Keith Daniel Putirka

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PERSONAL

Born: Los Angeles, CA, 7/30/62
Married: to Heather Bacon-Putirka; three daughters, Noelani Ann (b. 8/9/87), Sarah Elizabeth (b. 4/15/02), and Naomi Marie (b. 6/20/04).

EDUCATION

Degrees:

10/97 Ph.D., Geological Sciences**,** Columbia University, New York, NY
11/92 M.S., Geology, California State University, Los Angeles, CA
8/86 B.S., Geology, California State University, Northridge, CA

Other Institutions Attended:

7/83 Texas Tech University, Lubbock, TX (Field Camp in Salida CO)
1981-1983 Glendale Community College, Glendale, CA

PRESENT POSITION

7/07-present Associate Professor, California State University, Fresno
Department of Earth and Environmental Sciences

PRIOR POSITIONS

7/02-7/07Assistant Professor, California State University, Fresno
Department of Earth and Environmental Sciences
8/99-7/02 Assistant Professor, Indiana University of PA Geoscience Department
10/97-8/99 Post-Doctoral Research Staff Member*,* Lawrence Livermore National Laboratory, Livermore, CA.
9/92-5/95 Teaching Assistant, Columbia University, New York, NY. Igneous and Metamorphic Petrology Labs
9/92-5/95 Teaching Assistant, California State University, Los Angeles, CA.
Oceanography Lab, Geology of National Parks
8/86-6/91 Teacher, Los Angeles Unified School District, Sun Valley, CA
Courses Taught: Algebra, Physical Science

COLLABORATIONS AND OTHER AFFILIATIONS

Armienti, Pietro and Innocenti, Fabrizio, University of Pisa, Italy
Busby, Cathy: University of CA, Santa Barbara
Clynne, Michael, U.S. Geological Survey, Menlo Park, CA
Condit, Christopher: University of Massachusetts, Amherst
Kuntz, Mel: U.S. Geological Survey, Denver, CO
Mollo, Silvio, National Institute of Geophysics and Volcanology, Rome, Italy
Paterson, Scott, University of Southern California, Los Angeles, CA

Perfit, Michael, University of Florida, Gainesville
Ryerson, Frederick, Lawrence Livermore National Laboratory

GRADUATE AND POSDOCTORAL ADVISORS

Johnson, Marie, U.S. Military Academy at West Point (member, Ph.D. thesis committee)
Kinzler, Rosamond, Natural History Museum, New York (member, Ph.D. thesis committee)
Langmuir, Charles, Columbia University (member, Ph.D. thesis committee)
Longhi, John, Columbia University (member, Ph.D. thesis committee)
Ryerson, Frederick, Lawrence Livermore National Laboratory, Post-doctoral advisor
Walker, David, Columbia University (Ph.D. thesis advisor)

EXTERNAL GRANTS & AWARDS

2007-2009 NSF - Collaborative: Collaborative Research: Origin and Significance of High Potassium Volcanism: Insights from the Ancestral Cascades, California. Award: $157,804. Award # NSF-EAR 0711150

2004-2005 NSF-Research at Undergraduate Institutions (PI); *Award*: $105,188
Topic: RUI: An investigation of the Mauna Kea magma plumbing system: insights from mineral composition from the HSDP core. Award # NSF-EAR 0337345.

2004 NSF-Major Research Instrumentation Initiative (PI); *Award*: $148,105
Topic: Acquisition of an X-ray Diffraction Instrument: Developing an Interdisciplinary; Research/Teaching X-ray Diffraction Laboratory; Co-PIs: Zhi Wang (CSU Fresno, DEES); Horacio Ferriz (CSU Stanislaus, Geology and Physics Dept.). Award # NSF-EAR 0421272

2003 Claude Laval Jr. Award for Innovative Technology and Research; Award (PI): $5,000. “Some New Instrumental Techniques applied to Hawaiian Volcanism”.

2002-2003 NSF-Major Research Instrumentation Initiative (PI); *Award*: $303,297 (NSF Contribution: $198,106; Matching Funds: $105,191); *Topic:* "Development of an X-ray Fluorescence Laboratory: Integrating Geology Undergraduate Coursework with Geochemical Research"; *Co-PI's*: Steve Hovan (Geoscience), Charles Lake (Chemistry), Devki Talwar (Physics). Lab is currently being developed at Cal State Fresno. Award # NSF-EAR 0313688.

PUBLICATIONS

In Review

Putirka, K., Jean, M., Sharma, R., Torrez, G., Carlson, C. (2010) Cenozoic volcanism of the Sierra Nevada, and a new model for lithosphere degradation, submitted to Geosphere

In Press or in Print

Putirka, K.D., Ryerson, F.J., Perfit, M., and Ridley, W.I. (2011) Mineralogy and composition of the oceanic mantle, Journal of Petrology, v. 52, p. 279-313.

Mollo, S., Putirka, K., Iezzi, G., Pierdomenico, D.G., and Scarlato, P. (2011) Plagioclase-melt (dis)equilibrium due to cooling dynamics: implications for thermometry, barometry and hygrometry, Lithos, v. 125, p. 221-235.

Armienti. P., Gasperini, D., Perinelli, C., and Putirka, K.D. (2009) A new model for

estimating deep-level magma ascent rates from thermobarometry: an example from Mt. Etna, and implications for deep-seated magma dehydration, Acta Vulcanologica, v. 21, p. 145-158.
Putirka, K and Kuntz, M., Unruh, D., Vaid, N. (2009) Magma evolution and ascent at the Craters of the Moon and neighboring volcanic fields, southern ID, USA: implications for the evolution of polygenetic and monogenetic fields, Journal of Petrology, v. 50, p. 1639-1665.
Busby, C.J., and Putirka, K. (2009) Cretaceous-Cenozoic landscape evolution of the SW USA: evidence from Cenozoic paelocanyon fill in the central Sierra Nevada, International Geology Review, v. 51, p. 670-701.
Koerner, A., Busby, C.J., Putirka, K., and Pluhar, C., 2009, New evidence for alternating effusive and explosive eruptions form the type section of the Stanislaus Group in the "cataract" paleocanyon, central Sierra Nevada, International Geology Reviews, v. 51, p. 962-985.
Gorny, C., Busby, C., Pluhar, C.J., Hagan, J., and Putirka, K. (2009) An in-depth look at distal Sierra Nevada paleochannel fill drill cores through the Table Mountain Latite near Kings Ferry, International Geology Review, v. 51, p. 824-842.
Hagan, J.C., Busby, C.J., Putirka, K., Renne, P. (2009) Cenozoic paleocanyon evolution, ancestral Cascades arc volcanism, and structure of the Hope Valley – Carson Pass Region, Sierra Nevada, California, International Geology Reviews, v. 51, p. 777-823.
Du Bray, E.A., John, D.A., Putirka, K., and Cousens, B. (2009) Geochemical database for igneous rocks of the ancestral Cascades arc—southern segment, California and Nevada, U.S. Geological Survey Digital Data Series 439, 1 CD-ROM. [Available at URL http://pubs.usgs.gov/ds/439]
Putirka, K. D. (2008) Thermometers and barometers for volcanic systems, in: Putirka, K. D., and Tepley, F. eds., Rev. Mineral. Geochem. vol. 69, p 61-120.
Putirka, K.D. (2008) Introduction to Minerals, Inclusions and Volcanic Processes, in: Putirka, K. D., and Tepley, F. eds., Rev. Mineral. Geochem. vol. 69, p. 1-8.
Putirka, K. (2008) Hot arguments to cool off plume debate?: Comment, Geology, doi: 10.1130/G25165C.1.
Putirka, K. (2008) Excess Temperatures at Ocean Islands: Implications for Mantle Layering and Convection, Geology, v. 36, p. 283-286.
Busby, C.J., Hagan, J., Putirka, K., Pluhar, C., Gans, P., Rood, D., DeOeo, S., Skilling, I. Wagner, D. (2008) The ancestral Cascades arc: Implications for the development of the Sierran microplate and tectonic significance of high K2O volcanism. In, J. Wright and J. Shervais (ed.) Ophiolites, Arcs and Batholiths, Geol. Soc. Am. Spec. Paper 438, 331-378.
Garrison, N.J., Busby, C.J., Putirka, K., Gans, P.B., and Wagner, D.L. (2008) A Mantle Plume Beneath California? The Mid-Miocene Lovejoy Flood Basalt, Northern California, in Ophiolites, Arcs, and Batholiths, Geol. Soc. Am., Special Paper 438, 551-572.
Putirka, K., and Busby, C.J. (2007) The tectonic significance of high K_2O volcanism in the Sierra Nevada, California, Geology, v. 35, p. 923-926.
Putirka, K., Perfit, M., Ryerson, F.J., and Jackson, M.G. (2007) Ambient and excess mantle temperatures, olivine thermometry, and active vs. passive upwelling, Chemical Geology, v. 241, p. 177-206.
Putirka, K. (2005a) Mantle potential temperatures at Hawaii, Iceland, and the mid-ocean

ridge system, as inferred from olivine phenocrysts: Evidence for thermally–driven mantle plumes , Geochemistry, Geophysics, Geosystems, doi:10.1029/005GC000915
Putirka, K., (2005b) Igneous thermometers and barometers based on plagioclase + liquid equilibria: test of some existing models and new calibrations, American Mineralogist, v. 90, p. 336-346.
Putirka, K. and Kuntz, M. (2005) A Mineralogic View Into the Magma Plumbing Systems of the Craters of the Moon and Neighboring Volcanic Lava Fields in the Snake River Plain, ID. Goldschmidt Meeting, Moscow ID, post-meeting trip.
Putirka, K. and Condit, C. (2003) A cross section of a magma conduit system at the margins of the Colorado Plateau, Geology, v. 31, 701-704.
Putirka, K., Ryerson, F. J., and Mikaelian, H. (2003) New igneous thermobarometers for mafic and evolved lava compositions, based on clinopyroxene + liquid equilibria, American Mineralogist, v. 88, p. 1542-1554.
Putirka, K. (1999a) Melting depths and mantle heterogeneity beneath Hawaii and the East Pacific Rise: Constraints from Na/Ti and REE ratios, Journal of Geophysical Research, v. 104, p. 2817—2829.
Putirka, K. (1999b) Clinopyroxene+liquid equilibrium to 100 kbar and 2450 K, Contributions to Mineralogy and Petrology, v. 135, p. 151-163.
Putirka, K. (1998a) Garnet+liquid equilibrium, Contributions to Mineralogy and Petrology, v. 131, p. 273—288.
Putirka, K. (1997a) Magma transport at Hawaii: inferences from igneous thermobarometry, Geology, v. 25, p. 69—72.
Putirka, K., M. Johnson, R. Kinzler, and D. Walker (1996) Thermobarometry of mafic igneous rocks based on clinopyroxene-liquid equilibria, 0-30 kbar, Contributions to Mineralogy and Petrology, v. 123, p. 92-108.

Abstracts/Presentations (CSU Fresno student authors are underlined):

Putirka, K. (2011) A new view of Cenozoic lithosphere degradation ("Delamination") beneath the Sierra Nevada, submitted to AGU fall meeting, Dec. 1-5, 2011.
Jackson, B.A., Putirka, K., Clynne, M., Wood, A., Jackson, J., and Farner, M. (2011) Pre-eruption magmatic events recorded by veiscles in mafic enclaves: evidence form the 1915 eruption of Lassen Peak, California, submitted to AGU fall meeting, Dec. 1-5, 2011.
Letsinger, H., Cancholla, J., McNaughton, M., Neptune, C., Paterson, S., Putirka, K., Rolfs, S., and Steinert, B. (2011) A view into the roots of Sierra Nevada plutons: A study of the Guadalupe Igneous Complex, in the western foothills of the Sierra Nevada, California, submitted to AGU fall meeting, Dec. 1-5, 2011.
Lowry, A., Schutt, D., Putirka, K., Jean, M., and Perez-Guissinye, M. (2011) Hypothesis-testing proposed control of strain weakening by crustal quartz abundance, submitted to AGU fall meeting, Dec. 1-5, 2011.
Platt, B., and Putirka, K. (2011) A reconstruction of paleo-positions of Basin and Range volcanic rcoks, and implications for tectonic controls (Mendocino Triple Junction Migration) on volcanism, submitted to AGU fall meeting, Dec. 1-5, 2011.
Torrez, G, Carlson, C., Putirka, K., Pluhar, C., and Sharma, R. (2011) Correlations and Areal Distribution of the Table Mountain Formation, Stanislaus Group; Central Sierra Nevada, California. submitted to AGU fall meeting, Dec. 1-5, 2011.
Mollo, S., Putirka, K., Iezzi, G., Del Gaudio, P., Scarlato, P. (2011) Interpreting

plagioclase-melt (dis)equilibrium due to cooling dynamics: implications for thermometry, barometry and hygrometry, Geophysical Research Abstracts v. 13, European Geophysical Union General Assembly 2011

Putirka, K. and Busby, C. (2010) The meaning of high K_2O volcanism in the U.S. Cordillera, AGU fall meeting, V11B-2261.

Putirka, K. and Busby, C. (2010) Tectonic controls on high K_2O volcanicsm and the volcanic record of lithosphere degradation, GSA Penrose Conference, August 16-20, Bridgeport, CA.

Torrez, G. and Putirka, K. (2010) Wall rock assimilation and magma migration in the Sierra Nevada Batholith: a study of the Courtright Inrusive Zone, central California, AGU fall meeting, V43C-2396.

Farner, M., Jackson, J.L., Putirka, K., and Wood, A. (2010) Magma mixing and crystallization at Chaos Crags, in the Lassen Volcanic Center, AGU fall meeting, V43C-2384.

Busby, C.J., and Putirka, K. (2010) Birth of a plate boundary: transtensional tectoncis and magmatism, Sierra Nevada microplate and Gulf of California Rift, GSA Tectonic Crossroads: Evolving Orogens of Eurasia-Africa-Arabia Meeting, Ankara, Turkey, Oct 4-8, #175356.

Armienti, P., Perinelli, C., and Putirka, K.D. (2010) An empirical hygrometer for trachybasaltic melts: applications to the kinetics of magma ascent at Mt. Etna, Geophysical Research Abstracts, European Geophysical Union General Assembly, v. 12, abstract # EGU2010-8931.

Putirka, K. (2009) A Consensus on Mantle Potential Temperatures? AGU fall meeting, 2009.

Putirka, K. and Busby, C. (2009) On the Contrasts Between Basin and Range and Cascade Magmatism, & the Timing of Cordilleran Lithosphere Degradation, AGU fall meeting, 2009.

Wonderly, A., Cancholla, J., and Putirka, K. (2009) Geochemical investigation of Saddlebag lake Roof Pendant and Lee Vining Intrusive Suite origins, fall meeting AGU, Abstract #V51A-1635.

Busby, C., Putirka, K., Hagan, J., Koerner1, A., Melosh, B. (2009) Controls of Extension on Miocene Arc magmatism in the central Sierra Nevada, CA, AGU fall meeting, 2009.

Hagan, J., Busby, C., Putirka, K. (2009) Controls of extension on climactic arc Magmatism: Ebbetts Pass-Carson Pass Area, Sierra Nevada (CA), Geol. Soc. Am Annual Meeting, fall, 2009, Abstract # 165012.

Busby, C., Koerner, A., Putirka, K. (2009) Volcanism due to transtension at the birth of the Sierra Nevada Microplate: similarities to ongoing continental lithosphere rupture at nearby Long Valley, Geol. Soc. Am Annual Meeting, fall, 2009, Abstract # 163215.

Busby, C.J., Putirka, K., (2009) Cretaceous-Cenozoic landscape evolution of the SW U.S.A.: Uplift and erosion of the Sierra Nevada, GSA Cordilleran Section 105th Annual Meeting (7-9 May 2009).

Hagan, J., Busby, C., Putirka, K., Renne, P. (2009) Cenozoic paleocanyon evolution, ancestral Cascades arc volcanism and structure of the Carson Pass region, Sierra Nevada, California, GSA Cordilleran Section 105th Annual Meeting (7-9 May 2009

Putirka, K.D. (2008) Olivine compositions from the Hawaii Scientific Drilling Project

(HSDP), Phase 2: Evidence for a peridotite mantle source region, abstracts, American Geophysical Union, fall meeting, San Francisco, 2008.

Wonderly, A., K. Putirka, Abedini, A., and Hurwitx, S. (2007) Olivine crystallization and mantle potential temperatures beneath Yellowstone, Abstracts, American Geophysical Union, fall meeting, V53B-1324.

Putirka, K., and Busby, C.J. (2007) High K volcanism in the Sierra Nevada: A signal for the initiation of Walker Lane Faulting, and range uplift, not lithosphere delamination, Abstracts, American Geophysical Union, fall meeting, T33A-1146.

Busby, C.J., Hagan, J., and Putirka, K. (2007) Geologic evidence for eruption of voluminous high-K magmas at the onset of Walker Lane transtensional faulting, central Sierra Nevada: birth of a plate margin, not root delamination, Abstracts, American Geophysical Union, fall meeting, T33A-1145.

Busby, C.J., Hagan, J., Putirka, K., Wagner, D., and Gans, P. (2007) Birth of a plate boundary: voluminous high-K magmatism and tranbstension along the central Sierran range front, California, Geol Soc. Am. Penrose Conference.

Putirka, K. (2006) Petrologic evidence that most ocean islands derive from thermally driven mantle plumes, Abstracts, American Geophysical Union, fall meeting, V33D-07.

Jean, M., Putirka, K., Busby, C., and Hagan, J. (2006) The Central Sierra Nevada Volcanic Field: a geochemical study of a transitional arc, Abstracts, American Geophysical Union, fall meeting, V11A-0570.

Putirka, K. (2006), Average Potential Temperature of the Upper Mantle and Excess Temperatures Beneath Regions of Active Upwelling, Abstracts, American Geophysical Union, spring meeting, Paper Number: V21A-04.

Hagan, J.C., Busby, C., Putirka, K., Wagner, D., and Gans, P. (2006) A Preliminary Study of the Stratigraphy, Geochronology, Geochemistry and Structure of Tertiary Volcanic Rocks in the Central Sierra Nevada, From Carson Pass to Sonora Pass, Abstracts, American Geophysical Union, spring meeting, Paper Number: V33C-0693.

Putirka, K., (2005) Mantle temperatures, and tests of experimentally calibrated olivine-melt equilibria, Abstracts, American Geophysical Union, fall meeting, 2005, Paper Number: V41E-1508.

Vaid, N., Putirka, K., and Kuntz, M. (2005) Evolution of the Craters of the Moon Lavas from primitive Snake River Plain basalts: inferences from plagioclase-melt thermobarometers and whole rock compositions, Abstracts, American Geophysical Union, fall meeting, 2005, Paper Number: V13E-0601.

Sharma, R., Putirka, K., and Busby, C., (2005) Ancestral Cascade Arc volcanism in the North-Central Sierra Nevada, California , Abstracts, American Geophysical Union, fall meeting, 2005, Paper Number: V41B-1442.

Putirka, K.D. (2005) Estimates of Mantle Temperatures based on olivine phenocrysts and olivine-melt equilibria. Goldschmidt Conference Abstracts, 2005, Geochimica et Cosmochimica Acta.

Putirka, K.D., Smart, C., and Polfer, K. (2004) Mineral Compositions from the Hawaii Scientific Drilling Project (HSDP): Preliminary Results Part III – Olivine, Abstracts, American Geophysical Union, fall meeting, 2004.

Polfer, K., Smart, C., and Putirka, K.D. (2004) Mineral Compositions from the Hawaii

Scientific Drilling Project (HSDP): Preliminary Results Part I – Clinopyroxene, Abstracts, American Geophysical Union, fall meeting, 2004.
Rood, D.H, Busby, C.J., Putirka, K.D., and Gans, P., Range Front Faulting and Ancestral Cascades Arc Magmatism in the Central Sierra Nevada at 10 Ma: Onset of Basin and Range Extension or Sierran Root Delamination? Abstracts, American Geophysical Union, fall meeting, 2004.
Smart, C., Polfer, K., and Putirka, K.D. (2004) Mineral Compositions from the Hawaii Scientific Drilling Project (HSDP): Preliminary Results Part II – Plagioclase, Abstracts, American Geophysical Union, fall meeting, 2004.
Putirka, K. and Kuntz, Mel (2004) Temperature-pressure (depth) estimates of magmas from the Craters of the Moon and nearby lava fields, ID, based on mineral-melt equilibria: preliminary results, Geological Society of America Abstracts with Program, Cordilleran/Rocky Mountain section joint meeting, Boise ID, submitted.
Putirka, K. (2003) New igneous thermobarometers based on plagioclase + liquid equilibria, Eos, Transactions, American Geophysical Union, v. 84, fall 2003, V41C-0312.
Putirka, K., Condit, C. (2002) An interior view of the Springerville Volcanic Field, AZ Magma Plumbing System, Eos, Transactions, American Geophysical Union, v. 83, F1431.
Putirka, K. (2001) New Igneous Thermobarometers for Evolved Lava Compositions Based on Clinopyroxene + Liquid Equilibria, Eos, Transactions, American Geophysical Union, v. 82, p. S430.
Smith, S. and Putirka, K. (2001) "Crystallization depths for Holocene basaltic lavas from Craters of the Moon National Monument, ID, Sigma Xi Undergraduate Research Symposium, Indiana, Pa.
Putirka, K. (2000) Mapping the depths of mantle components, Eos, Transactions, American Geophysical Union, Spring meeting, 2000, Washington, DC., v. 81, p. 217.
Putirka, K., A. Kent, I. Hutcheon I., and F. Ryerson (1999c) Preliminary results regarding phlogopite-melt saturation and water partitioning, Eos, Transactions, American Geophysical Union, Spring, 1999, Boston, v. 80.
Putirka, K. (1999d) Estimating the Mineralogy of the Upper Mantle, and Partial melting Depths and Temperatures of Oceanic Basalts, in Institute of Geophysics and Planetary Physics, 1999 Annual Report, F. J. Ryerson ed., Lawrence Livermore National Laboratory.
Putirka, K. (1998b) Estimates of Mantle Heterogeneity and Initial Melting Depths at Hawaii and the East Pacific Rise, Eos, Transactions, American Geophysical Union, Fall, 1998, v. 79, p. F939.
Putirka, K (1998c) Melting Depths and Heterogeneity Beneath Earth's Ocean Basins, Institute of Geophysics and Planetary Physics, Annual Meeting, Los Alamos, NM.
Putirka, K. (1998d) Calibration of garnet + and clinopyroxene + liquid saturation surfaces, and some preliminary applications to komatiite petrogenesis (Invited), Eos, Transactions American Geophysical Union, v. 79, p. S378.
Putirka, K. (1997b) Melt productivity during fractional melting and the apparent conflict between inferred melting depths and crustal thickness, Eos, Transactions, American Geophysical Union, v. 78, p. F837-F838.
Putirka, K., M. Johnson, R. Kinzler, and D. Walker (1992) Thermobarometry of mafic

igneous rocks based on pyroxene-liquid equilibria, 0-25 kb, Eos, Transactions, American Geophysical Union, v. 74, p. 658.

Putirka, K. and P. Weigand (1987) Miocene volcanic rocks of the western Mojave Desert, California: evidence for magma-mixing, Geological Society of America, Abstracts with Program, v. 19, p. 441.