Shuang Zhang

Postdoctoral Fellow, Geophysical Laboratory
Carnegie Institution for Science, Washington, DC 20005, USA
+1 (203) 361-7880 | shuanggang111@gmail.com | www.shuang-zhang.space

EDUCATION

Yale University — New Haven, CT, USA
Ph.D., Department of Geology and Geophysics — Aug 2011 – Jul 2017

Peking University — Beijing, China
B.S. with honor (Rank: 1/41), School of Earth and Space Sciences — Sep 2007 – Jul 2011

RESEARCH POSITIONS

Postdoctoral Fellow — Washington, DC, USA
- [Mentor: Robert Hazen] — Jul 2019 – Present
- Geophysical Laboratory, Carnegie Institution for Science

Postdoctoral Associate — New Haven, CT, USA
- [Mentor: Noah Planavsky] — Jul 2017 – Jul 2019
- Department of Geology and Geophysics, Yale University

Graduate Student Researcher — New Haven, CT, USA
- [Mentor: Noah Planavsky and Pincelli Hull] — Jul 2017 – Jul 2019
- Department of Geology and Geophysics, Yale University

Undergraduate Researcher — Beijing, China
- [Advisor: Chunjing Wei] — 2009 – 2011
- School of Earth and Space Sciences, Peking University

SCIENTIFIC PUBLICATIONS

Published or In Press

13. Zhao, M., **Zhang, S.**, Tarhan, L., Reinhard, C., Planavsky, N. The role of calcium in regulating marine phosphorus burial and atmospheric oxygenation. Accepted. *Nature Communications*.

12. Isson, T., Planavsky, N., Coogan, L., Stewart, E., Ague, J., Bolton, E., **Zhang, S.**, McKenzie, R., Kump, L. 2020. Evolution of the global carbon cycle and climate regulation on Earth. *Global Biogeochemical Cycles*. DOI: 10.1029/2018GB006061.

11. **Zhang, S.** and Planavsky, N. 2019. Revisiting groundwater fluxes to the ocean with implications for the carbon cycle. *Geology*. DOI: 10.1130/G46408.1.

10. Henehan, S., Ridgwell, A., Thomas, E., **Zhang, S.**, Alegret, L., Schmidt, D., Rae, J., Witts, J., Landman, N., Greene, S., Huber, B., Super, J., Planavsky, N., Hull, P. 2019. Rapid ocean acidification and protracted Earth system recovery followed the end-Cretaceous Chicxulub impact. *PNAS*. DOI: 10.1073/pnas.1905989116.

9. Li, Y., McCoy-West, A., **Zhang, S.**, Selby, D., Burton, K., Horan, K. 2019. Controlling mechanisms for molybdenum isotope fractionation in porphyry deposits: The Qulong example. *Economic Geology*. DOI: 10.5382/econgeo.4653.

8. **Zhang, S.** and Planavsky, N. 2019. The silicate weathering feedback in the context of ophiolite emplacement: Insights from an inverse model of global weathering proxies. *American Journal of Science*. DOI: 10.2475/02.2019.01.

7. Li, Y., **Zhang, S.**, Hobbs, R., Caiado, C., Sproson, A., Selby, D., Rooney, A. 2019. Monte Carlo sampling for error propagation in linear regression and applications in isochron geochronology. *Science Bulletin*. DOI: 10.1016/j.scib.2018.12.019.

6. Krause, J., Mills, B., **Zhang, S.**, Planavsky, N., Lenton, T., Poulton, S. 2018. Stepwise oxygenation of the Paleozoic atmosphere. *Nature Communications*. DOI: 10.1038/s41467-018-06383-y.

5. **Zhang, S.**, Planavsky, N., Krause, J., Mills, B., Bolton, E. 2018. Model based Paleozoic atmospheric oxygen estimates: a revisit to GEOCARBSULF. *American Journal of Science*. DOI: 10.2475/05.2018.05.

4. **Zhang, S.**, Ague, J., Vitale Brovarone, A. 2018. Degassing of organic carbon during regional metamorphism of pelites, Wepawaug Schist, Connecticut, USA. *Chemical Geology*. DOI: 10.1016/j.chemgeo.2018.05.003.

3. Cole, D., **Zhang, S.**, Planavsky, N. 2017. A new estimate of detrital redox-sensitive metal concentrations and variability in marine sediments. *Geochimica et Cosmochimica Acta*. DOI: 10.1016/j.gca.2017.08.004.

2. **Zhang, S.**, Henehan, M., Hull, P., Reid, R., Hardisty, D., Hood, A., Planavsky, N. 2017. Investigating controls on boron isotope ratios in shallow marine carbonates. *Earth and Planetary Science Letters*. DOI:10.1016/j.epsl.2016.10.059.

1. Planavsky, N., Cole, D., Reinhard, C., Diamond, C., Love, G., Luo, G., **Zhang, S.**, Konhauser, K., Lyons, T. 2016. No evidence for high atmospheric oxygen levels 1,400 million years ago. *PNAS*. DOI:10.1073/pnas.1601925113.

THESES AND REPORTS

3. **Zhang, S.** 2017. Case studies on tracking and modeling the global carbon cycle (Doctoral dissertation, Yale University).

2. Wang, Z., Qiu, L., **Zhang, S.**, et al. 2014. Integrated experimental and modeling studies of mineral carbonation as a mechanism for permanent carbon sequestration in mafic/ultramafic rocks (DOE Technical Report).

1. **Zhang, S.** 2011. Petrologic characteristics and genesis of granitic veins in TTG gneiss from Hengshan Complex in Shanxi Province, China (Bachelor thesis, Peking University).

SELECTED CONFERENCE PRESENTATIONS

6. **Zhang, S.**, Morrison, S., Prabhu, A., Ma, C., Huang, F., Gregory, D., Large, R., Hazen, R. Understanding modes of pyrite formation using natural clustering. Deep Carbon Observatory, Washington, DC, USA. Oct 2019.

5. **Zhang, S.**, Planavsky, N. Ground-truthing silicate chemical weathering using machine learning. Goldschmidt Conference, Barcelona, Spain. Aug 2019.

4. **Zhang, S.**, Planavsky, N. Predicting silicate weathering rates across the continental United States. AGU Fall Conference, Washington, DC, USA. Dec 2018.

3. **Zhang, S.**, Planavsky, N. Prediction of atmospheric oxygen level during the Paleozoic using GEOCARBSULF, Northeastern Geobiology Symposium, University of Connecticut, Storrs, CT, USA. May 2017.

2. **Zhang, S.**, Henehan, M., Hull, P., Reid, R., Hardisty, D., Hood, A., Planavsky, N. Do boron isotopes in shallow marine carbonate record marine pH? Goldschmidt Conference, Yokohama, Japan. Jun 2016.

1. **Zhang, S.**, Wang, Z., Qiu, L., Karato, S., Johnson, K. T., Ague, J., Oristaglio, M. L., Bolton, E. W., Bercovici, D. Experimental study of the reaction kinetics between CO_2-bearing solution and picrite cubes. AGU Fall Conference, San Francisco, CA, USA. Dec 2013.

GEOLOGICAL APPLICATION DEVELOPMENT

Created and maintained the Isochron shiny app, which integrates the Monte Carlo analysis and greatly simplifies the workflow of geological dating using various radiogenic isotope systems.

AWARDS AND HONORS

- Hutchison Fund Travel Award **$2,000**
  One of the 15 awardees for attending the 2020 IGC meeting IUGS, 2019
- Karl Turekian Prize **$1,000**

Outstanding Ph.D. student in geochemistry — Yale University, 2017
- Conference Travel Fellowship — **$815**
  One of the 25 awardees for attending scientific conferences — Yale University, 2016
- Research Funding from Yale Institute of Biospheric Studies — Yale University, 2014
- Yale University Fellowship — Yale University, 2011
- Outstanding Undergraduate of Peking University — Peking University, 2011
- Starlight International Scholarship — Peking University, 2010
- 3rd Prize in Beijing Regional Physics Contest — Peking University, 2009
- Starlight International Scholarship — Peking University, 2008
- Tung OOCL Scholarship — Peking University, 2008
- Canon Special Scholarship — Peking University, 2007

PROFESSIONAL ACTIVITIES AND OUTREACH

Journal Referee

Nature Geoscience / Nature Communications / Paleoceanography / Global Biogeochemical Cycles / Palaeogeography, Palaeoclimatology, Palaeoecology / Sedimentary Geology

Professional Development

- Participant in computational workshops hosted by Yale Center for Research Computing, including version control with Git, scripting with Python, writing efficient R code, data analysis with Python, practical HPC, geo-computation and environmental analysis, scalable machine learning in the AWS cloud, etc. — New Haven, CT, USA 2012 – 2017
- Participant in deep-time data science workshop hosted by University of Idaho featuring lighting talks and machine learning training — Moscow, ID, USA May 2019
- Full-stack web developer for United Nations Global Compact: independently designed and created a fully responsive website — New Haven, CT, USA Nov 2014 – Feb 2015

Professional Affiliations

- American Geophysical Union (AGU) — 2012 – Present
- Geochemical Society — 2015 – Present

Field Trips

- Organizer of the Rhode Island field trip — Sep 2012
- Participant in the field trip in southern and western Connecticut — Oct 2011

Public Service

- Session convener and chair for 2019 AGU: (EP23D) Application of data and machine learning in Earth science, San Francisco, CA, USA, 2019

- Deputy leader of Young Volunteers Association in School of Earth and Space Sciences, Peking University, Beijing, 2008 – 2010
- Volunteer of teaching science at Ming Yuan elementary school, Beijing, 2008 – 2010
- Volunteer of teaching English to middle school students, Weifang, Shandong, 2008 – 2009

TEACHING EXPERIENCE

- Introduction to GRASS GIS: Teaching assistant (Yale University) — Fall, 2018
- G & G 625 Oceanography: Guest lecturer — Fall, 2018
- G & G 614 Biogeochemical Cycles Through Time: Guest lecturer — Fall, 2018
- G & G 775 Lithosphere and Surface Processes: Guest lecturer — Spring, 2018
- G & G 275 Renewable Energy: Office hours, grading weekly problem sets and exams for 35 students — Fall, 2016
- G & G 275 Renewable Energy: Office hours, grading weekly problem sets and exams for 35 students — Spring, 2016
- ENAS 747 Applied Numerical Methods I: Office hours and debugging weekly programs for 20 students — Fall, 2014
- G & G 274 Fossil Fuels & Energy Transitions: Office hours, grading problem sets and final essays for 75 students — Fall, 2013
- G & G 100 Natural Disasters: Grading weekly problem sets for 20 students — Fall, 2011

MENTORING EXPERIENCE

- Mentoring one undergraduate from Washington College on unsupervised machine learning — 2019 – present
- Mentoring one graduate student at Yale on numerical modeling of the global carbon cycle — 2018 – present
- Mentored one graduate student at Yale on boron isotope measurements using MC-ICP-MS — 2018 – 2019
- Mentored three graduate students at Yale on computer languages such as Python, R, and MATLAB — 2015 – 2019
- Mentored two undergraduate students at Yale for lab work — 2013 – 2015
- Supervised one undergraduate at Yale on his undergraduate thesis about carbon sequestration — 2013