

Matthew L. Whitaker

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CURRENT POSITIONS:

Ph.D. Candidate & Research Assistant with Dr. Baosheng Li
COMPRES Student/post-doc Executive Delegation (Founding Member, Former Chair)

EDUCATION:

Ph.D. Study in Geosciences – Stony Brook University: 2002 – Present
Concentration in Mineral Physics, Geochemistry, and Planetary Science Degree Anticipated Summer 2009
B.S. in Geological Sciences, Minor in Chemistry – State University of New York at New Paltz: 1997 - 2002

EMPLOYMENT HISTORY:

Research Assistant in Mineral Physics Institute, Stony Brook University w/ Dr. Baosheng Li March 2007 – Present
Teaching Assistant in Geosciences, Stony Brook University Fall 2002, Spring 2003, Spring 2005, Fall 2005
Graduate Student in Department of Geosciences, Stony Brook University July 2002 – Present
Teaching Assistant in Geology, State University of New York at New Paltz Spring 2001, Fall 2001, Spring 2002

RESEARCH INTERESTS:

Mineral Physics

- ❖ Determination of physical properties of mineral phases at high pressure and temperature
- ❖ Investigation of iron/light-element alloys, mantle minerals, and analog materials under extreme conditions
- ❖ Combined Ultrasonic Interferometry and Synchrotron X-Radiation Techniques in Multi-Anvil Apparatus
- ❖ High pressure studies using Diamond Anvil Cells and Synchrotron X-Radiation

Planetary Science

- ❖ Investigation of candidate constituents of terrestrial planetary cores
- ❖ Using terrestrial magmatism as a potential analog for volcanic diversity on Mars
- ❖ Experimental and analytical geochemical studies of martian meteorites (specifically Yamato 980459)

Experimental Geochemistry/Petrology

- ❖ Phase equilibria in basaltic melts as a function of pressure, temperature, and water content
- ❖ Residual liquid evolution during liquid differentiation; from basalt to rhyolite
- ❖ Finding possible relationships between rock types found in common intraplate suites

TECHNICAL EXPERIENCE AND SKILLS:

- ❖ Synchrotron X-Ray Techniques
- ❖ Ultrasonic Interferometry
- ❖ High Pressure Experimental Techniques (Piston-Cylinder & Multi-Anvil Apparatus, Diamond Anvil Cell)
- ❖ Various Low-Pressure Furnace Designs for Experiments and Sample Synthesis
- ❖ X-Ray Powder Diffraction
- ❖ Electron Microprobe and Scanning Electron Microscopy
- ❖ Petrographic Microscopy
- ❖ Extensive sample synthesis and preparation experience with several techniques
- ❖ Extensive experience designing and machining experimental materials, parts, and cell assemblies
- ❖ Some minimal Nuclear Magnetic Resonance Spectroscopy experience
- ❖ Proficient in coding HTML and some minor Javascript for web content

TEACHING EXPERIENCE:

Undergraduate Research Mentor:

w/ Dr. Donald H. Lindsley & Dr. Hanna Nekvasil

- ❖ Jan Kubicek-Whitaker, Stony Brook University (Department Research & Mineral Physics Institute Summer Scholar) June 2004 – May 2005
 - ❖ Nicholas DiFrancesco, Stony Brook University (MPISS & Department Research) July 2002 – May 2004
 - ❖ Bryan Boccicchio, Stony Brook University (Department Research) Summer 2003
 - ❖ Jenny Gast, Idaho State University (Mineral Physics Institute Summer Scholar) Summer 2002
- w/ Dr. Brian Phillips*
- ❖ Gretchen Miles, Alfred University (Center for Environmental Molecular Science Summer Scholar) Summer 2003
 - ❖ Harris Mason, Marietta College (MPISS) Summer 2003

Stony Brook University Graduate Teaching Assistant:

- ❖ GEO 407/507 – Mineralogy-Petrology II w/ Dr. Hanna Nekvasil Fall 2005
- ❖ GEO 102 – Physical Geology w/ Dr. Hanna Nekvasil Spring 2005
- ❖ GEO 306 – Mineralogy-Petrology I w/ Dr. Brian Phillips Spring 2003
- ❖ GEO 111 – Environmental Geology Laboratory w/ Dr. Gilbert Hanson Fall 2002

State University of New York at New Paltz Undergraduate Teaching Assistant:

- ❖ GEO 50100 – Planet Earth w/ Dr. Constantine Manos Spring 2001 – Spring 2002
- ❖ GEO 50220 – Physical Geology w/ Dr. Constantine Manos Fall 2001
- ❖ GEO 50311 – Mineralogy and Crystallography w/ Dr. Martin Rutstein Fall 2001

PROFESSIONAL & DEPARTMENTAL SERVICE:

- COMPRES Student/post-doc Executive Delegation (Founding Member) June 2008 – June 2010
- COMPRESSED Chairperson June 2008 – June 2009
- COMPRES Discussion Forum Developer/Administrator October 2008 – Present
- High Pressure Working Group, NSLS-II May 2008 – Present
- Stony Brook Department of Geosciences Graduate Student Representative April 2008 – July 2009
- Mineral Physics Institute Co-Webmaster (<http://www.mpi.stonybrook.edu>) March 2008 – July 2009
- Ultrasonics Group Webmaster (<http://www.mpi.stonybrook.edu/ultrasonics>) 2007 – July 2009
- Laboratory Manager – High Pressure Laboratory and Ultrasonics Laboratory September 2007 – March 2009
- Stony Brook Geosciences Department Grad Circus Coordinator 2008 – 2009
- Stony Brook University Teaching Assistant Orientation; GEO Department Representative August 2008
- Reviewer: Journal of Petrology 2007
- Stony Brook Geosciences Department Server Administrator 2003 – 2006
- Stony Brook Geosciences Department Grad Circus Coordinator 2003 – 2004
- Stony Brook Undergraduate GEO Club Graduate Student Advisor 2002 – 2004

AWARDS, SCHOLARSHIPS, GRANTS, AND FELLOWSHIPS:

- COMPRES Student Travel Scholarship (\$500) June 2009
- American Geophysical Union Best Student Paper Award ([link](#)) Fall Meeting, December 2008
- GAANN Fellowship, U.S. Department of Education 2008 – 2009
- Gordon Conference Chair's Fund, Meeting Defrayment (\$440) July 2008
- COMPRES Student Travel Scholarship (\$500) June 2008
- GAANN Fellowship, U.S. Department of Education 2006 – 2007
- Outstanding Teaching Assistant, Department of Geosciences, Stony Brook University May 2005
- GAANN Fellowship, U.S. Department of Education Fall 2003
- Excellence in Teaching, Department of Geosciences, Stony Brook University May 2003
- GAANN Fellowship, U.S. Department of Education Spring 2003
- Adopt-A-Scholar Program Scholarship, SUNY New Paltz Fall 1997 – Spring 2001

PROFESSIONAL AFFILIATIONS:

- ❖ American Geophysical Union
- ❖ Geochemical Society
- ❖ Mineralogical Society of America

NATIONAL LABORATORY FACILITIES EXPERIENCE:

User – Advanced Photon Source (APS) at Argonne National Laboratory (ANL)

GSECARS Beamline 13-ID-D: X-Ray Diffraction, X-Radiographic Imaging, and Ultrasonic Interferometry at High Pressure and Temperature in Large Volume Multi-Anvil Apparatus October 2007 – Present

User – National Synchrotron Light Source (NSLS) at Brookhaven National Laboratory (BNL)

Beamline X17C: X-Ray Diffraction using Diamond Anvil Cells March 2008 – Present

Beamline X17B2: X-Ray Diffraction, X-Radiographic Imaging, and Ultrasonic Interferometry at High Pressure and Temperature in Large Volume Multi-Anvil Apparatus April 2007 – Present

Beamline X26A: Hard X-Ray Microprobe and Fe-XANES September 2002 – August 2003

WORKSHOPS ATTENDED:

2nd Vlab Tutorial on Computational Mineral Physics – UC Santa Barbara July 2008

Future Directions of High-Pressure Research @ NSLS User Meeting (*Speaker*) May 2008

International Workshop on Synchrotron High-Pressure Mineral Physics and Materials Science (*Presenter*) (APS, ANL) December 2007

EXAFS Data Collection and Analysis Workshop (NSLS, BNL) July 2003

INVITED TALKS, COLLOQUIA & PUBLIC LECTURES:

- ❖ COMPRES 2009 Annual Meeting – Student Highlight Talk June 20, 2009
- ❖ Global Center of Excellence, Geodynamics Research Center, Ehime University April 27, 2009
- ❖ State University of New York at New Paltz Geological Sciences Department Lecture Spring 2009
- ❖ National Synchrotron Light Source Seminar Series ([link](#)) August 8, 2008

REFERREED PUBLICATIONS:

Whitaker, M.L., Liu, W., Liu, Q., Wang, L., Li, B. (2009) Thermoelasticity of ϵ -FeSi to 8 GPa and 1273 K. *American Mineralogist*, 94(7) 1039-1044. [PDF](#)

Whitaker, M.L., Liu, W., Liu, Q., Wang, L., Li, B. (2008) Combined *in situ* synchrotron X-ray diffraction and ultrasonic interferometry study of ϵ -FeSi at high pressure and temperature. *High Pressure Research*, 28(3), 385-395. [PDF](#)

Liu, Q., Liu, W., **Whitaker, M.L.**, Wang, L., Li, B. (2008) Compressional and shear wave velocities of Fe₂SiO₄ spinel at high pressure and high temperature. *High Pressure Research*, 28(3), 405-413. [PDF](#)

Whitaker, M.L., Nekvasil, H., Lindsley, D.H., and McCurry, M. (2008) Can crystallization of olivine tholeiite give rise to potassic rhyolites? an experimental investigation. *Bulletin of Volcanology*, 70(3), 417-434. [PDF](#)

Whitaker, M.L., Lindsley, D.H., Kubicek-Whitaker, J.M. and Nekvasil, H. (2007) Carbon is not required during crystallization to produce ferrobasalts/ferrodiorites (FTP rocks). *American Mineralogist*, 92(10), 1750-1755. [PDF](#)

Whitaker, M.L., Nekvasil, H., Lindsley, D.H., and DiFrancesco, N.J. (2007) The role of pressure in producing compositional diversity in intraplate basaltic magmas. *Journal of Petrology*, 48(2), 365-393. [PDF](#)

MANUSCRIPTS IN PREPARATION:

Whitaker, M.L., Liu, W., Liu, Q., Li, B. (in preparation) Thermal equation of state of ϵ -FeSi and implications for Earth's core.

Liu, Q., Liu, W., **Whitaker M.L.**, Wang, L., Li, B. (submitted), In situ observation of fayalite-spinel phase transformation at 1173K. *American Mineralogist*.

Whitaker, M.L., McCubbin, F.M., Lindsley, D.H., Filiberto, J., Hanson, G.N., Draper, D.S., Glotch, T.D., McLennan, S.M., and Nekvasil, H. (**in preparation**) Yamato 980459: Is it really representative of a Martian mantle melt?

Filiberto, J., **Whitaker, M.L.**, Nekvasil, H., Lindsley, D.H. (**in preparation**) An Experimental Study of the Tholeiitic to Silica-Undersaturated Transition.

Whitaker, M.L., Nekvasil, H., Lindsley, D.H. and Bochiccio, B. (**in preparation**) The role of water in generating compositional diversity in intraplate basaltic magmas.

EXTENDED ABSTRACTS:

Whitaker, M.L., Liu, W., Liu, Q., Wang, L., Li, B. (2007) Combined *in situ* synchrotron X-ray diffraction and ultrasonic interferometry study of ϵ -FeSi at high pressure and temperature. International Workshop on Synchrotron High-Pressure Mineral Physics and Materials Science. (Abstract & Poster) [PDF](#)

Whitaker, M.L., Nekvasil, H., and Lindsley, D.H. (2005) Potential magmatic diversity on Mars. Lunar and Planetary Science Conference, XXXVI, Abstract #1440. (Abstract & Talk) [Link to PDF](#)

McCubbin, F.M., **Whitaker, M.L.**, Lindsley, D.H., and Nekvasil, H. (2005) Kaersutite (Ti-rich amphibole) in the SNC Meteorites: Can it crystallize at low pressure? Lunar and Planetary Science Conference, XXXVI, Abstract #1967. (Abstract & Poster) [Link to PDF](#)

Nekvasil, H., Filiberto, J., **Whitaker, M.L.**, and Lindsley, D.H. (2003) Magmas Parental to the Chassigny Meteorite: New Considerations. Sixth International Conference on Mars, Abstract #3041, Lunar and Planetary Institute, Houston (CD-ROM). (Abstract & Poster) [Link to PDF](#)

ABSTRACTS:

Whitaker, M.L., Liu, Q., Liu, W., Wang, L., and Li, B. (2009) A Journey Toward the Center of the Earth: Iron/Light-Element Alloys at Extreme Conditions and Their Implications for the Earth's Core. COMPRES 2009 Annual Meeting. (Abstract, Poster, and Invited Talk)

Whitaker, M.L., Liu, W., Liu, Q., Wang, L., Li, B. (2008) Acoustic velocities and thermoelastic properties of FeSi at high P and T, AGU Fall Meeting 2008. (Abstract & Poster) [*AGU SEDI Section Best Student Paper Award*](#)

Li, B., Liu, W., Liu, Q., **Whitaker, M.L.** (2008) Elasticity and Density Measurements on Melts and Amorphous Materials at High Pressure, AGU Fall Meeting 2008. (Abstract & Invited Talk)

Liu, Q., Liu, W., **Whitaker, M.L.**, Wang, L., Li, B. (2008) In-situ elasticity measurements on fayalite to 8.7 GPa and 1073 K, AGU Fall Meeting 2008. (Abstract & Poster)

Whitaker, M.L., Liu, Q., Liu, W., Wang, L., and Li, B. (2008) Compressional and Shear Wave Velocities in ϵ -FeSi to 12 GPa. The 2008 Gordon Research Conference on Research at High Pressure. (Abstract & Poster)

Liu, Q., Liu, W., **Whitaker, M.L.**, Wang, L., and Li, B. (2008) *In situ* Ultrasonic observations of elasticity changes across the phase transformation in Fe₂SiO₄ at 1173 K. COMPRES 2008 Annual Meeting. (Abstract & Poster)

Whitaker, M.L., Liu, Q., Liu, W., Wang, L., and Li, B. (2008) Compressional and Shear Wave Velocities in ϵ -FeSi to 12 GPa. COMPRES 2008 Annual Meeting. (Abstract & Poster)

Whitaker, M.L., Liu, Q., Liu, W., Wang, L., and Li, B. (2008) High Pressure Synchrotron and Ultrasonic Interferometry Study of ϵ -FeSi. Future Directions In High Pressure Research Workshop, NSLS/CFN 2008 User Meeting. (Abstract & Talk)

- Liu, Q., Isaak, D., Liu, W., **Whitaker, M.L.**, Wang, L., Zhao, Y., Li, B. (2008) Thermoelasticity of tantalum: An integrated acoustic and diffraction study at high pressure and high temperature. Stewardship Science Academic Alliances 2008 Program Symposium (Poster Only)
- Li, B., Liu, W., Liu, Q., **Whitaker, M.L.**, Zhang, J., Zhao, Y., Isaak, D. (2008) Thermoelasticity of SSP Materials: An Integrated Acoustic and Diffraction Study at High P and High T. Stewardship Science Academic Alliances 2008 Program Symposium (Abstract & Talk)
- Liu, W., **Whitaker, M.L.**,* Wang, L., Li, B. (2007), Sound velocities of iron sulfide at high pressure and high temperature, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract MR31B-0374 (*Added late to Abstract, presented Poster at meeting)
- Whitaker, J.M., **Whitaker, M.L.**, Lindsley, D.H., and Nekvasil, H. (2005) Testing the dependence of liquid evolution paths on the presence of carbon during fractional crystallization. Stony Brook University URECA Program Conference. (Abstract & Poster)
- Whitaker, M.L.**, Nekvasil, H., and Lindsley, D.H. (2004) Can fractionation of an olivine tholeiite give rise to potassic rhyolites? GSA Abstracts w/ Program, 36(4), 25. (Abstract & Talk)
- DiFrancesco, N.J., **Whitaker, M.L.**, Nekvasil, H., and Lindsley, D.H. (2003) A road to rhyolite: Fractional crystallization experiments on a continental olivine tholeiite. GSA Abstracts w/ Program, 35(6), 631. (Abstract & Poster)
- Nekvasil, H., Lindsley, D.H., **Whitaker, M.L.**, Filiberto, J., DiFrancesco, N.J., Rossier, L., and Horn, J. (2003) Tholeiites, anorthosites, potassic granites, sodic trachytes, and tephriphonolites: Is there a link? GSA Abstracts w/ Program, 35(6), 395. (Abstract & Talk)
- Whitaker, M.L.**, DiFrancesco, N.J., Lindsley, D.H., and Nekvasil, H. (2003) Can fractionation of an olivine tholeiite give rise to ferrodiorites, ferrobasalts, and anorthosites? GSA Abstracts w/ Program, 35(6), 631. (Abstract & Poster)