

Stephen Judson Turner

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Professional Appointments

Lecturer, University of Massachusetts Amherst, Department of Geosciences, 2019 - present

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. Advisor: 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

Manuscripts in review

Turner S. J., Langmuir C. H., An evaluation of five models of arc volcanism. (pending minor revisions in *Journal of Petrology*)

Turner S. J., Langmuir C. H., Sediment and Ocean Crust Both Melt at Subduction Zones. (pending minor revisions in *Earth and Planetary Science Letters*)

Bekaert, D.V., Gazel, E., Turner, S. J., *Hammerstrom, A., Behn, M., de Moor, J. M., ... & Barry, P. H. High $^3\text{He}/^4\text{He}$ in western Panama reveals an asthenospheric pipeline from Galápagos plume. (pending moderate revisions in *Proceedings of the National Academy of Sciences*)

Turner S. J., Langmuir C. H., A Quantitative Framework for Global Variations in Arc Geochemistry (pending minor revisions in *Earth and Planetary Science Letters*)

Manuscripts in prep for 2021

*Barickman, M. H., Turner, S. J., *Rodriguez, J., Krawczynski, M. J., Fike, D. A., Parai, R. P. Boron isotopes in Central American volcanics indicate a key role for the subducting oceanic crust. (for submission to *Earth and Planetary Science Letters*)

Turner, S. J., Mather T., Pyle, D. Synthesizing boron, trace element, and radiogenic isotope systematics along and across the Southern Andean Volcanic Zone. (for submission to *Journal of Petrology*)

Turner S. J., Langmuir C. H., An alternative to the paradigm that ocean crust dehydrates and sediments melt at subduction zones. (for submission to *Nature Geoscience*)

Publications

- Iveson, A. A., Humphreys, M. C., Savov, 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. Forearc carbon sink reduces long-term volatile recycling into the mantle. *Nature* 568.7753 (2019): 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.

*Served as primary student adviser on associated project

Selected Conference Proceedings

- Turner, S.J., Langmuir, C.H., Wieser, P., Deciphering crust, mantle, and slab controls on arc magma compositions: A global perspective, *AGU*, 2020
- Turner, S.J., Langmuir, C.H., An Internally Consistent Framework for the Global and Regional Chemical Variability of Parental Arc Magmas, *Goldschmidt*, 2020

- 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., Ferrero, A., 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

- 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
- 2018: *State of the Arc* Meeting
- 2017: University of Oregon
- 2016: *Goldschmidt* Conference
- 2015: Cambridge University

Teaching/Advising

- 2021 Instructor for "Subduction Zone Geochemistry" Seminar, UMass Amherst
- 2021 Undergraduate research advisor for Kurt Lawson and Eli Nauda, UMass Amherst
- 2021 MS project advisor for students Sarah Justus and Kelly Brigham, UMass Amherst
- 2020-present PhD Advisor for student 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" faculty-graduate reading group seminar, Wash U St. Louis
- 2018-present PhD project co-adviser for Mattison Barickman, Wash U St. Louis
- 2017-2018 Seminar leader, "Geochemistry of Subduction Zones," Wash U St. Louis
- 2017-2018 Honors thesis adviser for Julian Rodriguez, Title: "Boron isotopes of 'HIMU' mid-ocean ridge basalts," Wash U St. Louis
- 2016-2017 Primary '4th-year thesis' 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

- Pending NSF OCE - Marine Geology and Geophysics, "Investigating lithosphere formation and modification in Alaska and western Canada from subduction to accretion: Integrating seismic and geochemical datasets" (\$462,538)
- 2019 NSF EAGER, "Development and application of Sr stable isotopes as a novel tracer of carbonate through subduction" (\$155,549)
- 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 Service

- 2021 UMass Amherst Geosciences Diversity, Equity, and Inclusion Committee
- 2021 UMass Amherst Geosciences Faculty Search Committee
- 2020-Present UMass Amherst Geosciences Graduate Admissions Committee
- 2019-2020 UMass Amherst Geosciences Classroom Renovation Committee

Professional Service

- 2015-Present Participation in the NERC *Deep Volatiles* consortium, an interdisciplinary program bringing together the communities of high-pressure experimental petrology, geodynamics, and the systematics of volcanic arcs (2015 to present)

2017-present Participation in the Deep Carbon Observatory's *Biology Meets Subduction* initiative, an interdisciplinary program bringing together the communities of microbiology, gas geochemistry, and analytical geochemistry/petrology ()

2020 Co-convended and chaired "Chalcophile, Siderophile, and Other Redox-Sensitive Elements in the Solid Earth" at the Goldschmidt 2020 Fall Meeting

2018 Co-convended and chaired "Magma Dynamics and Timescales in Volcanic Environments" at the Goldschmidt 2018 Fall Meeting

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