

James Lawford Anderson

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Personal Information

Research Interest: Igneous and metamorphic petrology; mineral equilibria
Born: December 2, 1947 – Goose Creek (now Baytown), Texas
Married to Jean Morrison, Professor of Earth and Environment and University Provost (2011-2023)

Education

B.A. (Geology, minor in History) Trinity University, San Antonio, 1970
M.S. (Geology) University of Wisconsin, Madison, 1972
Ph.D. (Geology, minor in Chemistry) University of Wisconsin, Madison, 1975

Military Experience

Commission: 2nd Lieutenant, U.S. Army, Field Artillery, May 1970; 1st Lieutenant, U.S. Army Reserve,
June 1973-77; Captain, U.S. Army Reserve, June 1977-78

Professional Experience

Assistant Director, Undergraduate Learning Assistant Program, Boston University, 2015 – 2020
Professor of Earth Sciences, Department of Earth & Environment, Boston University, 2011 – present
Professor (1989-2011), Associate Professor (1981-1989), Assistant Professor (1975-1981), Department of
Earth Sciences, University of Southern California
Director of Undergraduate Students, Department of Earth and Environment, Boston University, 2012-present.
Director of the USC Center for Excellence in Teaching, Office of the Provost (2007-2011)
Director of Faculty Affairs, Office of the Dean, College of Letters, Arts, and Sciences, USC (2002-2005)
Faculty Fellow, USC Center for Excellence in Teaching (2002-2011)
Chair (1998-2003), Department of Earth Sciences, USC
President of the Faculty of USC and the USC Academic Senate (1997-1998)
President, Faculty Council of the College of Letters, Arts, and Sciences, USC (1995-1996)
Technical Advisor, PBS television series, "Earth Revealed" (1988-1992)
Technical advisor, GameDesk (2011-2014); a non profit with NSF funding to make games for teaching
science, K-12)

Professional Societies and Affiliations

American Geophysical Union
Geological Society of America (Fellow)
Mineralogical Society of America (Fellow)

Awards

1989, USC Associates Award for Excellence in Teaching, Office of the Provost
1992, USC Innovative Teaching Award, Office of the Provost
1994, Hewlett Teaching Award, USC College
1998, Outstanding Teacher Award, University Student Association
1998, General Education Teaching Award, USC College of Letters, Arts, and Sciences
1999, Professor of the Year, Gamma Sigma Alpha National Honor Society
1999, Greek Women of USC Faculty Recognition Award

2000, Professor of the Year, Gamma Sigma Alpha National Honor Society
2000, University Distinctive Service Recognition Award, USC Academic Senate
2001, Faculty Member of the Year, USC Panhellenic Council
2003, Professor of the Year, USC Gamma Sigma Alpha National Honor Society
2006, Faculty Recognition Award, USC Gamma Sigma Alpha National Honor Society
2007, Faculty Innovative Teaching Award, Office of the Provost, USC
2008, Faculty Appreciation Award, Alpha Lambda Delta student honor society, USC
2008, Professor of the Year, Gamma Sigma Alpha National Honor Society, USC
2009, Professor of the Year, Gamma Sigma Alpha National Honor Society, USC
2009, Tapped by the USC Mortar Board Scholars, a National Honor Society, USC
2010, Distinguished Educator Award, Los Angeles Council of Engineers and Scientists
2014, Boston University Excellence in Advising Award

Summary of Research Activities

My principal research interest is the evolution and construction of the Earth's crust. As an igneous petrologist concerned with granitic magma genesis and mineral equilibria, much of my work and that of my students have been devoted to an understanding of the evolution of granite magma from its source to emplacement. The research is both field and lab oriented and has shared interests with other disciplines including geochemistry, structural geology and tectonics, and rock mechanics.

Present research problems are diverse but follow a common theme, one of crustal petrology. Much of my research is focused on the Proterozoic crustal evolution of North America with emphasis on the rapid growth of orogenic crust during the Early Proterozoic (1.7-1.9 Ga) and the Proterozoic-unique, "anorogenic" magmatism of the period 1.0 to 1.5 Ga. The objective is to document the evolution of distinct magmatic suites utilizing exposures in the midcontinent, the Colorado Front Range, and the mountainous regions of Arizona, southern Nevada, and southern California.

The second area of research is related to the Mesozoic and Tertiary magmatism of the western U.S. An exciting aspect of this study has been the identification of middle crust within the southwest Cordillera. Much of this work has centered around the Whipple Mountains region of southeastern California. Since 1990, I have been working on emplacement conditions and magmatic evolution of the Mt. Stuart batholith, north Cascades, Washington and the Tuolumne Intrusion of the Sierra Nevada batholith, California.

During 2006-2011, I was involved in a USC College- and Provost-supported Team Research project to have undergraduate students involved in our NSF-supported research in Yosemite. We had over a dozen undergraduate students in the field with us all these summers and years and their work was presented at national meetings, including GSA and AGU.

As of 2011 and after 36 years at USC, I have relocated to Boston University where I am enjoying making new colleagues and learning of new research endeavors. However, my research continues in the Sierras and the Washington Cascades. I am no longer accepting new graduate students but I continue to support two Ph.D. students at USC with my former colleague, Scott Paterson, and a MS student in Iran.

I am no longer accepting new graduate students but I recently advised two undergraduate senior theses at BU. Phillip Purvis worked on pegmatites and two mica granites from the Fitchburg, MA area. Connor Levy worked on the Quincy and Peabody granites. Through this research, they acquired new geochemical data, age data, and have completed new electron microprobe analyses at MIT. Both presented their research at a Spring GSA meeting.

Statement regarding Teaching and Service

I attempt to offer a balanced program of both teaching and research. Teaching a high quality course is a personal goal, regardless of the level of the class. In recent years, I have strived to make my teaching more learner-centered in recognition that each student learns differently. In my larger classes, I have the students use "clickers" to enable them to assess their learning in real time. The numbers of

students in my GE classes at BU are routinely 100 to over 150, however I strive to learn the name of every student and also to know them.

I have had the honor of receiving a number of teaching awards and most of these have come from the large general education courses.

Since 2012, I have served as the Director of Undergraduate Studies for our Department. At Boston University, I have taught three different 100 level earth science courses, plus ES 300 Earth's Rocky Materials, and ES 424 Igneous and Metamorphic Petrology.

I am currently the faculty advisor to our department's geology club (**Boston University Geological Society or BUGS**). I am also the faculty advisor, and perhaps the first ever at BU I am told, to a campus sorority (**Gamma Phi Beta**). I was the faculty advisor to the same sorority at USC for many years and upon my departure, the women there wrote those here that I might do the same. I help these women find the right major or double major or minor, seek internships, consider semester abroad opportunities, deal with grades less than their expectations, find research opportunities, and the next step beyond BU, be it jobs or higher education. I am also the faculty advisor to the all gender service fraternity at BU, **Alpha Phi Omega**.

I write many letters of recommendation for our EE undergraduate majors and other students at BU, easily near 100 per year. It is a time commitment but I am glad to be of help to all of our students.

Publications

Books

Anderson, J. L., editor, *The Nature and Origin of Cordilleran Magmatism*: Geological Society of America Memoir 174, 405 pages, (1990)

Papers (1990-present)

Anderson, J. L. and Cullers, R. L. (1990). Middle to upper crustal plutonic construction of a magmatic arc, an example from a metamorphic core complex, *in* Anderson, J. L., editor, *The Nature and Origin of Cordilleran Magmatism*, Geological Society of America Memoir 174, p. 47-69.

Davis, G. A., and Anderson, J. L. (1991) Low-angle normal faulting and rapid uplift of mid-crustal rocks in the Whipple Mountains metamorphic core complex, southeastern California: *in* Walawender, M. J., and Hanan, B. B., editors, *Geological Excursions in Southern California and Mexico*, Guidebook for the 1991 Annual Meeting, Geological Society of America, San Diego, p. 417-446.

Anderson, J. L., Barth, A. P., Young, E. D., Davis, M. J., Farber, D., Hayes, E. M., Johnson, K. A. (1992). Plutonism across the Tujunga-North American terrane boundary: A middle to upper crustal view of two juxtaposed arcs, *in* Bartholomew, M. J., Hyndman, D. W., Mogk, D. W., and Mason, R., editors, *Characterization and Comparison of Ancient and Mesozoic Continental Margins - Proceedings of the 8th International Conference on Basement Tectonics*, Kluwer Academic Publishers, Dordrecht, Netherlands, p. 205-230.

Cullers, R. L., Griffin, T., Bickford, M. E., and J. L. Anderson (1992) Origin and chemical evolution of the 1360 Ma-old San Isabel batholith, Wet Mountains, Colorado, USA: A mid-crustal granite of anorogenic affinities: *Geological Society of America Bulletin*, v. 104, p. 316-328.

Mayo, D. P., Morrison, J., and Anderson, J. L. (1992) Chemical and oxygen isotopic variations in upper plate rocks of the Whipple Mountains detachment system, California, USA, *in* Kharaka, Y. K. and Maest, A. S. (editors) *Water-Rock Interaction, Proceedings of the 7th International Symposium on Water-Rock Interaction*, v. 2, Moderate and High Temperature Environments, A. A. Balkema Publishers, Rotterdam, Netherlands, p. 1527-1532.

Anderson, J. L., and Morrison, J. (1992) The role of anorogenic granites in the Proterozoic crustal development of North America, *in* Condie, K. C., editor, *Proterozoic Crustal Evolution*: Elsevier, p. 263-299.

Cullers, R. L., Stone, J., Anderson, J. L., Sassarini, N., and Bickford, M. E. (1993) Petrogenesis of Mesoproterozoic Oak Creek and West McCoy Gulch plutons, Colorado: an example of cumulate unmixing of mid-crustal, two mica granite of anorogenic affinity: *Precambrian Research*, v. 62, p. 139-169.

- Anderson, J. L. (1993). The Wolf River Batholith, in Reed, J. C. and others (eds.) *Geology of North America, Geological Society of America DNAG Volume C-2, Precambrian: Conterminous U.S.*, p. 69-71.
- Bender, E. E., Morrison, J., Anderson, J. L., and Wooden, J. L. (1993) Early Proterozoic ties between two suspect terranes and the Mojave crustal block of the southwestern United States: *Journal of Geology*, v. 101, p. 715-728.
- Anderson, J. L., Wooden, J. L., and Bender, E. E. (1993) Mojave Province of southern California and vicinity, in Van Schmus, W. R., and Bickford, M. E. (eds.) *Transcontinental Proterozoic Provinces, Chapter 4, Geology of North America, Geological Society of America DNAG Volume C-2, Precambrian: Conterminous U.S.*, p. 176-188.
- Bickford, M. E., and Anderson, J. L. (1993) Middle Proterozoic magmatism, in Van Schmus, W. R., and Bickford, M. E. (eds.) *Transcontinental Proterozoic Provinces, Chapter 4, Geology of North America, Geological Society of America DNAG Volume C-2, Precambrian: Conterminous U.S.*, p. 281-292.
- Davis, M. J., Farber, D. L., Wooden, J. L., and Anderson, J. L. (1994) Conflicting tectonics? Contraction and extension at middle and upper crustal levels along the Cordilleran Late Jurassic arc, southeastern California: *Geology*, v. 22, p. 247-250.
- Howard, K. A., John, B. E., Davis, G. A., Anderson, J. L., and Gans, P. B. (1994) A guide to Miocene extension and magmatism in the lower Colorado River region, Nevada, Arizona, and California; Field Trip 3, 8th International Conference on Geochronology, Cosmochronology, and Isotope Geology, U.S.G.S. Open File Report 94-246, 54p.
- Paterson, S. R., Miller, R. B., Anderson, J.L., Lund, S., Bendixen, J., Taylor, N., and Fink, T. (1994) Emplacement and evolution of the Mt. Stuart batholith. In D.A. Swanson and R. A. Haugerud, Eds., *Geologic field trips in the Pacific northwest*, v. 2, p. 2F1-2F27, Department of Geological Sciences, University of Washington in conjunction with the Geological Society of America, Seattle.
- Ekstrom, H., Morrison, J., and Anderson, J. L. (1994) Petrogenetic modeling and stable isotopic evaluation of anorthositic and jotunitic to syenitic magma series in the San Gabriel anorthosite complex, southern California: *Precambrian Research*, v. 70, p. 1-24.
- Anderson, J. L., and Smith, D. R. (1995) The effect of temperature and oxygen fugacity on Al-in-hornblende barometry: *American Mineralogist*, v. 80, p. 549-559.
- Anderson, J. L. (1996) Status of thermobarometry in granitic batholiths: *Transactions of the Royal Society of Edinburgh*, v. 87, 125-138. [also published in *GSA Special Paper 315*]
- Anderson, J. L. (1997) Regional tilt of the Mount Stuart batholith, Washington, determined using aluminum-in-hornblende barometry, implications for northward translation of Baja British Columbia: *Discussion: Geological Society of American Bulletin*, v. 109, 1223-1225.
- Morrison, J. and Anderson, J. L. (1998) Footwall refrigeration along a detachment fault: Implications for the thermal evolution of core complexes: *Science*, v. 279, 2 January, p. 63-66.
- Mayo, D. P., Anderson, J. L., & Wooden, J. L. (1998) Isotopic constraints on the petrogenesis of Jurassic plutons, southeastern California: *International Geology Review*, v. 40, p. 257-278.
- Anderson, J. L. and Cullers, R. L. (1999) Paleo- and Mesoproterozoic granite plutonism of Colorado and Wyoming. *Rocky Mountain Geology*, v. 34, p. 149-164.
- Tate, M. C., Norman, M.D., Johnson, S. E., Fanning, C. M., and Anderson, J. L. (1999) Generation of tonalite and trondhjemite by subvolcanic fractionation and partial melting in the Zarza intrusive complex, western Peninsular Ranges batholith, northwestern Mexico: *Journal of Petrology*, v. 40, p. 983-1010.
- Anderson, J.L. and Morrison, J. (2005) Ilmenite, magnetite, and peraluminous Mesoproterozoic anorogenic granites of Laurentia and Baltica. *Lithos*, v. 80, p. 45-60.
- Anderson, J.L., Barth, A.P., Wooden, J.L. Mazdab, F. (2008) Thermometers and Thermobarometers in Granitic Systems. In, *Mineralogical Society of America, Reviews in Mineralogy and Petrology*, v. 69, Minerals, Inclusions, and Volcanic Processes, Putirka, K. and Tepley, F. eds., p. 121-142.
- Barth, A. P., Anderson, J.L., Jacobson, C., Paterson, S. R., Wooden, J.L. (2008) Magmatism and tectonics in a tilted crustal section through a continental arc, eastern Transverse Ranges and southern Mojave Desert. *GSA Field Guide 11, 2008 Cordilleran Section meeting*, p. 101-117.

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- Pignotta, G.S., Paterson, S.R., Coyne, C., Anderson, J.L. and Onezime, J. (2010) Testing models for the incremental growth of magma chambers: Construction of the Jackass Lakes pluton, central Sierra Nevada batholith., *GSA Geosphere*; v. 6, no. 2, p. 1–30.
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- Anderson, J.L., Morrison, J., and Paterson, S. (2012) Post-emplacement fluids and pluton thermobarometry: Mt. Stuart batholith, Washington Cascades. *International Geology Review*, v. 54, no. 5, p 491-508.
- Anderson, J. L. (2012) Cold Pegmatites, *Elements*, v. 8, no. 4., p. 248-249
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- Shi, Y., Anderson, J.L., Ding, J., Liu, C., Zhang, W. Shen, C. (2016) Zircon ages and Hf isotopic compositions of Permian and Triassic A-type granites from central Inner Mongolia and their significance for late Palaeozoic and early Mesozoic evolution of the Central Asian Orogenic Belt, *International Geology Review*, doi:10.1080/00206814.2016.1138333, 17p.
- Shi, Y., Anderson, J.L., Wu, Z., Yang, Z., Li, L., Ding, J. (2016) Age and Origin of Early Paleozoic and Mesozoic Granitoids in Western Yunnan Province, China: Geochemistry, SHRIMP Zircon Ages, and Hf-in-Zircon Isotopic Compositions, *The Journal of Geology*, 2016, volume 124, p. 617–630, DOI: 10.1086/687397.
- Li, L., Shi, Y., Anderson, J.L., and Cui, M. (2016) Sensitive high-resolution ion microprobe U-Pb dating of baddeleyite and zircon from a monzonite porphyry in the Xiaoshan area, western Henan Province, China: Constraints on baddeleyite and zircon formation process: *Geosphere*, v. 12, no. 4, p. 1362–1377, doi:10.1130/GES01328.1
- Robinson, F.A., Bonin, B, Pease, V., and Anderson, J.L. (2017) A discussion on the tectonic implications of Ediacaran late- to post-orogenic A-type granite in the northeastern Arabian Shield, Saudi Arabia: *Tectonics*, DOI: 10.1002/2016TC004320
- Yang, Y., Shi, Y., Anderson, J. L. (2017) Zircon SHRIMP U-Pb Ages and Geochemistry of Late Mesozoic Granitoids in Western Zhejiang and Southern Anhui: Constraints on the Model of Lithospheric Thinning of Southeast China: *International Geology Review*, DOI: 10.1080/00206814.2017.1317220
- Li, L., Shi, Y., Williams, I. S., Anderson, J. L., Wu, Z., Wang, S. (2017) Geochemical and zircon isotopic evidence for extensive high level crustal contamination in Miocene to mid-Pleistocene intra-plate volcanic rocks from the Tengchong field, western Yunnan, China: *Lithos*, DOI:10.1016/j.lithos.2017.06.015
- Ding, j., Shi, Y., Kroner, A, and Anderson, J. L. (2017) Constraints on sedimentary ages of the Chuanlinggou Formation in the Ming Tombs, Beijing, North China Craton: LAICP-MS and SHRIMP U–Pb dating of detrital zircons: *Acta Geochemica*, DOI 10.1007/s11631-017-0211-1
- Shi, Y., Hou, C., Anderson, J. L., Yang, T., Ma, Y., Bian, W., and Jin, J. (2017) Zircon SHRIMP U–Pb age of Late Jurassic OIB-type volcanic rocks from the Tethyan Himalaya: constraints on the initial activity time of the Kerguelen mantle plume: *Acta Geochemica*, DOI 10.1007/s11631-017-0239-2
- Ratschbacher, B.C., Keller, C.B., Schoene, B., Paterson, S.R., Anderson, J.L., Okaya, D., Putirka, K., Lippoldt, R., (2018) A new workflow to assess emplacement duration and melt residence time of

- compositionally diverse magmas emplaced in a subvolcanic reservoir. *Journal of Petrology*, 1-23. DOI: 10.1093/petrology/egy079
- Ding, J., Shi, Y., Kröner, A., & Lawford Anderson, J. (2018). Constraints on sedimentary ages of the Chuanlinggou Formation in the Ming Tombs, Beijing, North China Craton: LA-ICP-MS and SHRIMP U–Pb dating of detrital zircons. *Acta Geochimica*, 37(2), 257-280. doi:10.1007/s11631-017-0211-1
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- Bao, Z., Shi, Y., Anderson, J.L., Kennedy, A., Ke, Z., Gu, X., Wang, P., Che, X., Kang, Y., Sun, H., Wang, C. (2020) Petrography and chronology of lunar meteorite Northwest Africa 6950. *Science China*, v. 63, 1-13. <https://doi.org/10.1007/s11432-019-2809-3>
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- Kang, Y., Shi, Y., Anderson, J.L. (2021) Tectonic mechanism and evolution of eastern China during the Early Cretaceous: a view from magmatism in the middle to Southern Tan-Lu fault zone. *International Geology Review*, v. 63, p. 21-46. <https://doi.org/10.1080/00206814.2019.1700400>
- Wu, X., Shi, Y., Anderson, J.L., (2021) Shrimp U-Pb dating of detrital zircons from the Permian sandstones along the southern and northern margins of Xar Moran River, central inner Mongolia: Implications for provenance and the tectonic evolution of the eastern segment of the central Asian orogenic belt. *American Journal of Science*, v. 321, p 152-177. <https://DOI.org/10.2475/01.2021.04>
- Kang, Y. L., Shi, Y., Anderson, J.L. (2021) Chronological and geochemical variations of the late Mesozoic granitoids in the Taihang Mountains and middle-southern Tan-Lu fault: Implications for lithosphere destruction of the North China Craton. *American Journal of Science*. v. 321, p. 739-787. <https://DOI.10.2475/06.2021.04>
- Economos, Rita C., Andrew P. Barth, Joseph L. Wooden, Scott R. Paterson, Brody Friesenhahn, Bettina A. Wiegand, J. Lawford Anderson, Jennifer L. Roell, Emerson F. Palmer, Adam J. Ianno, and Keith A. Howard (2021) Testing models of Laramide orogenic initiation by investigation of Late Cretaceous magmatic-tectonic evolution of the central Mojave sector of the California Arc, *Geosphere*, v. 17, No. 6, p. 2042-2061. <https://doi.org/10.1130/GES02225.1>
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Meeting Abstracts (since 2004)

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- Needy, S.K., Barth, Andrew P.1, Anderson, J.L., and Wooden, J. (2006) Geothermobarometry of the eastern Transverse Ranges, southern California. GSA Abstracts with Programs, Vol. 38.
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- Foley, B. J., Ball, E. N., Fischer, G.C., Thompson, J.M., Memeti, V., Pignotta, G.S., Anderson, J.L., Paterson, S.R., Matzel, J., Mundil, R. (2007) Downward ductile displacement of volcanic crust during pluton emplacement in the central Sierra Nevada: Undergraduate Team Research at USC: Geological Society of America Abstracts with Programs [Bellingham].
- Thompson, J.M., Ball, E. N., Fischer, G.C., Foley, B. J., Memeti, V., Pignotta, G.S., Paterson, S.R., Anderson, J.L., Matzel, J., Mundil, R. (2007) Searching for the Mojave-Snow Lake Fault: Undergraduate Team Research at USC: Geological Society of America Abstracts with Programs [Bellingham].
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Faculty Advisor

Sorority Gamma Phi Beta USC (1992 – 2011), BU (2012- present)
Boston University Geologic Society (BUGS) 2012 – present
Alpha Phi Omega, a BU all gender service fraternity 2018- present

Past Graduate Students

Supervised Masters Theses - 18
Supervised Dissertations – 11

Recent undergraduate senior theses that I advised and financially supported

Purvis, Phillip (2017) Pegmatites of Rollstone Hill in Fitchburg, Massachusetts, 74p.
Levy, Connor (2017) Characterization and Classification of the Peabody and Quincy Plutons in the Eastern Massachusetts Igneous Complex, 35 p.

Former graduate students hold tenured faculty positions at UCLA, Oxford, Northern Arizona University, Pomona College, Santa Ana College, Pasadena City College, Indiana University, University of Arkansas, Orange Coast College, and Cal State University Los Angeles. Others are working in the mineral exploration, petroleum, environmental, or aerospace industry.