.J., J.E. Nichols, G. Winckler, P. De Deckker. Pairing Leaf-Wax Isotopes and Lithogenic Fluxes to Understand the Drivers of Dustiness in the South Pacific, AGU Fall Meeting, 2014.

Pavia, F.J., G. Winckler, J.E. Nichols. The Sensitivity of *n*-alkanes in Marine Sediments to Changes in Dustiness: Further Developing the Use of Leaf Wax Biomarkers as a Dust Proxy. AGU Fall Meeting, 2013.

Pavia, F.J., J.E. Nichols, D.M. Peteet. Reconstructing Paleoclimate and Carbon Storage of Alaskan Peatlands During the Holocene. AGU Fall Meeting, 2012.

- REVIEW ACTIVITIES
- Peer Reviewer: *Geochemistry, Geophysics, Geosystems, Geophysical Research Letters, Frontiers in Marine Science, Frontiers in Earth Science, Biogeosciences, Paleoceanography & Paleoclimatology, Global Biogeochemical Cycles, Chemical Geology, JGR Oceans, Earth System Science Data, Oceanography, Nature Communications, Geochimica et Cosmochimica Acta.*
 - Panel Reviewer: NASA PSTAR, NOAA mCDR, ARPA-E

FIELD EXPERIENCE	R/V Sally Ride (SR2113) San Diego to San Diego. 28 days. Water sampling, in-situ pump operation, gravity coring, multicoring.	November-December 2021
	R/V Sally Ride (SR2010) San Diego to San Diego. 8 days. Water sampling, in-situ pump operation, sediment sampling.	December 2020
	R/V Ka'imikai-O-Kanaloa (HOT-303) Honolulu to Honolulu. 5 days. Water sampling for noble gas isotopes.	June 2018

R/V IB Nathaniel B. Palmer (NBP17-02) **January-March 2017**
McMurdo Station, Antarctica to Lyttleton, New Zealand. 42 days.
Water sampling and filtration, multicoring, gravity coring, piston coring.

UltraPac Expedition, R/V Sonne (SO245). **December 2015-January 2016**
Antofagasta, Chile to Wellington, New Zealand. 43 days.
Water sampling and filtration, in-situ pump operation, box coring, gravity coring.