

Andrew J. Campbell

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Education

Ph.D., Geophysics, University of Chicago, 1993

B.S., Geophysics, California Institute of Technology, 1988

Professional Positions

- 2017-present Professor, Department of the Geophysical Sciences, University of Chicago
- 2010-2017 Associate Professor, Department of the Geophysical Sciences, University of Chicago
- 2005-2010 Assistant Professor, Department of Geology, University of Maryland
- 1998-2005 Senior Research Associate / Research Scientist / Research Associate, Department of the Geophysical Sciences, University of Chicago
- 1995-1997 Senior Development Engineer, GE Superabrasives, General Electric Company
- 1993-1995 Postdoctoral Research Fellow, Geophysical Laboratory, Carnegie Institution of Washington
- 1988-1993 Research Assistant / Teaching Assistant, Department of the Geophysical Sciences, University of Chicago

Awards and Honors

Faculty Award for Excellence in Graduate Teaching and Mentoring, 2014-2015.

Fellow of the Mineralogical Society of America, elected 2013.

CAREER Award, National Science Foundation, 2009-2014.

Distinguished Assistant Professor Award, College of Computer, Mathematical, and Physical Sciences, University of Maryland, 2008.

Carnegie Fellowship, Carnegie Institution of Washington, 1993-1995.

McCormick Fellowship, University of Chicago, 1988-1991.

Research Grants

NSF, continuous support 2003–2020.

NASA, continuous support 2000–2004 and 2008–2011.

Professional Service (selected)

President, Mineral and Rock Physics, American Geophysical Union, 2017-2019.

President-elect, 2015-2017.

MSA Award Committee, Mineralogical Society of America, 2017-2019.

Associate Editor, *Geochimica et Cosmochimica Acta*, 2016-present.

Mineralogy–Petrology Grant Committee, Mineralogical Society of America, 2015-2018.

Panel Member, Graduate Research Fellowship Program, Geosciences, National Sciences Foundation, 2016.

Facilities Committee, Consortium for Material Properties Research in the Earth Sciences (COMPRES), elected member 2008-2016; Chair 2011-2015 (two terms).

Chair of Site Review Team for COMPRES facilities at NSLS-II, 2015.

Program Committee, COMPRES Annual Meeting, 2011; 2013 (Chair); 2014.

HP-CAT Review Panel Member, Advanced Photon Source, Argonne National Laboratory, 2013.

Panel Member, Petrology & Geochemistry Program, National Science Foundation, 2009, 2011, 2012, 2013.

COMPRES Distinguished Lecturer, 2011-2012.

Panel Member, Powder / Single Crystal Crystallography Panel, National Synchrotron Light Source, Brookhaven National Laboratory, 2007-2011.

Panel Member, Cosmochemistry Program, NASA, 2008-2009.

Council member, Geological Society of Washington, 2008-2009.

Delegate for the Geochemical Society, Planning Meeting of the American Geophysical Union – Joint Assembly Program Committee, 2007.

NASA Genesis Mission Science Team, 1999-2004.

Advising

Postdoctoral Scholars

Daniel Reaman, 2011-2013. Now at U.S. Naval Observatory.

Graduate Students

Nigel Brauser, Ph.D. advisor, 2016-present.

Anne Davis, Ph.D. advisor, 2016-present.

Claire Zurkowski, Ph.D. advisor, 2016-present.

Elizabeth Thompson, Ph.D. advisor, 2013-present. In 2018: NSF Postdoctoral Fellow.

Bethany Chidester, Ph.D. advisor, 2012-2017. Thesis: “The distribution of heat-producing radioactive elements in the deep Earth.” Now Postdoc at UC Davis.

Rebecca Fischer, Ph.D. advisor, 2009-2015. Thesis: “Earth’s accretion, core formation, and core composition.” Now Assistant Professor, Earth and Planetary Sciences, Harvard University.

Gregory Shofner, Ph.D. advisor, 2007-2011. Thesis: “High pressure redox geochemistry of tungsten in metal–silicate systems: Implications for core formation in the Earth.” Now at Towson University.

Noah Miller, M.S. advisor, 2006-2009. Thesis: “Melting and phase relations in iron-silicon alloys with applications to the Earth’s core.” Now at Goodrich.

Undergraduates

Charlotte Ring (Geophysical Sciences major), 2017-present.

Billie Males (Geophysical Sciences major), 2017-present.

Claire Doody (Geophysical Sciences major), 2015-present.

Sabrina Tecklenburg (Geophysical Sciences major), 2016-2017. Senior thesis.

Matthew Brennan (Geophysical Sciences and Environmental Sciences major), 2015-2017. Senior thesis.

Olivia Pardo (Geophysical Sciences major), 2015-2017. Senior thesis.

Hannah Bausch (Geophysical Sciences major), 2015-2017.

Andrew Mattillion (Physics major), 2014-2015.

Brissa Renovato (Geophysical Sciences and Statistics major), 2013-2015.

Jacob Britz (Geophysical Sciences and Chemistry major), 2013-2015. Senior thesis.

Gregory Myers (Geophysical Sciences major), 2012-2015.

Maria Valdes (B.S. in Geophysical Sciences), 2011-2012.

Gwen Gage (Geophysical Sciences and Russian Studies major), 2011-2013.

Gerasimos Michalitsianos (Geology major), 2010.

Aleeza Harburger (Geology major, University of Pittsburgh), 2010.

Katherine Watter (Geology major), 2010.

Sarah Saslow (Chemistry major), 2009-2010. Senior thesis.

James Deane (Geology major), 2009-2010. Senior thesis.

Tess Van Orden (Geology major), 2008-2010.

Caroline Harbitz (Physics major), 2008-2009. Senior thesis.

Nina Wernecke (Geology major), 2008-2009. Senior thesis.

Rebecca Fischer (Earth and Planetary Sciences major, Northwestern University), 2008.
Thomas Tamarkin (Chemical Engineering major), 2007-2008.
Oluchi Ofoha (Physics major), 2007-2008.
Graham Taylor (Eleanor Roosevelt H. S. Senior), 2006-2007.
Helen Nguyen (Geology major), 2006-2007. Senior thesis.
Robert Thomas (Geology major). Laboratory research, 2006-2007. Senior thesis.
Genna Davidson (College Park Scholars / Earth, Life & Time), 2006.

Teaching

GEOS 13100 Physical Geology: 2011, 2012, 2013, 2014, 2015, 2016
GEOS 21000 Mineralogy: 2017, 2018
GEOS 21005/31005 Mineral Science: 2012, 2016
GEOS 21200/31200 Physics of the Earth: 2014
GEOS 21400/31400 Thermodynamics and Phase Change: 2013, 2017
GEOS 31500 Mineral Physics: 2015
GEOL 212 Planetary Geology: 2007, 2008, 2009
GEOL 322 Mineralogy: 2005, 2006, 2007, 2008, 2009
GEOL 394 Research Problems in Geology: 2006, 2007, 2008, 2009, 2010
GEOL 622 Mineralogy of the Rock-Forming Silicates: 2006, 2008, 2010
GEOL 789N Mineral Physics: 2007

Departmental and University Service

Director, NSF Graduate Fellowship Workshop program, 2017-present.
Appointments Committee, 2015-present. Chair, 2017-present.
Colloquium Committee, 2017-present.
Center for Advanced Radiation Sources (CARS) Appointments Committee, 2016-2019.
Curriculum Committee, 2014-present.
Graduate Recruitment Committee, Physical Sciences Division, 2015-2017.
Diversity Committee, Physical Sciences Division, 2014-2017.
NSF Graduate Fellowship workshop advisory committee, Physical Sciences Division, 2015-2016.
Faculty Award for Excellence in Graduate Teaching and Mentoring Selection Committee, 2016.
Chamberlin Fellowship Committee, 2010-2011; 2015-2016 (Chair).

Department Chair Selection Committee (Chair), 2015.
GradUCon panel member, 2013.
Graduate Application Committee (Chair), 2013.
Disciplinary Panel, Physical Sciences Division, 2012.
Department Chair Selection Committee, 2012.
Promotions Committee, 2011-2012.
Search Committee for Geology Department chairman, 2010.
CAREER Award Proposal Workshop, hosted by College of Engineering, 2010.
Discussion panel member.
Wylie Fellowship Selection Committee, 2010.
Geophysics Planning Group (Chair), 2007-2008.
X-ray Diffraction Facilities Committee, 2006.
Nuclear Fuel Cycle Hiring Directions Committee, 2006.
Graduate Committee, 2006-2010.

Publications (reprints and preprints available at <http://geosci.uchicago.edu/~campbell>)

Chidester B. A., Pardo O. S., Fischer R. A., Thompson E. C., Heinz D. L., Prescher C., Prakapenka V. B., and Campbell A. J. (in press) High-pressure phase behavior and equations of state of ThO₂ polymorphs. *Am. Mineral.*

Thompson E. C., Davis A. H., Bi W., Zhao J., Arp E. E., Zhang D., Greenberg E., Prakapenka V. B., and Campbell A. J. (2018) High-pressure geophysical properties of fcc phase FeH_x. *Geochem. Geophys. Geosys.*, 19, doi: 10.1002/2017GC007168.

Thompson E. C., Campbell A. J., and Tsuchiya J. (2017) Elasticity of ε-FeOOH: Seismic implications for Earth's lower mantle. *J. Geophys. Res.*, 122, 5038-5049.

Chidester B. A., Rahman Z., Righter K., and Campbell A. J. (2017) Metal-silicate partitioning of U: Implications for heat budget of the core and evidence for reduced U in the mantle. *Earth Planet. Sci. Lett.*, 199, 1-12.

Fischer R. A., Campbell A. J., and Ciesla F. (2017) Sensitivities of Earth's core and mantle compositions to accretion and differentiation processes. *Geochim. Cosmochim. Acta*, 458, 252-262.

Thompson E. C., Chidester B. A., Fischer R. A., Myers G. I., Heinz D. L., Prakapenka V. B., and Campbell A. J. (2016) Equation of state of pyrite to 85 GPa and 2400 K. *Am. Mineral.*, 101, 1046-1051.

Campbell A. J. (2016) Phase diagrams and thermodynamics of core materials. In "*Deep Earth: Physics and Chemistry of the Lower Mantle and Core*," eds. Terasaki H. and

Fischer R. A. AGU Monograph Series, 217, 191-199.

Thompson E. C., Campbell A. J., and Liu Z. (2016) In-situ infrared spectroscopic studies of hydroxyl in amphiboles at high pressure. *Am. Mineral.*, 101, 706-712.

Shofner G. A., Campbell A. J., Danielson L. R., Righter K., Fischer R. A., Wang Y., and Prakapenka V. B. (2016) The W-WO₂ oxygen fugacity buffer (WVO) at high pressure and temperature: Implications for *f*O₂ buffering and metal-silicate partitioning. *Am. Mineral.*, 101, 211-221.

Fischer R. A. and Campbell A. J. (2015) The axial ratio of hcp Fe and Fe–Ni–Si alloys to the conditions of Earth's inner core. *Geophys. Res. Lett.*, 100, 2718-2724.

Fischer R. A., Nakajima Y., Campbell A. J., Frost D. J., Harries D., Langenhorst F., Miyajima N., Pollok K., and Rubie D. C. (2015) High pressure metal–silicate partitioning of Ni, Co, V, Cr, Si, and O. *Geochim. Cosmochim. Acta*, 167, 177-194.

Fedkin A. V., Grossman L., Humayun M., Simon S. B., and Campbell A. J. (2015) Condensates from vapor made by impacts between metal-, silicate-rich bodies: Comparison with metal and chondrules in CB chondrites. *Geochim. Cosmochim. Acta*, 164, 236-261.

Fischer R. A., Campbell A. J., Caracas R., Reaman D. M., Heinz D. L., Dera P., and Prakapenka V. B. (2014) Equations of state in the Fe-FeSi system at high pressures and temperatures. *J. Geophys. Res.*, 119, 2810-2827.

Fischer R. A., Campbell A. J., Reaman D. M., Miller N. A., Heinz D. L., Dera P., and Prakapenka V. B. (2013) Phase relations in the Fe-FeSi system at high pressures and temperatures. *Earth Planet. Sci. Lett.*, 373, 54-64.

Fischer R. A., Campbell A. J., Caracas R., Reaman D. M., Dera P., and Prakapenka V. B. (2012) Equation of state and phase diagram of Fe-16Si alloy as a candidate component of Earth's core. *Earth Planet. Sci. Lett.*, 357-358, 268-276.

Fischer R. A., Campbell A. J., Lord O. T., Shofner G. A., Dera P., and Prakapenka V. B. (2011) Phase transition and metallization of FeO at high pressures and temperatures. *Geophys. Res. Lett.*, 38, L24301.

Fischer R. A., Campbell A. J., Shofner G. A., Lord O. T., Dera P., and Prakapenka V. B. (2011) Equation of state and phase diagram of FeO. *Earth Planet. Sci. Lett.*, 304, 496-502.

Fischer R. A. and Campbell A. J. (2010) High pressure melting of wüstite. *Am. Mineral.*, 95, 1473-1477.

Campbell A. J., Danielson L., Righter K., Seagle C. T., Wang Y., and Prakapenka V. B. (2009) High pressure effects on the iron-iron oxide and nickel-nickel oxide oxygen fugacity buffers. *Earth Planet. Sci. Lett.*, 286, 556-564.

- Lauretta D. S., Goreva J. S., Hill D. H., Killgore M., LaBlue A. R., Campbell A. J., Greenwood R. C., Verchovsky A. B., and Franchi I. A. (2009) The Fountain Hills unique CB chondrite: Insights into thermal processes on the CB parent body. *Meteorit. Planet. Sci.*, *44*, 823-838.
- Richter K., Humayun M., Campbell A. J., Danielson L., Hill D., and Drake M. J. (2008) Experimental studies of metal-silicate partitioning of Sb: Implications for the terrestrial and lunar mantles. *Geochim. Cosmochim. Acta*, *73*, 1487-1504.
- Chabot N. L., Campbell A. J., McDonough W. F., Draper D. S., Agee C. B., Humayun M., Watson H. C., Cottrell E., and Saslow S. A. (2008) The Fe-C system at 5 GPa and implications for Earth's Core. *Geochim. Cosmochim. Acta*, *72*, 4146-4158.
- Ebel D. S., Weisberg M. K., Hertz J. and Campbell A. J. (2008) Shape, metal abundance, chemistry and origin of chondrules in the Renazzo (CR) chondrite. *Meteorit. Planet. Sci.*, *43*, 1725-1740.
- Campbell A. J. (2008) Measurement of temperature distributions across laser-heated spots by multispectral imaging radiometry. *Rev. Sci. Instrum.*, *79*, 015108.
- Mao W. L., Campbell A. J., Prakapenka V. B., Hemley R. J. and Mao H.-K. (2007) Effect of iron on the properties of post-perovskite silicate. In *Post-perovskite: The Last Mantle Phase Transition*, eds. K. Hirose, J. Brodholt, T. Lay, D. Yuen. American Geophysical Union Monograph Series, Volume 174. pp. 37-46.
- Seagle C. S., Heinz D. L., Campbell A. J., Prakapenka V. B., and Wanless S. T. (2008) Melting and thermal expansion in the Fe – FeO system at high pressure. *Earth Planet. Sci. Lett.*, *265*, 655-665.
- Campbell A. J., Seagle C. S., Heinz D. L., Shen G., and Prakapenka V. B. (2007) Partial melting in the iron-sulfur system at high pressure: A synchrotron x-ray diffraction study. *Phys. Earth Planet. Int.*, *162*, 119-128.
- Seagle C. T., Campbell A. J., Heinz D. L., Shen G., and Prakapenka V. (2006) Thermal equation of state of Fe₃S and implications for sulfur in the Earth's core. *J. Geophys. Res.*, *111*, B06209, doi:10.1029/2005JB004091.
- Mao W. L., Campbell A. J., Shen G., and Heinz D. L. (2006) Phase relations of Fe-Ni alloys at high pressure and temperature. *Phys. Earth Planet. Int.*, *155*, 146-150.
- Rushmer T., Petford N., Humayun M., and Campbell A. J. (2005) Fe-liquid segregation in deforming planetesimals: Coupling core forming compositions with transport phenomena. *Earth Planet. Sci. Lett.*, *239*, 185-202.
- Chabot N. L., Campbell A. J., Jones J. H., Humayun M., and Lauer H. V. (2005) The influence of carbon on partitioning behavior during planetary evolution. *Geochim. Cosmochim. Acta*, *70*, 1322-1335.
- Campbell A. J. and Humayun M. (2005) Compositions of group IVB iron meteorites and

their parent melt. *Geochim. Cosmochim. Acta*, 69, 4733-4744.

Campbell A. J., Humayun M., and Weisberg M. K. (2005) Compositions of unzoned and zoned metal in the CB₁ chondrites HH 237 and QUE 94627. *Meteorit. Planet. Sci.*, 40, 1131-1148.

Campbell A. J., Zanda B., Perron C., Meibom A., and Petaev M. I. (2005) Origin and thermal history of Fe-Ni metal in primitive chondrites. In *Chondrites and the Protoplanetary Disk*, eds. A. N. Krot, E. R. D. Scott, and B. Reipurth. Astronomical Society of the Pacific Conference Series, Volume 341. pp. 407-431.

Mao W. L., Meng Y., Shen G., Prakapenka V. B., Campbell A. J., Heinz D. L., Shu J., Caracas R., Cohen R. E., Fei Y., Hemley R. J. and Mao H.-K. (2005) Iron-rich silicates in the Earth's D" layer. *Proc. Natl. Acad. Sci.*, 102, 9751-9753.

Righter K., Campbell A. J., and Humayun M. (2005) Diffusion of trace elements in FeNi metal: Application to zoned metal grains in chondrites. *Geochim. Cosmochim. Acta*, 69, 3145-3158.

Mao W. L., Shen G., Prakapenka V. B., Meng Y., Campbell A. J., Heinz D. L., Shu J., Hemley R. J. and Mao H.-K. (2004) Ferromagnesian post-perovskite silicates in the D" layer of the Earth. *Proc. Natl. Acad. Sci.*, 101, 15867-15869.

Campbell A. J. and Humayun M. (2004) Formation of metal in the CH chondrites ALH 85085 and PCA 91467. *Geochim. Cosmochim. Acta*, 68, 3409-3422.

Puchtel I. S., Humayun M., Campbell A. J., Sproule R. A. and Leshner C. M. (2004) Platinum group element geochemistry of komatiites from the Alexo and Pyke Hill area, Ontario, Canada. *Geochim. Cosmochim. Acta*, 68, 1361-1383.

Righter K., Campbell A. J., Humayun M., and Hervig R. L. (2004) Partitioning of Ru, Rh, Pd, Re, Ir, and Au between Cr-bearing spinel, olivine, pyroxene, and silicate melts. *Geochim. Cosmochim. Acta*, 68, 867-880.

Campbell A. J., Simon S. B., Humayun M., and Grossman L. (2003) Chemical evolution of metal in refractory inclusions in CV3 chondrites. *Geochim. Cosmochim. Acta*, 67, 3119-3134.

Jurewicz A.J.G., Burnett D.S., Wiens R.C., Friedmann T.A., Hays C.C., Hohlfelder R.J., Nishiizumi K., Stone J.A., Woolum D.S., Becker R., Butterworth A.L., Campbell A.J., Ebihara M., Franchi I.A., Heber V., Hohenberg C.M., Humayun M., McKeegan K.D., McNamara K., Meshik A., Pepin R.O., Schlutter D., and Wieler R. (2003) Overview of the Genesis solar-wind collector materials. *Spa. Sci. Rev.*, 105, 535-560.

Campbell A. J. and Humayun M. (2003) Formation of metal in GRO 95551 and comparison to ordinary chondrites. *Geochim. Cosmochim. Acta*, 67, 2481-2495.

Chabot N. L., Campbell A. J., Jones J. H., Humayun M. and Agee C. B. (2003) An experimental test of Henry's Law in solid metal-liquid metal systems with implications

for iron meteorites. *Meteorit. Planet. Sci.*, *38*, 181-196.

Lin J. F., Campbell A. J., Heinz D. L. and Shen G. (2003) Static compression of iron-silicon alloys: Implications for silicon in the Earth's core. *J. Geophys. Res.*, *108*, 2045.

Lin J.-F., Heinz D. L., Campbell A. J., Devine J. M., Mao W., and Shen G. (2002) Iron-nickel alloy in the Earth's core. *Geophys. Res. Lett.*, *29*, 10.1029/2002GL015089.

Humayun M. and Campbell A. J. (2002) The duration of ordinary chondrite metamorphism inferred from tungsten microdistribution in metal. *Earth Planet. Sci. Lett.*, *198*, 228-243.

Lin J.-F., Heinz D. L., Campbell A. J., Devine J. M., and Shen G. (2002) Iron-silicon alloy in the Earth's core? *Science*, *925*, 313-315.

Campbell A. J., Humayun M., and Weisberg M. K. (2002) Siderophile element constraints on the formation of metal in the metal-rich chondrites Bencubbin, Gujba, and Weatherford. *Geochim. Cosmochim. Acta*, *66*, 631-644.

Campbell A. J., Humayun M., Meibom A., Krot A. N., and Keil K. (2001) Origin of zoned metal grains in the QUE94411 chondrite. *Geochim. Cosmochim. Acta*, *65*, 163-180.

Campbell A. J. and Humayun M. (1999) Trace element microanalysis in iron meteorites by laser ablation ICPMS. *Anal. Chem.*, *71*, 939-946.

Yoo C. S., Campbell A. J., Mao H. K., and Hemley R. J. (1997) Detecting phases of iron – response. *Science*, *275*, 96.

Yoo C. S., Soderlind P., Moriarty J. A., Akella J., and Campbell A. J. (1996) Dhcp as a new ϵ' phase of iron at high pressures and temperatures, *Phys. Lett. A*, *214*, 65-70.

Peiris S. M., Sweeney J. S., Campbell A. J., and Heinz D. L. (1996) Pressure-induced amorphization of covellite, CuS. *J. Chem. Phys.*, *104*, 11-16.

Yoo C. S., Akella J., Campbell A. J., Mao H. K., and Hemley R. J. (1995) Phase diagram of iron by in situ x-ray diffraction: Implications for the Earth's core. *Science*, *270*, 1473-1475.

Campbell A. J. and Heinz D. L. (1994) High-pressure acoustic wave velocities and equations of state of the alkali chlorides. *J. Geophys. Res.*, *99*, 11765-11774.

Peiris S., Campbell A. J., and Heinz D. L. (1994) Equation of state of MgS to 50 GPa. *J. Phys. Chem. Solids*, *55*, 413-419.

Campbell A. J. and Heinz D. L. (1993) An amorphous phase on the anorthite Hugoniot. *Geophys. Res. Lett.*, *20*, 237-240.

Campbell A. J. and Heinz D. L. (1993) Equation of state and high pressure phase transition of NiS in the NiAs structure. *J. Phys. Chem. Solids*, *54*, 5-7.

Campbell A. J. and Heinz D. L. (1992) A high pressure test of Birch's law. *Science*, *257*,

66-68.

Campbell A. J., Heinz D. L., and Davis A. M. (1992) Material transport in laser-heated diamond anvil cell melting experiments. *Geophys. Res. Lett.*, 19, 1061-1064.

Zhou Y., Campbell A. J., and Heinz D. L. (1991) Equations of state and optical properties of the high pressure phase of zinc sulfide. *J. Phys. Chem. Solids*, 52, 821-825.

Campbell A. J. and Heinz D. L. (1991) Compression of KCl in the B2 structure to 56 GPa. *J. Phys. Chem. Solids*, 52, 495-499.