

CHENGUANG SUN

Department of Geological Sciences | The University of Texas at Austin
E-mail: csun@jsg.utexas.edu | Phone: (512) 232-1941 | Website: earth-sun.weebly.com
Google scholar: Total citations = 1307; h-index = 18

RESEARCH INTERESTS

Deep volatile cycle; planetary differentiation and habitability; magmatic processes; thermal histories of Earth and planetary materials

EDUCATION

Ph.D., Geological Sciences, Brown University, Providence, RI, USA 2014
B.Sc., Geology, China University of Geosciences, Beijing, China 2007

ACADEMIC APPOINTMENTS

Assistant Professor, The University of Texas at Austin	01/2021 – Present
Postdoctoral Research Associate, Rice University	09/2016 – 01/2021
Postdoctoral Research Associate, Brown University	04/2016 – 08/2016
Postdoctoral Scholar/ Investigator, Woods Hole Oceanographic Institution	09/2014 – 03/2016
Research/Teaching Assistant, Brown University	08/2008 – 08/2014
Research Assistant, China University of Geosciences (Beijing)	07/2007 – 07/2008

HONORS/AWARDS/FUNDING

Life Fellow, Mineralogical Society of America	2021
MSA Award, Mineralogical Society of America	2021
NSF-OCE: Documenting dynamic accretion in the lower ocean crust: ocean drilling holes U1473A and 735B, SW Indian Ridge. PI: H. Dick; Co-PI: C. Sun. Total awarded: \$ 495,003 to WHOI	09/2016 – 08/2019
Devonshire Postdoctoral Scholar, Woods Hole Oceanographic Institution Total awarded: \$ 92,250 to C. Sun	09/2014 – 02/2016
Dissertation Fellowship, Brown University	01/2013 – 05/2013
GSA Student Travel Grant	10/2013
AGU Outstanding Student Paper Award, VGP Section	12/2012
Outstanding Student Paper Award, National Annual Symposium on Petrology & Geodynamics, China	11/2007
Best Senior Thesis Award, China University of Geosciences (Beijing)	06/2007

THESES

Ph.D. Thesis: Trace element partitioning between mantle minerals and basaltic melts with applications to subsolidus re-equilibration and thermobarometry. Brown University, May 2014. Committee: Yan Liang (advisor), Alberto Saal, Marc Parmentier, Reid Cooper,

Steve Parman, Bruce Watson (outside reader from RPI)
B.Sc. Thesis: Geochronology and geochemistry of Sailipu ultrapotassic volcanic rocks, Southern Tibet. China University of Geosciences (Beijing), June 2007. Advisor: Zhidan Zhao

PUBLICATIONS

2012–present

- Dasgupta R, Chowdhury P, Eguchi J, **Sun C**, Saha S. Volatile-bearing partial melts in the lithospheric and sub-lithospheric mantle on earth and other rocky planets. *Review in Mineralogy and Geochemistry*. In press. [Invited contribution]
- Sun C**. Trace element geothermometry and geospeedometry for cumulate rocks: Quantitative constraints on thermal and magmatic processes during igneous crust formation. *Geophysical Monograph Series (AGU)*. In press. doi.org/10.1002/essoar.10504587.2. [Invited contribution]
- Sun C**, Dasgupta R. (2020) Thermobarometry of CO₂-rich, silica-undersaturated melts constrains cratonic lithosphere thinning through time in areas of kimberlitic magmatism. *Earth and Planetary Science Letters*, 550: 116549. doi.org/10.1016/j.epsl.2020.116549
- Grewal DS, Dasgupta R, **Sun C**, Tsuno K, Costin G. (2019) Delivery of carbon, nitrogen and sulfur to the silicate Earth by a giant impact. *Science Advances*, 5(1), p.eaau3669. doi:10.1126/sciadv.aau3669
- Sun C**, Dasgupta R. (2019) Slab-mantle interaction, carbon transport, and kimberlite generation in the deep upper mantle. *Earth and Planetary Science Letters*, 506: 38–52. doi:10.1016/j.epsl.2018.10.028
- Sun C**, Lissenberg CJ. (2018) Caveats and challenges in geospeedometry: A reply to Faak et al.'s critique of the Mg-REE coupled geospeedometry. *Earth and Planetary Science Letters*, 502: 287–290. doi:10.1016/j.epsl.2018.08.044
- Sun C**, Lissenberg CJ. (2018) Formation of fast-spreading lower oceanic crust as revealed by a new Mg-REE coupled geospeedometer. *Earth and Planetary Science Letters*, 487: 165–178. doi:10.1016/j.epsl.2018.01.032
- Sun C**. (2018) Partitioning and partition coefficients. In *Encyclopedia of Geochemistry*. Editor: W. White. Springer. doi:10.1007/978-3-319-39193-9_347-1 [Invited contribution]
- Sun C**. (2018) Onuma diagrams. In *Encyclopedia of Geochemistry*. Editor: W. White. Springer. doi:10.1007/978-3-319-39193-9_344-1 [Invited contribution]
- Sun C**, Liang Y. (2017) A REE-in-plagioclase-clinopyroxene thermometer for crustal rocks. *Contributions to Mineralogy and Petrology*, 172(24). doi:10.1007/s00410-016-1326-9
- Sun C**, Graff M, Liang Y. (2017) Trace element partitioning between plagioclase and silicate melt: the importance of temperature and plagioclase composition, with implications for terrestrial and lunar magmatism. *Geochimica et Cosmochimica Acta*, 206: 273–295. doi:10.1016/j.gca.2017.03.003
- Shimizu K, Liang Y, **Sun C**, Jackson C, Saal A. (2017) Parameterized lattice strain models for REE partitioning between amphibole and silicate melt. *American Mineralogist*, 102: 2254–2267.

- Le Roux V, Nielsen S, **Sun C**, Yao L. (2016) Dating layered websterite formation in the lithospheric mantle. *Earth and Planetary Science Letters*, 454: 103–122
- Sun C**, Liang Y. (2015) A REE-in-garnet-clinopyroxene thermobarometer for eclogites, granulites and garnet peridotites. *Chemical Geology*, 393: 79–92. doi:10.1016/j.chemgeo.2014.11.014
- Sun C**, Liang Y. (2014) An assessment of subsolidus re-equilibration on REE distribution among mantle minerals, olivine, orthopyroxene, clinopyroxene, and garnet in peridotites. *Chemical Geology*, 372: 80–91. doi:10.1016/j.chemgeo.2014.02.014
- Dygert N, Liang Y, **Sun C**, Hess P. (2014) An experimental study of trace element partitioning between augite and Fe-rich basalts. *Geochimica et Cosmochimica Acta*, 132: 170–186
- Liu D, Zhao Z, Zhu DC, Niu Y, DePaolo DJ, Harrison TM, Mo X, Dong G, Zhou S, **Sun C**, Zhang Z, Liu J. (2014) Postcollisional potassic and ultrapotassic rocks in southern Tibet: Mantle and crustal origins in response to India-Asia collision and convergence. *Geochimica et Cosmochimica Acta*, 143, 207–231
- Sun C**, Liang Y. (2013) The importance of crystal chemistry on REE partitioning between mantle minerals (garnet, clinopyroxene, orthopyroxene and olivine) and basaltic melts. *Chemical Geology*, 358: 23–36. doi:10.1016/j.chemgeo.2013.08.045
- Sun C**, Liang Y. (2013) Distribution of REE and HFSE between low-Ca pyroxene and lunar picritic melts around multiple saturation points. *Geochimica et Cosmochimica Acta*, 119: 340–358. doi:10.1016/j.gca.2013.05.036
- Liang Y, **Sun C**, Yao L. (2013) A REE-in-two-pyroxene thermometer for mafic and ultramafic rocks. *Geochimica et Cosmochimica Acta*, 102: 246–260
- Yao L, **Sun C**, Liang Y. (2012) A parameterized model for REE distribution between low-Ca pyroxene and basaltic melts with applications to REE partitioning in low-Ca pyroxene along a mantle adiabat and during pyroxenite-derived melt and peridotite interaction. *Contributions to Mineralogy and Petrology*, 164: 261–280
- Sun C**, Liang Y. (2012) Distribution of REE between clinopyroxene and basaltic melt along a mantle adiabat: effects of major element composition, water, and temperature. *Contributions to Mineralogy and Petrology*, 163: 807–823. doi:10.1007/s00410-011-0700-x

2007–2009

- Zhao Z, Mo X, Dilek Y, Niu Y, DePaolo DJ, Robinson P, Zhu D, **Sun C**, Dong G, Zhou S, Luo Z, Hou Z. (2009) Geochemical and Sr-Nd-Pb-O isotopic compositions of the post-collisional ultrapotassic magmatism in SW Tibet: Petrogenesis and implications for India intra-continental subduction beneath southern Tibet. *Lithos*, 113: 109–212
- Yang Z, Luo Z, Zhang H, Zhang Y, Huang F, **Sun C**, Dai J. (2009) Petrogenesis and Geological Implications of the Tianheyong Cenozoic Basalts, Inner Mongolia China. *Earth Science Frontiers*, 16(2): 90–106. doi:10.1016/S1872-5791(08)60083-4
- Zhu DC, Mo XX, Zhao ZD, Xu JF, Zhou CY, **Sun CG**, Wang LQ, Chen HH, Dong GC, Zhou S. (2008) Zircon U-Pb geochronology of Zenong group volcanic rocks in Coqen area of the Gangdese, Tibet and tectonic significance. *Acta Petrologica Sinica*, 24(3): 401–412

- Sun CG**, Zhao ZD, Mo XX, Zhu DC, Dong GC, Zhou S, Chen HH, Xie LW, Yang YH, Sun JF, Yu F. (2008) Enriched mantle source and petrogenesis of Sailipu ultrapotassic rocks in southwestern Tibetan Plateau: constraints from zircon U-Pb geochronology and Hf isotopic compositions. *Acta Petrologica Sinica*, 24(2): 249–264
- Zhao ZD, Mo XX, **Sun CG**, Zhu DC, Niu YL, Dong GC, Zhou S, Dong X, Liu YS. (2008) Mantle xenoliths in southern Tibet: geochemistry and constraints for the nature of the mantle. *Acta Petrologica Sinica*, 24(2): 193–202
- Sun CG**, Zhao ZD, Mo XX, Zhu DC, Dong GC, Zhou S, Dong X and Xie GG. (2007) Geochemistry and origin of the Miocene Sailipu ultrapotassic rocks in western Lhasa block, Tibetan Plateau. *Acta Petrologica Sinica*, 23(11): 2715–2726
- Zhao Z, Mo X, Dong G, Zhou S, Zhu D, Liao Z, **Sun C**. (2007) Pb isotopic geochemistry of Tibetan plateau and its implications. *Geoscience*, 21(2): 265–274

RECENT CONFERENCE ABSTRACTS

- Sun C**, Dasgupta R. (2019) Thermobarometry of silica-poor intraplate magmas as a probe into the melting depth and thermal vigor of the Earth's mantle. AGU Fall Meeting, V13B-08
- Dasgupta R, **Sun C**. (2019) Generation of kimberlitic melts – experimental and natural thermobarometric constraints and insights into materials transfer across mantle transition zone. AGU Fall Meeting, D124A-01
- Sun C**, Dasgupta R. (2019) Kimberlite evidence for the evolution of cratonic lithosphere. Gordon Research Conference: Interior of the Earth. South Hadley, MA, USA.
- Liang Y, Cherniak D, **Sun C**. (2018) Some remarks on the multiple time scales of diffusion in minerals and melts. GSA Annual Meeting in Indianapolis, Indiana, USA. Vol. 50, No. 6
- Sun C**, Dasgupta R. (2018) Slab-mantle interaction, carbon transport, and kimberlite generation in the deep upper mantle. Gordon Research Conference: Deep Carbon Science in the Context of Geologic Time. Smithfield, RI, USA.
- Sun C**, Dasgupta R. (2017) Reactive transport of slab-derived carbonatitic melts in the deep upper mantle and generation of kimberlites. AGU Fall Meeting, abstract# V33F-0580
- Grewal DS, Dasgupta R, **Sun C**, Tsuno K. (2017) Simultaneous alloy-silicate fractionation of carbon, nitrogen, and sulfur at high pressures and temperatures: Implications for establishing the volatile budget of the Earth. AGU Fall Meeting, abstract# V14B-05
- Sun C**, Liang Y. (2017) The importance of temperature on REE and other trace element partitioning in plagioclase with applications to lunar magma ocean solidification. 48th Lunar and Planetary Science Conference, abstract# 1535
- Sun C**, Dick H, Hellebrand E, and Snow J. (2015) Magma supply at the Arctic Gakkel Ridge: constraints from peridotites and basalts. AGU Fall Meeting, abstract# V11B-3068
- Liang Y, **Sun C**, Yao L, Dygert N, Wang C. (2015) Some remarks on the interpretation of the REE-in-two-mineral thermobarometers. AGU Fall Meeting, abstract# V13A-3093
- Le Roux V, **Sun C**, Nielsen S, Yao L. (2015) Timing of frozen melt fronts preserved in the mantle.

- AGU Fall Meeting, abstract# V11B–3061
- Shimizu K, Liang Y, **Sun C**, Jackson C, Saal A. (2015) Parameterized lattice strain models for REE partitioning between amphibole and silicate melt, AGU Fall Meeting, abstract# V13A–3091
- Sun C**, Liang Y. (2015) HFSE partitioning in pyroxenes and olivine: parameterized models with implications to HFSE fractionation in the upper mantle. Goldschmidt, abstract # 2052
- Liang Y, **Sun C**. (2015) Temperature and thermal history of HED and SNC meteorites as deduced from the REE-in-plagioclase-clinopyroxene thermometer. 46th Lunar and Planetary Science Conference, abstract# 1244
- Sun C**, Liang Y. (2014) Crystallization temperatures of Lunar FANs revealed by a new REE-in-plagioclase-clinopyroxene thermometer. Goldschmidt, abstract # 2412
- Sun C**, Liang Y, Ashwal L, and VanTongeren J. (2013) Temperature variations along stratigraphic height across the Bushveld complex with implications for magma chamber processes in layered intrusions. GSA Annual Meeting in Denver: 125th Anniversary of GSA (27-30 October 2013)
- Sun C**, Yao L, Liang Y. (2013) Thermobarometers based on REE partitioning between mantle minerals. GSA Annual Meeting in Denver, Colorado, USA. Vol. 45, No. 7
- Sun C**, Liang Y. 2013. Distribution of REE between garnet and clinopyroxene: a new thermobarometry for garnet peridotites and eclogites. AGU Fall Meeting, abstract# V51B–2649
- Liang Y, **Sun C**, Ashwal L, VanTongeren J. (2013) Spatial variations in temperature across the Bushveld layered intrusion revealed by REE-in-plagioclase-pyroxene thermometers with implications for magma chamber processes. AGU Fall Meeting, abstract# V54B–07
- Sun C**, Liang Y. (2013) A REE-in-plagioclase-clinopyroxene thermometer for mafic and ultramafic rocks from the Earth, Moon, and other planetary bodies. 44th Lunar and Planetary Science Conference, abstract# 1627
- Sun C**, Liang Y, Hess P. (2013) A parameterized thermodynamic model for ilmenite solubility in silicate melts. 44th Lunar and Planetary Science Conference, abstract# 2295
- Graff M, **Sun C**, Liang Y. (2013) Internally consistent REE partitioning models for anorthite and low-Calcium pyroxene: a reappraisal of subsolidus reequilibration with applications to parent magma compositions of lunar ferroan anorthosites. 44th Lunar and Planetary Science Conference, abstract# 1641
- Sun C**, Liang Y, Yao L. (2012) A REE-in-two-pyroxene thermometer and a REE-in-garnet-cpx thermometer for mafic and ultramafic rocks. AGU Fall Meeting, abstract# V33C–2888

TEACHING EXPERIENCE

Guest Lectures in Advanced Petrology, Rice University	09/2016 & 02/2018 & 10/2019
Supervisor for Lauren Oquinn (REU intern), Rice University	06/2018 – 07/2018
Supervisor for Michael Dean (REU intern), Rice University	06/2017 – 08/2017
Supervisor for Michelle Graff (senior thesis), Brown University	08/2012 – 05/2013
Supervisor for Emma Soucy (co-op intern), WHOI	07/2015 – 12/2015

Teaching Assistant in Mineralogy, Brown University	09/2011 – 12/2011
Instructor of Field Geology, China University of Geosciences (Beijing)	07/2008

FIELD EXPERIENCE

Field work in South Tibet, China for mapping and sampling	08/2006
Field camp in Zhoukoudian, Beijing, China for training field methods	07/2005
Field camp in Beidaihe, Hebei, China for training field methods	07/2004

SKILLS

High-temperature experiments: Multi-Anvil, Piston Cylinder, & Gas-mixing furnace
 Analytical tools: SIMS, Electron Microprobe, LA-ICP-MS
 Computational tools: MATLAB, COMSOL, VBA/VB/Fortran/C
(VBA/Matlab programs for my papers are available at <http://earth-sun.weebly.com/tools.html>)

SERVICES

Conference Convener

“Quantities, Movements, Forms, and Origins of Carbon and Other Volatile Elements in Earth and Planetary Bodies”, AGU Fall Meeting, 2019
 “Advances in geothermobarometry and geospeedometry”, AGU Fall Meeting, 2015
 “Peridotite records of mantle dynamics”, AGU Fall Meeting, 2015
 “Advances in trace element partitioning”, Goldschmidt conference, 2015

Journal/Proposal Reviewer

Geochimica et Cosmochimica Acta; Chemical Geology; Journal of Geophysical Research (Solid Earth); Geochemistry, Geophysics, Geosystems; Geochemical Perspectives Letters; Lithos; American Journal of Science; American Mineralogist; Tectonophysics; Earth-Science Review; Minerals; Nature Communications; Science Advances; Earth and Planetary Science Letters; Geology; German Research Foundation; National Science Foundation (US NSF)

INVITED SEMINARS

Brown University	11/2020
University of Texas at Austin	03/2020
University of Houston	02/2020
University of Missouri	02/2020
Florida State University	01/2020
Princeton University	04/2019
Tulane University	03/2018
University of Missouri at Columbia	02/2018
University of Texas at Austin	11/2016
Texas A&M University	04/2016
Stanford University	03/2016
Dartmouth College	02/2016

Rice University	02/2016
Rensselaer Polytechnic Institute	10/2015
China University of Geosciences (Beijing)	07/2015
University of Chicago	02/2015
University of Chicago	04/2014
Woods Hole Oceanographic Institution	01/2014
Boston University	03/2013