

CURRICULUM VITAE

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Education

PhD	2005	Earth and Planetary Sciences, Johns Hopkins University
MA	1999	Earth and Planetary Sciences, Johns Hopkins University
MS	1997	Geological Sciences, The University of Texas, Austin
EdM	1990	Graduate School of Education, Harvard University
BA	1986	History and Science, <i>cum laude</i> , Harvard College

Employment

2013-present	Associate Professor, Department of Geology, University of Maryland
2015-2016	Research Fellow in the Judd H. and Cynthia S. Oualline Centennial Lectureship in Geological Sciences, Department of Geosciences, The University of Texas at Austin
2008-2017	Research Associate, National Museum of Natural History, Smithsonian Institution
2007-2013	Assistant Professor, Department of Geology, University of Maryland
2005-2007	Research Associate, Department of Geology, University of Maryland
2004-2005	Lecturer, Department of Geology, University of Maryland
1990-1993	Middle School Science Teacher (General Science) and Algebra II

Research Interests

I am interested in processes occurring within subduction zones. My studies focus primarily on metamorphic rocks exhumed from within subduction zones. Much of my research has emphasized the understanding of subduction-related fluids, approaching questions of fluid sources, fluid flow pathways, and mass transfer. Recently I have become interested in understanding the tectonic history of subduction-related metamorphic rocks using trace element thermometry. I collect field data and the analytical tools that I use include the electron microprobe, *in situ* trace element analysis of minerals by LA-ICP-MS, and stable and radiogenic isotope analysis of oxygen, carbon, lithium, osmium, and sulfur in rocks and minerals.

Publications (lead authors are the first in the list of authors, mentored co-authors (UMD students, post-docs, etc.) are indicated by a hashtag#)

- Filiberto, J., Gross, J., Udry, A., Trela, J., Wittmann, A., Cannon, K. M., **Penniston-Dorland, S.**, Ash, R., Hamilton, V.E., Meado, A.L., Carpenter, P., Jolliff, B., Ferré, E.C., 2018. Shergottite Northwest Africa 6963: A pyroxene-cumulate Martian gabbro. *Journal of Geophysical Research: Planets*, 123. <https://doi.org/10.1029/2018JE005635>
- Barth, A.P., Wooden, J.L., Riggs, N.R., Walker, J.D., Tani, K., **Penniston-Dorland, S.C.**, Jacobson, C.E., Laughlin, J.A., Hiramatsu, R., 2018. Marine volcanoclastic record of early arc evolution in the Eastern Ritter Range Pendant, Central Sierra Nevada, California. *Geochemistry, Geophysics, Geosystems*. doi:10.1029/2018GC007456.
- #Magalhães, N., **Penniston-Dorland, S.**, Farquhar, J., and Mathez, E.A., 2018, Variable sulfur isotope composition of sulfides provide evidence for multiple sources of contamination in the

Rustenberg Layered Suite, Bushveld Complex. *Earth and Planetary Science Letters*, 492: 163-173.

- Penniston-Dorland, S.C.**, Kohn, M.J., and Piccoli, P.M., 2018, A mélange of subduction temperatures: Evidence from Zr-in-rutile thermometry for strengthening of the subduction interface. *Earth and Planetary Science Letters*, 482: 525-535, <https://doi.org/10.1016/j.epsl.2017.11.005>.
- Kohn, M.J. and **Penniston-Dorland, S.C.**, 2017, Diffusion: obstacles and opportunities in petrochronology. *Reviews in Mineralogy and Geochemistry*, eds. Kohn, M.J., Engi, M., Lanari, P. *Petrochronology: Methods and applications*, 83: 103-152.
- Penniston-Dorland, S.C.**, Liu, X.-M., and Rudnick, R.L., 2017, Lithium isotope geochemistry, in *Reviews in Mineralogy and Geochemistry*, eds. Teng, F.-Z., Watkins, J.M., Dauphas, N., Non-traditional stable isotopes, 82: 165-217, doi:10.2138/rmg.2017.82.6
- #Sievers, N.E., Tenore, J., **Penniston-Dorland, S.C.**, and Bebout, G.E., 2016, Fingerprints of forearc element mobility in blueschist-facies metaconglomerates, Catalina Schist, California, *International Geology Review*, doi:10.1080/00206814.2016.1253038
- Kohn, M.J., **Penniston-Dorland, S.C.**, and Ferreira, J.C.S., 2016, Implications of near-rim compositional zoning in rutile for geothermometry, geospeedometry, and trace element equilibration. *Contributions to Mineralogy and Petrology*, 171: 78. doi:10.1007/s00410-016-1285-1.
- Bebout, G.E. and **Penniston-Dorland, S.C.**, 2016, Fluid and mass transfer at subduction interfaces – the field metamorphic record. Invited manuscript, *Lithos*. 240-243, 228-258.
- #Ireland, R.H.P., and **Penniston-Dorland, S.C.**, 2015, Chemical interactions between a sedimentary diapir and surrounding mafic magma: Evidence from the Phepane Dome and Bushveld Complex, South Africa. *American Mineralogist*. 100, 1985-2000.
- Penniston-Dorland, S.C.**, Kohn, M.J., and Manning, C.E., 2015, The global range of subduction zone thermal structures from exhumed blueschists and eclogites: Rocks are hotter than models. *Earth and Planetary Science Letters*. 428, 243-254.
- Penniston-Dorland, S.C.**, #Gorman, J.K., Bebout, G.E., Piccoli, P.M., and Walker, R.J., 2014, Reaction rind formation in the Catalina Schist: Deciphering a history of mechanical mixing and metasomatic alteration, *Chemical Geology*. 384, 47-61.
- Ferry, J.M., Winslow, N.W., and **Penniston-Dorland, S.C.**, 2013, Re-evaluation of infiltration-driven regional metamorphism in northern New England: New transport models with solid solution and cross-layer equilibration of fluid composition, *Journal of Petrology*. 54, 2455-2485.
- Sharman, E.R., **Penniston-Dorland, S.C.**, Kinnaird, J.A., Nex, P.A.M., Brown, M., and Wing, B.A., 2013, Primary origin of marginal Ni-Cu-(PGE) mineralization in layered intrusions: $\Delta^{33}\text{S}$ evidence from the Platreef, Bushveld, South Africa. *Economic Geology*. 108, 365-377.
- Filiberto, J., Chin, E., Day, J.M.D., Franchi, I.A., Gross, J., Greenwood, R.C., **Penniston-Dorland, S.C.**, Schwenzer, S.P., and Treiman, A.H., 2012, Intermediate olivine-phyric shergottite NorthWest Africa 6234, with similarities to basaltic shergottite NorthWest Africa 480 and olivine-phyric shergottite NorthWest Africa 2990. *Meteoritics and Planetary Science*. 47, 1256-1273.
- Penniston-Dorland, S.C.**, Mathez, E.A., Wing, B., Farquhar, J., and Kinnaird, J.A., 2012, Multiple sulfur isotope evidence for surface-derived sulfur in the Bushveld Complex. *Earth and Planetary Science Letters*, 337-338, 236-242.
- Yakob, J.L., Feineman, M.D., Deane, Jr., J.A., Egglar, D.H., **Penniston-Dorland, S.C.**, 2012, Lithium partitioning between olivine and diopside at upper mantle conditions: An experimental study. *Earth and Planetary Science Letters*. 329-330, 11-21.
- Penniston-Dorland, S.C.**, Walker, R.J., Pitcher, L., and Sorensen, S.S., 2012, Mantle-crust interactions in a paleosubduction zone: Evidence from highly siderophile element

systematics of eclogite and related rocks. *Earth and Planetary Science Letters*, 319-320, 295-306.

- Penniston-Dorland, S.C.**, Bebout, G.E., Pogge von Strandmann, P.A.E., Elliott, T., and Sorensen, S.S., 2012, Lithium and its isotopes as tracers of subduction zone fluids and metasomatic processes: Evidence from the Catalina Schist, California, USA. *Geochimica et Cosmochimica Acta*, 77, 530-545.
- Hebert, C.L., Kaufman, A.J., **Penniston-Dorland, S.C.**, and Martin, A.J., 2010, Radiometric and stratigraphic constraints on terminal Ediacaran (post-Gaskiers) glaciation and metazoan evolution. *Precambrian Research*, 182, 402-412.
- Penniston-Dorland, S.C.**, Sorensen, S.S., Ash, R.D., and #Khadke, S.V., 2010, Lithium isotopes as a tracer of fluids in a subduction zone mélange: Franciscan Complex, CA. *Earth and Planetary Science Letters*, 292, 181-190.
- Penniston-Dorland, S.C.**, Wing, B.A., Nex, P.A.M., Kinnaird, J.A., Farquhar, J., Brown, M., and Sharman, E.R., 2008. Multiple sulfur isotopes reveal a primary magmatic origin for the Platreef PGE deposit, Bushveld Complex, South Africa: *Geology*, 36, 979-982. (25)
- Penniston-Dorland, S.C.** and Ferry, J.M., 2008. Element mobility and scale of mass transport in the formation of quartz veins during regional metamorphism of the Waits River Formation, east-central Vermont: *American Mineralogist*, 93, 7-21.
- Penniston-Dorland, S.C.** and Ferry, J.M., 2006. Development of spatial variations in reaction progress during regional metamorphism of micaceous carbonate rocks, Northern New England: *American Journal of Science*, 306, 475-524.
- Ferry, J.M., Rumble, D. III, Wing, B.A. and **Penniston-Dorland, S.C.**, 2005. A new interpretation of centimeter-scale variations in the progress of infiltration-driven metamorphic reactions: Case study of carbonated metaperidotite, Val d'Efra, Central Alps, Switzerland. *Journal of Petrology*, 46, 1725-1746.
- Penniston-Dorland, S.C.** and Ferry, J.M., 2005. Coupled dichotomies of apatite and fluid composition during contact metamorphism of siliceous carbonate rocks. *American Mineralogist*, 90, 1606-1618.
- Ferry, J.M., Wing, B.A., **Penniston-Dorland, S.C.** and Rumble, D. III, 2002. The direction of fluid flow during contact metamorphism of siliceous carbonate rocks: new data for the Monzoni and Predazzo aureoles, northern Italy, and a global review. *Contributions to Mineralogy and Petrology*, 142, 679-699.
- Penniston-Dorland, S.C.**, 2001. Illumination of vein quartz textures in a porphyry copper ore deposit using scanned cathodoluminescence: Grasberg Igneous Complex, Irian Jaya, Indonesia. *American Mineralogist*, 86, 652-666.

Other

- Ernst, W.G., Dutrow, B.L., Sisson, V., **Penniston-Dorland, S.**, 2017, Subduction, fluids and accessory minerals: a celebration of the career of Sorena S. Sorensen, *International Geology Review*, 59, 523-525.
- Penniston-Dorland, S.**, 2012, Patching the leaky faculty pipeline: *Elements*, 8, 85.
- Feineman, M., **Penniston-Dorland, S.**, Poitrasson, F., and Weyer, S., 2009, Applications of non-traditional stable isotopes in high-temperature geochemistry: *Chemical Geology*, 258, 1-4.

Teaching, Mentoring and Advising

Courses Taught in the Last Five Years - University of Maryland

Geol 322: Mineralogy (2013-2015, 2017)

Geol 423: Optical Mineralogy (2005-2014, 2016-present)

Geol 443: Petrology (2011-2015, 2017-present, co-taught with Richard Walker)

Portions of Geol 497H: Special Topics: Recent Advances in Geology (2009, 2010, 2012-2014)
 Geol 643/789P: Igneous and Metamorphic Petrology (2008, 2011)
 Geol 789A: Advanced Petrology (2016)
 Geol 798: Petrology seminar (2010)

Undergraduates

Jenna Reimer – senior thesis TBD

Tyler Hicks – senior thesis “P-T conditions and chemical changes in Monviso eclogites: Implications for fluid-rock interaction in a subduction shear zone” 2018.

Gwen Sullivan – senior thesis “Fluids in subduction zones: Production of jadeite in Panoche Pass, CA” 2018.

Devin Simmons – University of Maryland undergraduate research assistant, 2017-2018.

Justine Grabiec – senior thesis “Insights into the formation of the Cottonwood Canyon Fault in the Catalina Schist” 2017

Steven Noll – senior thesis “Zirconium in rutile geothermometry: Peak temperature determination in the Catalina Schist” 2015

Robert Burgess – University of Maryland undergraduate research assistant, 2014.

Jessica Adams – University of Maryland undergraduate research assistant, 2013.

Hollie McBride – senior thesis “Zirconium in rutile thermometry: Temperature estimates for metamorphic rocks of the Catalina Schist” 2013

Natalie Sievers – senior thesis “Evidence for chemical changes during subduction zone metamorphism within the Catalina Schist” 2012.

Gregory Polley – senior honors thesis “A study of the $\Delta^{33}\text{S}$ signature of xenoliths from the Premier kimberlite, South Africa” 2011.

Maureen Kelly – University of Maryland summer intern, 2011.

Aleeza Harburger – summer intern, University of Pittsburgh, summer 2010.

Sarah Regen – senior thesis "Fluid-rock interactions: Lithium concentrations in minerals from a block in the Franciscan Complex, California," 2009-2010.

Supriya Khadke – Senior Summer Scholars Research Project: “Lithium isotope study of eclogite from the Samana Peninsula of the Dominican Republic” (summer 2009), work on lithium isotope analysis of rocks of the Franciscan Complex, CA, 2007-2010.

Alexandra Schwaab - lithium isotope analysis of a variety of rocks. 2009-2010.

Cory Hanson – senior honors thesis “Vein-related mass transport in the Ritter Range roof pendant during Late Cretaceous contact metamorphism,” 2008-2009.

Whitney Ford –LSAMP project: "Dehydration of Serpentinites in the Bergell contact aureole, Northern Italy" 2007-2008.

Graduate Students

William Hoover, Ph.D. student, 2016-present – "Subducting slab hydrology from a petrologic and stable isotopes perspective: A case study of the Monviso Ophiolite (Western Alps, Italy)"

Kayleigh Harvey, Ph.D. student, 2015-present – "A tale of two mélanges: A comparison of tectonic mixing and differential movement between the Catalina Schist and Rio San Juan Complex"

Nivea Magalhães, Ph.D. student, 2013-present – “Origin of $\Delta^{33}\text{S}$ anomaly in the Rustenburg Layered Suite, Bushveld Complex”

Leigh Roble, M.S. 2014 – “Lithium and its isotopes as a tracer of fluid flow mechanisms in the Catalina Schist melange zone”

Hydrogeologist, South Carolina Dept. of Health and Environmental Control

Julia Gorman, M.S. 2013 – “Understanding mechanisms of rind formation in mélange zones using highly siderophile elements”

Water Quality Specialist for the PA Department of Environmental Protection

John-Luke Henriquez, M.S. 2011 – “Tracing retrograde metamorphic fluids in a subduction zone using Li: Franciscan Complex, California.”

Instructional support technician/adjunct professor at SUNY Cortland.

Rachel Potter, M.S. 2009 - "Diffusion of oxygen and lithium isotopes at a contact between the Bushveld and metasedimentary rocks: Implications for diapiric rise of the Phepane Dome". Rachel received a GSA Research Grant in 2007 for her research and additionally granted **Outstanding Mention** (one of the top 20 recipients).

Staff consultant for TechLaw, Inc.

Service on Graduate Student Committees

Christine France (PhD 2008), Xiaoming Liu (MS 2009), Lin Qiu (PhD 2011), Jessica Yakob (MS 2011, Pennsylvania State University), Jesse Wimert (MS 2011), Michael Mengason (PhD 2011), Heather Franz (PhD 2012), Nanping Wu (PhD 2013), Zachary Reeves (MS 2014) Christopher Yakymchuk (PhD 2014), J. Michael Wilks (MS 2015), Mitchell Haller (MS 2017), Stephanie Wafforn (PhD 2017, UT Austin), Michele Locatelli (PhD 2017, UPMC, Paris), John Hollingsworth (MS 2018), Jeffrey Cullen (PhD 2018, UT Austin).

Service

Professional

Subduction community service

- Subduction Zone 4D Coordinating Committee, 2017- present.
- Member of organizing committee for Subduction Zone Observatory Workshop, September, 2016.
- Member of GeoPRISMS Steering and Oversight and Education Advisory Committees, 2014 to 2018; Mid-term Review Writing Committee; Organizing committee for GeoPRISMS Theoretical and Experimental Institute for the SCD initiative, October, 2015, led fieldtrip to Santa Catalina Island.
- Co-founder of ExTerra: Understanding Subduction Through Study of Exhumed Terranes (2011-present); Convened GeoPRISMS ExTerra Mini-workshop at Fall AGU, 2011; ExTerra workshop at Goldschmidt, 2013; Co-director of E-FIRE (ExTerra Field Institute and Research Endeavor, 2016-present).
- Leader of NSF-GeoPRISMS SCD Metamorphic Processes working group (2009-11)

Mineralogical Society of America

- MSA Councilor, 2016-present.
- MSA Award Committee 2018, Dana Medal Committee 2016-2017, Committee on Committees, 2012, Lecture Program Committee, 2007-2009.

Editorial service

- Associate Editor, *American Mineralogist*, 2013-present
- Associate Editor, *GSA Bulletin*, 2012 to 2014.
- Associate guest editor, “*Subduction Top to Bottom 2*,” 2015-present.
- Guest editor, Special Issue of *International Geology Review*, 2017, "Subduction, fluids, and accessory minerals: A celebration of the career of Sorena S. Sorensen."
- Guest editor, Special Issue of *Chemical Geology*, 2009, “Applications of non-traditional stable isotopes in high-temperature geology”

Other

- Member of GSA Student Research Grants Selection Committee, 2014 to 2016
- Leader of Early Career Geoscience Faculty workshop, On the Cutting Edge, 2014, 2015. Convener and leader, 2016-present.
- Member of National Science Foundation Earth Sciences Proposal Review Panels - Petrology and Geochemistry, Tectonics Programs.
- Co-convenor of sessions at international conferences: Fall American Geophysical Union (AGU) meeting (2011, 2012), Goldschmidt (2007, 2009, 2010, 2013-2017), GSA (2015, 2016, 2018) and AGU 2006 Joint Assembly.
- NSF Louis Stokes Alliance for Minority Participation (LSAMP) faculty mentor for Undergraduate Research Program (URP), 2007-2008.
- Reviewer for: Science, Nature Geoscience, Geology, Geochimica et Cosmochimica Acta, American Mineralogist, American Journal of Science, Chemical Geology, Contributions to Mineralogy and Petrology, Economic Geology, Geochemistry, Geophysics, Geosystems (G³), GSA Bulletin, Journal of Metamorphic Geology, Journal of Petrology, European Journal of Mineralogy, National Science Foundation-EAR: Petrology and Geochemistry and Instrumentation and Facilities, and the Czech and German Science Foundations.
- AGU Fall Meeting Program Committee, Fall 2012, 2014.
- Lead author for online minilesson “Subduction Zone Metamorphism” through the MARGINS mini-lesson program.

Departmental

Director of Graduate Studies (2017-present)
 Graduate Admissions Committee (2006-2009, 2015-present)
 Coordinator, Geology Colloquium (2008-2010)
 Merit Pay Review Committee (2011-2012)
 Wylie Fellowship Committee (2012-2013)
 Graduate Student Best Paper Award Committee (2014-present)

Campus

University Library Committee (2013-2015)
 Reviewer for University submissions for NSF-PIRE, 2016.
 Graduate Student Grievance Policy Committee, Graduate School, 2017.

Contracts and Grants

- 2018-2021** "Collaborative Research: Early Career Geoscience Faculty Development Workshop: A partnership between NAGT and NSF. " National Science Foundation DUE-IUSE 1821317 (\$261,442); PIs, S. Penniston-Dorland, T. Hill.
- 2017-2019** "Acquisition of a State-of-the-Art Multi-Collector Inductively-Coupled Plasma Mass Spectrometer." National Science Foundation EAR-1659023 (\$480,000); PIs, R. Walker, R. Ash, W. McDonough, S. Penniston-Dorland, I. Puchtel.
- 2017-2018** "On the Cutting Edge: Early Career Geoscience Faculty Development Workshop: A partnership between NAGT and NSF." National Science Foundation EHR-171102 (\$82,912); PI, S. Penniston-Dorland.
- 2016-2018** “Constraining the source of ancient, surface-derived sulfur in the Bushveld Complex” National Science Foundation EAR-1551196 (\$134,316); PI S. Penniston-Dorland

- 2016-2021** “PIRE: ExTerra Field Institute and Research Endeavor (E-FIRE)” National Science Foundation OISE-1545903 (\$4,022,940; UMd portion \$882,832), PIs M. Kohn, M. Feineman, S. Penniston-Dorland
- 2014-2017** “Collaborative Research: Deciphering subduction dynamics: Case study of the Catalina Schist,” National Science Foundation EAR-1419871 (\$210,544); PIs, S. Penniston-Dorland, M. Kohn.
- 2013-2015** “Workshop: ExTerra 2013, Florence, Italy,” National Science Foundation EAR-1340360, (\$27,265); PI S. Penniston-Dorland.
- 2013-2015** “Acquisition of a State-of-the-Art Thermal Ionization Mass Spectrometer,” National Science Foundation EAR-1255787, (\$325,000); PI R. Walker, Co-PIs M. Brown, S. Penniston-Dorland, I. Puchtel, R. Rudnick.
- 2011-2015** “Highly siderophile elements as tracers of mantle-crust interactions in subduction zone metamorphic rocks,” National Science Foundation EAR-1119111, (\$300,027); PIs, S. Penniston-Dorland, R. Walker.
- 2009-2012** Tracing evidence of fluid flow in eclogite, blueschist and amphibolite blocks in subduction zone mélanges,” National Science Foundation EAR-0911100, (\$249,675.50); PI, S. Penniston-Dorland.
- 2007-2009** “Under the (Mesozoic) Volcano: fluid-rock histories of a fossil hydrothermal system in the Sierra Nevada, USA,” Smithsonian Institution, (\$22,515); S. Sorensen, PI, S. Penniston-Dorland, Co-PI.
- 2005-2007** “Petrogenesis of the Platreef, Bushveld Complex, South Africa, interrogated using mass-independent sulfur isotopes,” USGS MRERP, (\$44,500); M. Brown, S. Penniston-Dorland, B. Wing, Co-PIs

Collaborators

Philippe Agard (UPMC), Samuel Angiboust (IPGP), Richard Ash (UMd), Jaime Barnes (UT Austin), Gray Bebout (Lehigh), Michael Brown (UMd), Grant Bybee (Univ. of Witwatersrand), Mark Caddick (Virginia Tech.), Emily Chin (Rice), James Day (Scripps), Besim Dragovic (Virginia Tech.), David Egger (Penn State), Tim Elliott (University of Bristol), James Farquhar (UMd), Maureen Feineman (Penn State), John Ferry (JHU), Justin Filiberto (SIU Carbondale), Ian Franchi (Open University), Richard Greenwood (Open University), Juliane Gross (AMNH), Jay Kaufman (UMd), Judith Kinnaird (Univ. of Witwatersrand), Matthew Kohn (Boise State), Craig Manning (UCLA), Horst Marschall (WHOI), Aaron Martin (UMd), Edmond Mathez (AMNH), Philip Piccoli (UMd), Philip Pogge von Strandmann (University of Bristol), Marco Scambelluri (Genova), Susanne Schwenzer (Open University), Jane Selverstone (UNM), Elizabeth Sharman (McGill), Sorena Sorensen (NMNH), Allen Treiman (LPI), Richard Walker (UMd), Allan Wilson (Univ. of Witwatersrand), Boswell Wing (McGill).