

Stephen Judson Turner

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Positions Held

Assistant Professor, University of Houston, Department of Earth and Atmospheric Sciences, 2024 - present
Adjunct Professor, University of Massachusetts Amherst, Department of Earth, Geographic, and Climate Sciences, 2023 - present
Lecturer, University of Massachusetts Amherst, Department of Earth, Geographic, and Climate Sciences, 2019 - 2023
Fossett Postdoctoral Fellow, Washington University in St. Louis, Department of Earth and Planetary Sciences, 2017 - 2019
Postdoctoral Researcher, University of Oxford, Department of Earth Sciences, 2015 - 2017

Education

Ph.D., Earth and Planetary Sciences, Harvard University, Cambridge MA, 2015
Major element, trace element, and isotopic constraints on arc magma generation from local, regional, and global perspectives. Adviser: Charles H. Langmuir
M.A., Earth and Planetary Sciences, Harvard University, Cambridge MA, 2011
B.A., Cognitive Science, Religious Studies, Rice University, Houston TX, 2007

Peer-Reviewed Journal Publications

(*advised or co-advised student)

- Turner, S. J., & Langmuir, C. H. (2024). An alternative to the igneous crust fluid+ sediment melt paradigm for arc lava geochemistry. *Science Advances*, 10(24), eadg6482.
- Turner, S. J., *Barickman, M. H., *Rodriguez, J., Fike, D. A., Jones, C. M., Wang, K., ... & Parai, R. (2023). Boron isotopes in Central American volcanics indicate a key role for the subducting oceanic crust. *Earth and Planetary Science Letters*, 619, 118289.
- Barry, P. H., et al. (2022). The helium and carbon isotope characteristics of the Andean Convergent Margin. *Frontiers in Earth Science*, 10, 897267.
- Turner, S. J., & Langmuir, C. H. (2022c). A quantitative framework for global variations in arc geochemistry. *Earth and Planetary Science Letters*, 584, 117411.
- Turner, S. J., & Langmuir, C. H. (2022b). Sediment and ocean crust both melt at subduction zones. *Earth and Planetary Science Letters*, 584, 117424.
- Turner, S. J., & Langmuir, C. H. (2022a). An evaluation of five models of arc volcanism. *Journal of Petrology*, 63(3), egac010.
- Bekaert, David V., Gazel, E., Turner, S., et al., (2021). High $^3\text{He}/^4\text{He}$ in central Panama reveals a distal connection to the Galápagos plume. *Proceedings of the National Academy of Sciences* 118.47.
- Iveson, A. A., Humphreys, M. C., Savoy, I. P., de Hoog, J. C., Turner, S. J., Churikova, T. G., ... & Cooper, G. F. (2021). Deciphering variable mantle sources and hydrous inputs to arc magmas in Kamchatka. *Earth and Planetary Science Letters*, 562, 116848.

- Bekaert, D. V., Turner, S. J., Broadley, M. W., Barnes, J. D., Halldórsson, S. A., Labidi, J., ... & Barry, P. H. (2021). Subduction-Driven Volatile Recycling: A Global Mass Balance. *Annual Review of Earth and Planetary Sciences*, 49.
- Kirstein, L. A., Kanev, S., Fitton, J. G., & Turner, S. J. (2020). Volcanic spherules condensed from supercritical fluids in the Payenia volcanic province, Argentina. *Journal of the Geological Society*, 178(1).
- *Wieser, P. E., Turner, S. J., Mather, T. A., Pyle, D. M., Savov, I. P., & Orozco, G. (2019). New constraints from Central Chile on the origins of enriched continental compositions in thick-crustal arc magmas. *Geochimica et Cosmochimica Acta*.
- Barry, P. H., et al. (2019). Forearc carbon sink reduces long-term volatile recycling into the mantle. *Nature* 568.7753: 487.
- Turner, S. J., Langmuir, C. H., Dungan, M. A., & Escrig, S. (2017). The importance of mantle wedge heterogeneity to subduction zone magmatism and the origin of EM1. *Earth and Planetary Science Letters*, 472, 216-228.
- Turner, S. J., Langmuir, C. H., Katz, R. F., Dungan, M. A., & Escrig, S. (2016). Parental arc magma compositions dominantly controlled by mantle-wedge thermal structure. *Nature Geoscience*, 9(10), 772-776.
- Turner, S. J., & Langmuir, C. H. (2015b). What processes control the chemical compositions of arc front stratovolcanoes? *Geochemistry, Geophysics, Geosystems*, 16(6), 1865-1893.
- Turner, S. J., & Langmuir, C. H. (2015a). The global chemical systematics of arc front stratovolcanoes: Evaluating the role of crustal processes. *Earth and Planetary Science Letters*, 422, 182-193.
- Turner, S. J., Izbekov, P., & Langmuir, C. H. (2013). The magma plumbing system of Bezymianny Volcano: Insights from a 54-year time series of trace element whole-rock geochemistry and amphibole compositions. *Journal of Volcanology and Geothermal Research*, 263, 108-121.
- Le Roux, V., Lee, C. T., & Turner, S. J. (2010). Zn/Fe systematics in mafic and ultramafic systems: Implications for detecting major element heterogeneities in the Earth's mantle. *Geochimica et Cosmochimica Acta*, 74(9), 2779-2796.

Selected Conference Abstracts

- Turner, S. J., Mather, T. A., Pyle, D., Savov, I. P., *Hammerstrom, A., Barry, P. H., ... & Hudak, M. R. Geochemical evidence for shear heating, slab melting, and slab melt channelization in the South Andean subduction zone, *Goldschmidt*, 2023
- *Hammerstrom, A., Parai, R., Carlson, R., Turner, S. J. Stable Sr Isotope ($\delta^{88}\text{Sr}$) Constraints on Nicaraguan arc subduction fluxes and carbonate recycling, *AGU*, 2022
- *Brigham, K., Brueseke, H., Turner, S. J. Geochemistry of Wrangell Arc lavas indicate a mantle origin for voluminous high-Mg# andesites, *AGU*, 2022
- Turner, S.J., *Justus, S., *Hammerstrom, A., *Brigham, K., Global trends in silica (and other major element) abundances among high-Mg# arc-front stratovolcanoes, *Goldschmidt*, 2022
- Turner, S.J., Langmuir, CH., *Wieser, P., Deciphering crust, mantle, and slab controls on arc magma compositions: A global perspective, *AGU*, 2020
- *Wieser, P., Turner, S.J., Mather, T., Pyle, M., Savov, I., Orozco, G., Deciphering crust, mantle, and slab controls on arc magma compositions: A case study from Central Chile, SVZ (33–46° S), *AGU*, 2020
- Turner, S.J., Langmuir, CH., An Internally Consistent Framework for the Global and Regional Chemical Variability of Parental Arc Magmas, *Goldschmidt*, 2020

- *Barickman, M. H., Turner, S. J., Parai, R. P., Fike, D. A., Krawczynski, M., Wang, K. Boron isotopic constraints on slab and mantle-derived fluid and melt sources of Nicaraguan volcanics, *AGU*, 2019
- Turner, S.J., Langmuir, C., Cerpa, N., Does the ocean crust always melt at convergent margins? *State of the Arc Meeting*, 2018
- Turner, S.J., Humphreys, M., Matzen, A., Di Genova, D., Iveson, A., Smythe, D., Mather T., Pyle, D., Fe-redox in olivine-hosted melt inclusions and embayments across the Andean Southern Volcanic Zone, *Goldschmidt*, 2018
- Turner, S.J., Mather T., Pyle, D., Savov, I., Humphreys, M., Matzen, A., Di Genova, D., Whole-rock and melt inclusion chemistry of basalts and andesites from the southern Andes indicate mantle wedge hydration (and oxidation?) via melts from a slab mélange, *NERC Deep Volatiles Fall Program*, 2017
- Turner, S.J., Mather T., Pyle, D., Humphreys, M., Matzen, A., Savov, I., Trace element, volatile element, boron isotope, and XANES analyses of olivine-hosted melt inclusions from Chile and Argentina indicate a mantle wedge hydrated and oxidized primarily by hydrous melts of subducting sediment and oceanic crust, *Goldschmidt*, 2017
- Turner, S.J., Langmuir, C., Dungan, M., Escrig, S., The importance of mantle wedge heterogeneity to arc geochemistry, *Goldschmidt*, 2016
- Turner, S.J., Langmuir, C., Dungan, M., Escrig, S., Global geochemical insights from the Chilean Southern Volcanic Zone, *Goldschmidt*, 2015

Invited Talks (past 5 years)

- 2023: University of Florida, Florida Atlantic University, University of Houston
- 2022: National Museum of Natural History, Cornell, Institut de Physique du Globe de Paris
- 2021: Carnegie Institute Department of Terrestrial Magnetism
- 2020: AGU Fall Meeting, Goldschmidt Conference, Woods Hole Oceanographic Institute
- 2019: Princeton University, New Mexico Tech, Lamont-Doherty Earth Observatory

Teaching/Advising

- 2022-2024 Undergraduate honors thesis adviser for student Kristina Bardfield
- 2021-2024 Instructor for “Subduction Zone Geochemistry” (GEO-723), UMass Amherst
- 2021-2022 Undergraduate research adviser for Kurt Lawson and Eli Nauda, UMass Amherst
- 2021-present MS project adviser for student Kelly Brigham, UMass Amherst
- 2021-2023 MS project adviser for students Sarah Justus, UMass Amherst
- 2020-present PhD Adviser for Alexander Hammerstrom
- 2019-present Instructor for Mineralogy (GEO-311), And Petrology (GEO-312), UMass Amherst
- 2019-present Instructor for Petrology Seminar (GEO-SCI-821), UMass Amherst
- 2019-present Instructor for Mineralogy Honors Colloquium (GEO-H311), UMass Amherst
- 2019 “Boron Isotopes” seminar, Wash U St. Louis
- 2018-2022 MS co-adviser for Mattison Barickman, Wash U St. Louis
- 2017-2018 Seminar leader, “Geochemistry of Subduction Zones,” Wash U St. Louis
- 2017-2018 Undergraduate Honors adviser for Julian Rodriguez, Title: “Boron isotopes of ‘HIMU’ mid-ocean ridge basalts,” Wash U St. Louis
- 2016-2017 MS adviser for Penny Wieser, Title: “Don Casimiro: An EM1 Arc-Front Volcano,” University of Oxford

- 2015-2016 Guest lecturer, “Topics in Volcanology,” University of Oxford
 2009-2014 TA section leader for: How to Build a Habitable Planet (SPU-14) (three cumulative sections), Energy and Climate: Vision for the Future (ENVR-103), Natural Disasters (SPU-12), Introduction to Geological Sciences (EPS-7), Harvard University

Research Support

- 2023 NSF CH, Bubble Trouble - Reevaluating olivine melt inclusion barometry and trace-element geochemistry in the Cascades (\$292,000 to Lead-PI Turner, \$292,000 to Co-PI Wieser)
 2022 Equipment: Acquisition of a Confocal Micro-Raman Spectroscopy System at the University of Massachusetts and Amherst College (\$285,000, Turner as Co-PI)
 2019 NSF CH, “Development and application of Sr stable isotopes as a novel tracer of carbonate through subduction” (\$123,000 to Lead-PI Turner, \$38,000 to Co-PI Parai)
 2016 UK Diamond Light Source facilities allotment, “Fe K-edge XANES on olivine-hosted melt inclusions in subduction zones”
 2015 UK Ion Microprobe facilities allotment, “Constraining volatile fluxes in the Chilean Southern Volcanic Zone”

Field Experience

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| 2021 | Washington/Oregon | Expeditions to Mt. Rainier, Mt. Baker, and the Oregon High Lava Plains |
| 2018 | Costa Rica/Panama | Sampling of monogenetic cones and Volcán Barú |
| 2017 | Costa Rica/Nicaragua | Expedition to Telica Volcano, Nicaragua, and various sites in CR |
| 2016 | Kamchatka, Russia | Expedition to Bakening, Shiveluch, Kluchevskoy, and Avachinsky |
| 2015 | Argentina | Two separate expeditions (Spring/Fall) to various volcanic sites in Neuquén and Mendoza, Argentina, and Southern Chile |
| 2012 | Southern Chile | Expeditions to Chillan, Callaqui, Mocho-Choshuenco, Antillanca, Villarica, and Osorno Volcanoes |
| 2011 | Southern Chile | Expeditions to Llaima, Sierra Nevada Tolguaca, Lonquimay, and Sollipulli Volcanoes |
| 2010 | Kamchatka, Russia | Expeditions to Bezymianny and Zimina Volcanoes |
| 2009 | Kamchatka, Russia | Expeditions to Shiveluch and Bezymianny Volcanoes |

Department/Professional Service

- 2022 Co-organizer for the 2022 New England Intercollegiate Geologic Conference
 2022 Co-organizer for the 2022 UMass Panel on Accessible Fieldwork
 2021-present UMass Amherst Geosciences Diversity, Equity, and Inclusion Committee
 2020-Present UMass Amherst Geosciences Graduate Admissions Committee
 2019-2020 UMass Amherst Geosciences Classroom Renovation Committee
 2020 Convener “Chalcophile, Siderophile, and Other Redox-Sensitive Elements in the Solid Earth” at the Goldschmidt 2020 Fall Meeting
 2018 Convener “Magma Dynamics and Timescales in Volcanic Environments” at the Goldschmidt 2018 Fall Meeting

25 reviews (past 5 years) for *EPSL*, *Geology*, *Lithos*, *Chemical Geology*, *G³*, *Science Advances*, *Journal of Petrology*, *Nature*, *Nature Communications*, *Gondwana Research*, *Earth Science Reviews*, *NSF Petrology and Geochemistry*