Stephanie M. Brown

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Earth, Atmospheric, and Planetary Science
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Education: ***Massachusetts Institute of Technology***

Ph.D., Earth, Atmospheric, and Planetary Science, **2012 - 2019**
Dissertation: Quantifying melting and chemical differentiation processes on Earth and the Moon
Principal Advisor: Timothy L. Grove, Committee: Mark D. Behn, Oliver Jagoutz, David McGee

S.M. Earth, Atmospheric, and Planetary Science, **2011**
Principal Advisor: Linda T. Elkins-Tanton, Committee: Sang-Heon Shim, Benjamin P. Weiss

S.B. Earth, Atmospheric, and Planetary Science, **2010**

S.B. Engineering as Recommended by the Department of Mechanical Engineering, **2010**

Honors & Awards

The Award for Excellence in Teaching, Massachusetts Institute of Technology, 2016

The Award for Excellence in Teaching, Massachusetts Institute of Technology, 2014

The Massachusetts Institute of Technology Presidential Fellowship, 2012-2013

The W. O. Crosby Award for Sustained Excellence, Massachusetts Institute of Technology, 2010

Paul E. Gray (1954) Endowed Fund for research, Massachusetts Institute of Technology, 2008

39th LPSC Stephen E. Dwornick Planetary Geoscience Award, Honorable Mention poster, 2008

Other Research Experience: ***MIT Dept of Earth, Atmospheric, and Planetary Science***

Science Crew for R/V Armstrong Voyage #AR23-02, Mark D. Behn, October 2017

Field Experience: Cascades 2012, 2014, 2017

Research Associate, Linda T. Elkins-Tanton, June 2011 – September 2012

Field Geology Assistant, Oliver Jagoutz, Indian Himalayas (Ladakh), August 2011

Field Experience: MIT field camp in southern Nevada, January 2010

Research Assistant, Linda T. Elkins-Tanton, August 2007 – June 2010

Research Assistant, Wesley A. Watters, January 2007 – May 2007

Teaching Experience: ***MIT Teaching Assistant***

Petrology 12.109, Timothy L. Grove, Spring 2016

Structure of Earth Materials (Minerology) 12.108, Timothy L. Grove, Spring 2014

Discovering Earth, Atmospheric, and Planetary Science, Yellowstone National Park, August 2008, 2009, 2010, 2016, 2017, 2018 Samuel Bowring and Timothy L. Grove

Structure of Earth Materials 12.108, Spring 2009, Sang-Heon Shim

Introduction to Geology 12.001, Spring 2008, Linda T. Elkins-Tanton

Publications in preparation

·**Brown, S.**, M.D. Behn, and T.L. Grove, U-series disequilibria in MORBs generated by shallow spinel and plagioclase-field mantle melting

·**Brown, S.**, M.D. Behn, and T.L. Grove, The Myth of Garnet-Signatures and the Origin of Plagioclase-Signatures in Mid-Ocean Ridge Basalts: a Major Element, Trace Element, Isotopic, and Geophysical Approach

·**Brown, S.**, M.D. Behn, and T.L. Grove, Measuring consistency in petrologic models: the effect of mantle source composition, mantle potential temperature, and plagioclase field melting on basalt variability at the slow and ultraslow 9-25°CE Southwest Indian Ridge

·**Brown, S**., and T.L. Grove, Remelting the lunar magma ocean

·Shinevar, W.D. and R/V Armstrong #AR23-02 science crew (including **S. Brown**), Causes of oceanic crustal thickness oscillations along a 100-Myr Mid-Atlantic Ridge flow line (submitted)

Publications

5. Grove, T.L., and **Brown, S**., Magmatic processes leading to compositional diversity in igneous rocks: Bowen (1928) revisited, American Journal of Science, 318, 000-000, 2018.

4. **Brown, S**., and T.L. Grove, Origin of the Apollo 14, 15, and 17 yellow ultramafic glasses by mixing of deep cumulate remelts, Geochimica et Cosmochimica Acta, 171, 201-215, 2015.

3. **Brown, S.**, L.T. Elkins-Tanton, and R.J. Walker, Effects of magma ocean crystallization and overturn on the development of ^{142}Nd and ^{182}W isotopic heterogeneities in the primordial mantle, Earth and Planetary Science Letters, 408, 319-330, 2014.

2. Black, B.A., E.H. Hauri, L.T. Elkins-Tanton, and **S.M. Brown**, Sulfur isotopic evidence for sources of volatiles in Siberian Traps magmas, Earth and Planetary Science Letters, 394, 58-69, 2014.

1. **Brown, S.** and L.T. Elkins-Tanton, Composition of Mercury's oldest crust from magma ocean models, Earth and Planetary Science Letters, 286, 446-455, 2009.

Invited Talks

· Brown University, Planetary Lunch Seminar (May 2019)

· Woods Hole Oceanographic Institute, Geophysics and Geochemistry Seminar (January 2019)

· AGU (December 2018)

· Goldschmidt Keynote (August 2018)

· Harvard University, Geophysical Sciences Department Seminar (May 2018)

· University of Chicago, Geophysical Sciences Department Seminar (April 2018)

Selected Conference Presentations

Talks

·Brodksy, H.F., S.M. Brown and T.L. Grove, Origin of the High-Titanium Lunar Glasses: Constraints from Cumulate Remelting Experiments, 50th LPSC, 2019.

·Guenther, M.E., S.M. Brown and T.L. Grove, Origin of the Apollo 14 Black Glasses: New Experimental Constraints on the Influence of Variable Oxygen Fugacity on the Depth of Multiple Saturation and Implications for Late-Stage Magma Ocean Cumulate Overturn, 50th LPSC, 2019.

·Brown, S.M., Olive, J.A., Behn, M.D., and T.L. Grove, Chaos at ultraslow and slow spreading ridges: effects of asymmetric thermal structures on basalt compositions, AGU, 2018.

·Brown, S.M., M.D. Behn, T.L. Grove, Addressing an old question with a new model: What are the sources of garnet signatures in MORB?, Goldschmidt, 2018.

·Brown, S.M., M.D. Behn, T.L. Grove, Major and trace element modeling of mid-ocean ridge mantle melting from the garnet to the plagioclase stability fields: generating local and global major and trace element compositional variability, AGU, 2017.

·Brown, S.M. and T.L. Grove, Mixing of Melts of Compositionally Distinct Source Regions Can Explain the Within- and Between-Suite Compositionally Variability of the Lunar Ultramafic Glasses: Experiments and Models, 48th LPSC, 2017.

·Brown, S.M. and T.L. Grove, Olivine-Melt Equilibria in Lunar Ultramafic Magmas: Insights into Melt Thermodynamic Properties, 46th LPSC, 2015.

·Brown, S.M. and T.L. Grove, Influence of variable fO_2 and TiO_2 on the high pressure phase equilibria of lunar ultramafic glasses, Goldschmidt, Sacramento, CA, 2014.

·Brown, S.M. and T.L. Grove, The origin of the Apollo 14, 15 and 17 yellow glasses, 44th LPSC, 2013.

·Brown, S.M. and L.T. Elkins-Tanton, The early dynamics and density structure of Mercury's mantle, 43th LPSC, 2012.

·Brown, S. and L.T. Elkins-Tanton, Thermal and solar weathering of Mercury's crust, EPSC-DPS Joint Meeting 2011.

·S. Brown and L.T. Elkins-Tanton, Hypotheses for compositions of Mercury's ancient crust and implications for surface spectra, The Surface Composition of Mercury from Ultraviolet-Visible-Infrared Spectroscopy: State of the Art and Future Strategies Conference, 2009.

·L.T. Elkins-Tanton and S. Brown, A mechanism for spreading non-silicate iron- titanium oxides on the Mercurian surface (Presented by S. Brown), The Surface Composition of Mercury from Ultraviolet-Visible-Infrared Spectroscopy: State of the Art and Future Strategies Conference, 2009.

·Brown S. and L.T. Elkins-Tanton, Earliest planetary crusts: Constraints on the formation of Mercury and implications for bodies of different sizes, 40th LPSC, 2009.

Posters

·Brown, S.M., M.D. Behn, T.L. Grove, Modeling Major and Trace Element Magma Compositions at Slow and Ultra-Slow Spreading Mid-Ocean Ridges: Implications for Melting in the Garnet Field, AGU, 2016.

·Brown, S.M., L.T. Elkins-Tanton, R.J. Walker, Non-Chondritic ^{142}Nd and Archean ^{142}Nd and ^{182}W variability reconciled by magma ocean crystallization and overturn, Goldschmidt, Sacramento, CA, 2014.

·Brown, S. and L.T. Elkins-Tanton, Influence of variable fO_2 and TiO_2 on the high pressure phase equilibria of lunar ultramafic glasses, 45th LPSC, 2014.

·Brown, S., L.T. Elkins-Tanton, RJ. Walker, Linking early Earth magma ocean crystallization and overturn with observed large low shear velocity provinces (LLSVPs) and short lived radioisotopic measurements in Archean rocks, AGU, 2013.

·Brown, S. and L.T. Elkins-Tanton, An experimental approach to thermal and solar weathering of Mercury's surface, 42nd LPSC, 2011.

·Brown, S. and L.T. Elkins-Tanton, An experimental approach to thermal and solar weathering of Mercury's surface, AGU, 2010.

·Brown, S. and L.T. Elkins-Tanton, Ranges of likely earliest crustal compositions on rocky planets, DPS, Cornell University,2008.

·Brown, S. and L.T. Elkins-Tanton, Predicting Mercury's ancient crustal composition, 39th LPSC, 2008.

·Brown, S. and L.T. Elkins-Tanton. Mercury's core fraction and ancient crustal composition: Predictions from planetary formation under extremely reducing conditions, AGU, 2007.

Professional Activities

Student Seminar Chair, MIT Dept of Earth, Atmospheric, and Planetary Science, 2014 - 2018

Member, Geochemical Society, 2014 - present

Member, Pi Tau Sigma (Mechanical Engineering honor society), 2010 - present

Member, American Astronomical Society & Division of Planetary Science, 2008 - present

Member, American Geophysical Union, 2007 - present

Last updated: September 2019