Curriculum Vitae

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Birth date: October 21, 1954
Birth place: San Francisco, California

Education:

A.B.	1976	University of California, Berkeley
M.A.	1978	University of California, Berkeley
Ph.D.	1980	University of California, Berkeley

Positions held:

1980-1985	Assistant Professor, Geological Sciences, University of Washington
1985-1988	Associate Professor, Geological Sciences, University of Washington
1988-2003	Professor, Geological Sciences, University of Washington
1990-present	Associate editor, *American Journal of Science*
1990-1993	Associate editor, *American Mineralogist*
1991-2002	Associate editor, *Geochimica et Cosmochimica Acta*
1994-1999	Chairman, Geological Sciences, University of Washington
2003-2005	Professor, Geophysical Sciences and the College, University of Chicago
2005-present	Vice President & Senior Research Associate, OFM Research Inc.
2007-present	Affiliate Professor, Earth & Space Sciences, University of Washington
2012-present	Adjoint Professor of Earth & Environmental Sciences, Vanderbilt University
2015-present	Associate Editor, *Contributions to Mineralogy and Petrology*

Awards:

1984	Presidential Young Investigator Award, National Science Foundation
1987	Intern Assoc Mathematical Geologists Best Paper Award for 1983
1993	Elected Fellow of the Mineralogical Society of America
1996-1997	Distinguished Lecturer, Mineralogical Society of America
1997	Elected Fellow of the Geological Society of America
1997-2001	Elected Councilor of the Mineralogical Society of America
1999	Elected Fellow of the American Geophysical Union
2003	Dana Medal, Mineralogical Society of America
2010	Bunsen Medal, European Geosciences Union
2014	Bowen Award, VGP Section, American Geophysical Union

National Committees

1988-1991	Mineralogical Society of America representative to the Joint Technical Program Committee of the Geological Society of America
1988	Representative to the National Science Foundation advisory panel on Presidential Young Investigator Awards
1992-1995	Joint Technical Program Committee (JTPC) for Annual Meetings, Geological Society of America. 1994 Chair for the Seattle meeting.
1994	Mineral Soc America, ad hoc committee on the *American Mineralogist*
1994-1995	Mineralogical Society of America, Committee on Committees
1995-1997	Mineral Soc America, Short Course Committee (1996-7, Chair)
1997-2000	American Geophysical Union, VGP Executive Committee
1998-1999	Mineralogical Society of America, Roebling Medal Committee (Chair)
2010-2013	Mineralogical Society of America, MSA award committee
2011-2013	European Geosciences Union, Bunsen Medal selection committee

Published Papers:

(1) Ghiorso MS, Carmichael ISE, Moret, LK (1979) Inverted high-temperature quartz. Unit cell parameters and properties of the α-β inversion. *Contrib Mineral Petrol* **68**:307-323

(2) Ghiorso MS, Carmichael ISE (1980) A regular solution model for met-aluminous silicate liquids: Applications to geothermometry, immiscibility, and the source regions of basic magmas. *Contrib Mineral Petrol* **71**:323-342

(3) Ghiorso MS, Carmichael ISE (1981) A FORTRAN IV computer program for evaluating temperatures and oxygen fugacities from the compositions of coexisting iron-titanium oxides. *Computers and Geosciences* **7**:123-129

(4) Sack RO, Carmichael ISE, Rivers ML, Ghiorso MS (1981) Ferric-ferrous equilibria in natural silicate liquids at 1 bar. *Contrib Mineral Petrol* **75**:369-376

(5) Brimhall GH Jr, Ghiorso MS (1983) Origin and ore-forming consequences of the advanced argillic alteration process in hypogene environments by magmatic gas contamination of meteoric fluids. *Econ Geol* **78**:73-90

(6) Ghiorso MS (1983) LSEQIEQ: A FORTRAN IV subroutine package for the analysis of multiple linear regression problems with possibly deficient pseudorank and linear equality and inequality constraints. *Computers and Geosciences* **9:**391-416

(7) Ghiorso MS, Carmichael ISE, Rivers ML, Sack RO (1983) The Gibbs free energy of mixing of natural silicate liquids; an expanded regular solution approximation for the calculation of magmatic intensive variables. *Contrib Mineral Petrol* **84**:107-145

(8) Ghiorso MS, Carmichael ISE (1984) Comment on "Density calculations for silicate liquids. I. Revised method for aluminosilicate compositions" by Bottinga, Weill and Richet. *Geochim Cosmochim Acta* **48**:401-408

(9) Ghiorso MS (1984) Activity/composition relations in the ternary feldspars. *Contrib Mineral Petrol* **87**:282-296

(10) Curtiss B, Adams J, Ghiorso MS (1985) Origin, development and chemistry of silica-alumina rock coatings from the arid regions of the island of Hawaii. *Geochim Cosmochim Acta* **49**:49-56

(11) Ghiorso MS (1985) Chemical mass transfer in magmatic processes. I. Thermodynamic relations and numerical algorithms. *Contrib Mineral Petrol* **90**:107-120

(12) Ghiorso MS, Carmichael ISE (1985) Chemical mass transfer in magmatic processes. II. Applications in equilibrium crystallization, fractionation and assimilation. *Contrib Mineral Petrol* **90**:121-141

(13) Carmichael ISE, Ghiorso MS (1986) Oxidation-reduction relations in basic magma: a case for homogeneous equilibria. *Earth Planet Sci Letts* **78**:200-210

(14) Kelemen PB, Ghiorso MS (1986) Assimilation of Peridotite in zoned Calc-Alkaline Plutonic Complexes: Evidence from the Big Jim Complex, Washington Cascades. *Contrib Mineral Petrol* **94**:12-28

(15) Ghiorso MS, Kelemen PB (1987) Evaluating reaction stoichiometry in magmatic systems evolving under generalized thermodynamic constraints: Examples comparing isothermal and isenthalpic assimilation, *in*, Mysen BO, ed., Magmatic Processes: Physicochemical Principles, Geochemical Society, *Special Publication* **1**: 319-336

(16) Ghiorso MS (1987) Thermodynamics of Minerals and Melts. *Rev Geophys* (U.S. National Report to the I.U.G.G., 1983-1986), **25**:1054-1064

(17) Ghiorso MS (1987) Chemical mass transfer in magmatic processes. III. Crystal growth, chemical diffusion and thermal diffusion in multicomponent silicate melts. *Contrib Mineral Petrol* **96**:291-313

(18) Ghiorso MS (1987) Modeling Magmatic Systems: Thermodynamic relations, in, Carmichael, ISE, Eugster HP, eds., Thermodynamic modeling in Geologic Systems: minerals, fluids and melts, Mineralogical Society of America *Short Course Notes*, Chapt **12**, 443-465

(19) Ghiorso MS, Carmichael ISE (1987) Modeling Magmatic Systems: Petrologic Applications, in, Carmichael, ISE, Eugster HP, eds., Thermodynamic model-

ing in Geologic Systems: minerals, fluids and melts, Mineralogical Society of America *Short Course Notes*, Chapt **13**, 467-499

(20) Wells JT, Ghiorso MS (1988) Rock alteration and mercury transport and deposition at Sulphur Bank, California. *Econ Geol.* **83**, 606-618

(21) Sack RO, Ghiorso MS (1989) Importance of considerations of mixing properties in establishing an internally consistent database: Thermochemistry of minerals in the system Mg_2SiO_4-Fe_2SiO_4-SiO_2. *Contrib Mineral Petrol* **102**, 41-68

(22) Ghiorso, MS (1990) Thermodynamic properties of hematite-ilmenite-geikielite solid solutions. *Contrib Mineral Petrol* **104**, 645-667

(23) Ghiorso, MS (1990) Application of the Darken equation to mineral solid-solutions with variable degrees of order-disorder. *Am Mineral* **75**, 539-543

(24) Carmichael ISE, Ghiorso MS (1990) The effect of oxygen fugacity on the redox state of natural liquids and their crystallizing phases, in, Nicholls J, Russell JK, eds., Modern Methods of Igneous Petrology: Understanding Magmatic Processes, Mineralogical Society of America *Reviews in Mineralogy*, **24**, 191-212

(25) Ghiorso MS (1991) Temperatures in and around cooling magma bodies, *in*, Perchuk LL, ed., Progress in Metamorphic and Magmatic Petrology, Cambridge University Press, 387-410

(26) Sack, RO, Ghiorso, MS (1991) An internally consistent model for the thermodynamic properties of Fe-Mg-titanomagnetite-aluminate spinels. *Contrib Mineral Petrol* **106**, 474-505

(27) Ghiorso MS, Sack RO (1991) Thermochemistry of the oxide minerals, *in*, Lindsley DH ed., Oxide Minerals: Petrologic and Magnetic Significance, Mineralogical Society of America *Reviews in Mineralogy* **25**, 221-264

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(29) Sack, RO, Ghiorso, MS (1991) Chromian spinels as petrogenetic indicators: thermodynamics and petrological applications. *Am Mineral* **76**, 827-847

(30) Ghiorso, MS, Sack, RO (1991) Fe-Ti oxide geothermometry: Thermodynamic formulation and the estimation of intensive variables in silicic magmas. *Contrib Mineral Petrol* **108**, 485-510

(31) Ghiorso MS (1991) Thermodynamics of Minerals and Melts. *Rev Geophys* (U.S. National Report to the I.U.G.G., 1986-1990) Supplement, 446-456

(32) Wells JT, Ghiorso MS (1991) Coupled fluid flow and reaction in mid-ocean ridge hydrothermal systems I: The behavior of silica. *Geochimica et Cosmochimica Acta* **55**, 2467-2482

(33) Kress, VC, Ghiorso MS (1993) Multicomponent diffusion in the MgO-Al_2O_3-SiO_2 and CaO-MgO-Al_2O_3-SiO_2 systems. *Geochimica et Cosmochimica Acta* **57**, 4453-4466

(34) Sack RO, Ghiorso MS (1994) Thermodynamics of multicomponent pyroxenes: I. Formulation of a general model. *Contrib Mineral Petrol* **116**, 277-286

(35) Sack RO, Ghiorso MS (1994) Thermodynamics of multicomponent pyroxenes: II. Phase relations in the quadrilateral. *Contrib Mineral Petrol* **116**, 287-300

(36) Ghiorso MS (1994) Algorithms for the estimation of phase stability in heterogeneous thermodynamic systems. *Geochimica et Cosmochimica Acta* **58**, 5489-5501

(37) Hirschmann M, Ghiorso MS (1994) Chemical potentials of $NiSi_{0.5}O_2$, $CoSi_{0.5}O_2$, and $MnSi_{0.5}O_2$ in magmatic liquids and applications to olivine-liquid partitioning. *Geochimica et Cosmochimica Acta* **58**, 4109-4126

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(48) Evans BW, Ghiorso MS (1995) Thermodynamics and Petrology of Cummingtonite. *Amer Mineral* **80**, 649-663

(49) Asimow PD, Hirschmann MM, Ghiorso MS, O'Hara MJ, Stolper EM (1995) The effect of pressure-induced solid-solid phase transitions on decompression melting of the mantle. *Geochimica et Cosmochimica Acta* **59**, 4489-4506

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(52) Ghiorso MS (1997) Thermodynamic modeling of igneous processes. *Ann Rev Earth & Planet Sci* **25**, 221-41

(53) Ghiorso MS (1997) Thermodynamic analyses of the effect of magnetic ordering on miscibility gaps in the Fe-Ti cubic and rhombohedral oxide minerals and the Fe-Ti oxide geothermometer. *Physics and Chem Minerals* **25**, 28-38

(54) Sack RO, Ghiorso MS (1998) Thermodynamics of feldspathoid solutions. *Contrib Mineral Petrology* **130**, 256-274

(55) Ghosal S, Sack RO, Ghiorso MS, Lipschutz ME (1998) Evidence for a reduced, Fe-depleted Martian mantle source region of Shergottites. *Contrib Mineral Petrology* **130**, 346-357

(56) Hirschmann MM, Ghiorso MS, Wasylenki LE, Asimow PD, Stolper EM (1998) Calculation of peridotite partial melting from thermodynamic models of minerals and melts. I. Methods and comparison to experiments. *J Petrology* **39**, 1091-1115

(57) Asimow PD, Ghiorso MS (1998) Algorithmic Modifications Extending MELTS to Calculate Subsolidus Phase Relations. *American Mineralogist* **83**, 1127-1131

(58) Hirschmann MM, Ghiorso MS, Stolper EM (1999) Calculation of Peridotite Partial Melting from Thermodynamic Models of Minerals and Melts. II. Isobaric variations in melts near the solidus and owing to variable source composition. *J Petrology* **40**, 297-313

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(60) Ghiorso MS, Yang H., Hazen RM (1999) Thermodynamics of cation ordering in Karrooite ($MgTi_2O_5$). *American Mineralogist* **84**, 1370-1374

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(64) Evans BW, Ghiorso MS, Yang H, Medenbach O (2001) Thermodynamics of the amphiboles: Anthophyllite-ferroanthophyllite and the ortho-clino phase loop. *American Mineralogist* **86**, 640-651

(65) Mastin LG, Ghiorso MS (2001) Adiabatic temperature changes of magma-gas mixtures during volcanic eruptions. *Contributions to Mineralogy and Petrology* **141**, 307-321

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(67) Ghiorso MS, Hirschmann MM, Reiners PW, Kress VC III (2002) The pMELTS: A revision of MELTS for improved calculation of phase relations and major element partitioning related to partial melting of the mantle to 3

GPa. *Geochemistry, Geophysics, Geosystems* **3**(5), 10.1029/2001GC000217.

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(69) Ghiorso M.S., 2004, Acceptance of the Dana medal of the Mineralogical Society of America for 2003, *American Mineralogist*, **89**, 910-911.

(70) Ghiorso M.S., 2004, An Equation of State for Silicate Melts. I. Formulation of a General Model, *American Journal of Science,* **304**, 637-678.

(71) Ghiorso M.S., and Kress V.C., 2004, An Equation of State for Silicate Melts. II. Calibration of volumetric properties at 10^5 Pa, *American Journal of Science,* **304**, 679-751.

(72) Ghiorso M.S., 2004, An Equation of State for Silicate Melts. III. Analysis of stoichiometric liquids at elevated pressure: shock compression data, molecular dynamics simulations and mineral fusion curves, *American Journal of Science,* **304**, 752-810.

(73) Ghiorso M.S., 2004, An Equation of State for Silicate Melts. IV. Calibration of a multicomponent mixing model to 40 GPa, *American Journal of Science,* **304**, 811-834.

(74) Kress V.C. and Ghiorso M.S., 2004, Thermodynamic modeling of post-entrapment crystallization in igneous phases, *Journal of Volcanology and Geothermal Research*, **137**, 247-260.

(75) Fedkin A., Grossman L., Ghiorso M.S., 2006, Vapor pressures and evaporation coefficients for melts of ferromagnesian chondrule-like compositions, *Geochimica et Cosmochimica Acta*, **70**, 206-223.

(76) Gualda G.A.R., Ghiorso M.S., 2007, Magnetite scavenging and the buoyancy of bubbles in magmas, *Contributions to Mineralogy and Petrology,* **154**, 479-490.

(77) Spera F.J., Bohrson W.A., Till C.B., Fowler S.J., Ghiorso M.S., 2007, Partitioning of trace elements among coexisting crystals, melt and supercritical fluid during isobaric fractional crystallization and fractional melting. *American Mineralogist*, **92**, 1881-1898.

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magmatic phase equilibria. *Geochemistry, Geophysics, Geosystems*, **9**, Q03011, doi:10.1029/2007GC001894.

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(81) Martin G.B., Spera F.J., Nevins D., Ghiorso M.S. (2009) Structure, Thermodynamic and Transport Properties Of Molten Mg_2SiO_4: Molecular Dynamics Simulations and Model EOS. *American Mineralogist*, **94**, 693-703.

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Software, databases and computational tools:

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(2) Software for computational thermodynamics of geological materials: CORBA-, SOAP-, and REST-based webservices at http://ctserver.ofm-research.org/

(3) Database portal for experimental data on mineral-melt equilibria at http://lepr.ofm-research.org/

(4) PhasePlot, software for visualization of phase equilibria on pressure-temperature grids. Available through the Apple App Store. http://PhasePlot.org.

(5) MagmaSat (Mac) and MagmaSatApp (iPad), software for computation of saturation conditions of H_2O-CO_2 mixed fluids in natural composition silicate melts. Available through the Apple App Store.

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