

VITA - Douglas Smith

Born - April 1, 1940, St. Joseph, Missouri

Married - (Jean F. Smith), two children

Education:

B.S., Geology, 1962, California Institute of Technology

A.M., Geology, 1963, Harvard University

Ph.D., Geology, 1969, California Institute of Technology

Employment:

Geologist, Maine Geological Survey, Summer, 1962

Field Assistant (in Maine), U.S. Geological Survey, 1963

Postdoctoral Fellow, 1968-1971, Carnegie Institution of Washington (Geophysical Laboratory)

Assistant Professor, Univ. Texas Austin, 1971-1977

Associate Professor, Univ. Texas Austin, 1977-1983

Visiting Associate in Geology, California Institute of Technology, 1-1-80 to 7-1-80

Professor, Univ. Texas Austin, 1983-2003

Albert W. and Alice M. Weeks Professor, 1986 -2003

Phased Retirement (Half-time appointment), 2000 - 2003

Professor Emeritus, 9/2003 to present

Professional Societies: Fellow, Geological Society of America. Fellow, Mineralogical Society of America. Member, American Geophysical Union.

Articles (and recent poster)

Smith, D., 2020, Trace elements in Cr-pyrope from the Navajo volcanic field of the Colorado Plateau, SW USA, and implications for the mantle wedge during low-angle subduction. *Lithos* v. 362-363, 105460, doi: 10.1016/j.lithos.2020.105460

Smith, D., 2017, Trace elements in Cr-pyrope from the Navajo Field of the Colorado Plateau: evidence for mixing in the mantle wedge during low-angle subduction. Geological Society of America Annual Fall Meeting, 85-6 (Poster at link: <https://gsa.confex.com/gsa/2017AM/meetingapp.cgi/Paper/297476>)

Behr, W. M., and Smith, D., 2016, Deformation in the mantle wedge associated with Laramide flat-slab subduction. *Geochemistry, Geophysics, Geosystems* 10.1002/2016GC006361

Smith, D., 2013, Olivine thermometry and source constraints for mantle fragments in the Navajo Volcanic Field, Colorado Plateau, southwest United States: Implications for the mantle wedge, *Geochemistry, Geophysics, Geosystems* v. 14, doi:10.1002/ggge.20065

Smith, D., 2010, Antigorite Peridotite, Metaserpentinite, and other Inclusions within Diatremes on the Colorado Plateau, SW USA: Implications for the Mantle Wedge during Low-angle Subduction. *Journal of Petrology* v. 51, p 1355-1379. doi: 10.1093/petrology/egq022

Smith, D., and Griffin, W. L., 2005, Garnetite Xenoliths and Mantle-Water Interactions Below the Colorado Plateau, Southwestern United States. *Journal of Petrology* v. 46, p 1901-1924.

Smith D., Connelly J. N., Manser K., Moser D. E., Housh T. B., McDowell F. W., Mack L.E., 2004, Evolution of Navajo eclogites and hydration of the mantle wedge below the Colorado Plateau, southwestern United States. *Geochemistry Geophysics Geosystems* v. 5, Q040050, doi:10.29/2003GC000675

- Smith, D., 2000, Insights into the evolution of the uppermost continental mantle from xenolith localities on and near the Colorado Plateau and regional comparisons. *Journal of Geophysical Research*, v 105, p 16769-16781.
- Smith, D., 1999, Temperatures and pressures of mineral equilibration in peridotite xenoliths: Review, discussion, and implications. In *Mantle Petrology: Field Observations and High Pressure Experimentation: A tribute to Francis R. (Joe) Boyd*. Eds. Fei, Y., Bertka, C. M., and Mysen, B. O., *Geochemical Society Special Publication no. 6*, p 171-188.
- Smith, D., Riter, J. C. A., and Mertzman, S. A., 1999, Water-rock interactions, orthopyroxene growth, and silica enrichment in the mantle: evidence in xenoliths from the Colorado Plateau, southwestern United States. *Earth and Planetary Science Letters*, v. 165, p 45-54.
- Esperanca, S., Carlson, R. W., Shirey, S. B., and Smith, D., 1997, Dating crust-mantle separation: Re-Os isotopic study of mafic xenoliths from central Arizona. *Geology*, v. 25, p 651-654.
- Smith, D. and Riter, J. C. A., 1997, Genesis and evolution of low-Al orthopyroxene in spinel peridotite xenoliths, Grand Canyon field, Arizona, USA. *Contributions to Mineralogy and Petrology*, v. 127, p 391-404.
- Griffin, W. L., Smith, D., Ryan, C. G., O'Reilly, S. Y., and Win, T. T., 1996, Trace-element zoning in mantle minerals: metasomatism and thermal events in the upper mantle. *Canadian Mineralogist*, v. 34, p 1179-1193.
- Davis, L. L., Smith, D., McDowell, F. W., Walker, N. W., and Borg, L. E., 1996, Eocene potassic magmatism at Two Buttes, Colorado, with implications for Cenozoic tectonics and magma generation in the western United States. *Geological Society of America Bulletin*, v 108, 1567-1579.
- Riter, J. C. A. and Smith, D., 1996, Xenolith constraints on the thermal history of the mantle below the Colorado Plateau. *Geology*, v 24, p 267-270.
- Smith, D., 1995, Chlorite-rich ultramafic reaction zones in Colorado Plateau xenoliths: recorders of sub-Moho hydration. *Contributions to Mineralogy and Petrology*, v 121, p 185-200.
- Smith, D., Arculus, R. J., Manchester, J. M., and Tyner, G. N., 1994, Garnet-pyroxene-amphibole xenoliths from Chino Valley, Arizona, and implications for continental lithosphere below the Moho. *Journal of Geophysical Research*, v 99, p. 683-696.
- Smith, D., Griffin, W. L., and Ryan, C. G., 1993, Compositional evolution of high-temperature sheared lherzolite PHN 1611. *Geochimica et Cosmochimica Acta*, v 57, p 605-613.
- Davis, L. L. and Smith, D., 1993, Ni-rich olivine in minettes from Two Buttes, Colorado: a connection between potassic melts from the mantle and low Ni partition coefficients. *Geochimica et Cosmochimica Acta*, v 57, p 123-129.
- Smith, D. and Boyd, F. R., 1992, Compositional zonation in garnets in peridotite xenoliths. *Contributions to Mineralogy and Petrology*, v 112, p 134-147.
- Smith, D. and Barron, B. R., 1991, Pyroxene-garnet equilibration during cooling in the mantle. *American Mineralogist*, v 76, 1950-1963.
- Smith, D., Griffin, W. L., Ryan, C. G., and Sie, S. H., 1991, Trace-element zonation in garnets from The Thumb: heating and melt infiltration below the Colorado Plateau. *Contributions to Mineralogy and Petrology*, v 107, 60-79.
- Roden, M. F., Smith, D., and Murthy, V. R., 1990, Chemical constraints on lithosphere composition and evolution beneath the Colorado Plateau. *Journal of Geophysical Research*, v 95, p 2811-2831.

- Griffin, W. L., Smith, D., Boyd, F. R., Cousens, D. R., Ryan, C. G., Sie, S. H., and Suter, G. F., 1989, Trace-element zoning in garnets from sheared mantle xenoliths. *Geochimica et Cosmochimica Acta*, v 53, p 561-567.
- Wittke, J. H., Smith, D. and Wooden, J. L., 1989, Origin of Sr, Nd, and Pb isotopic systematics in high-Sr basalt from central Arizona. *Contributions to Mineralogy and Petrology*, v 101, p 57-68.
- Smith, D. and Boyd, F. R., 1989, Compositional heterogeneities in minerals of sheared lherzolite inclusions from African kimberlites. *Proc. IV International Kimberlite Conf., Special Publication of the Geological Society of Australia* 14, v 2, p 709-724.
- Arculus, R. J., Ferguson, J., Chappel, B. W., Smith, D., McCulloch, M. T., Jackson, I., Hensel, H. D., Taylor, S. R., Knutson, Jr., and Gust, D. A., 1988, Eclogites and granulites in the lower continental crust: examples from eastern Australia and southwestern U.S.A.: *Proceedings 1st Eclogite Conference*, p 335-386.
- Wilkerson, A., Carlson, W. D., and Smith, D., 1988, Eclogite remnants in Purdy Hill quadrangle, Mason County, Texas: P-T implications for the Llano Uplift. *Geology*, v. 16, p 391-394.
- Smith, D., 1988, Implications of zoned garnets for the compositional evolution of sheared lherzolites: examples from northern Lesotho and the Colorado Plateau. *Journal of Geophysical Research*, v. 93, p 4895-4905.
- Smith, D., 1987, Genesis of carbonate in pyrope from ultramafic diatremes on the Colorado Plateau, southwestern United States. *Contributions to Mineralogy and Petrology*, v 97, p 389-396.
- Smith, D. and Boyd, F. R., 1987, Compositional heterogeneities in a high-T lherzolite nodule and implications for mantle processes. In *Mantle Xenoliths*, P. H. Nixon, ed., John Wiley & Sons, New York, p 551-561.
- Tyner, G. N. and Smith, D., 1986, Peridotite xenoliths in silica-rich, potassic latite from the transition zone of the Colorado Plateau in north-central Arizona. *Contributions to Mineralogy and Petrology*, v 94, p 63-71.
- McDowell, F. W., Roden, M. F., and Smith, D., 1986, Comments on "Tectonic implications of the age, composition, and orientation of lamprophyre dikes, Navajo volcanic field, Arizona", by A. W. Laughlin, Aldrich, M. J. Jr., Shafiqullah, M. and Husler, J. *Earth Planetary Science Letters*, v 80, p 415-417.
- Wilson, C. R. and Smith, D., 1985, A numerical study of mineral zoning formed during the cooling of finite volume grains. *Journal of Geophysical Research*, v 90, p 10351-10358.
- Smith, D. and Wilson, C. R., 1985, Garnet-olivine equilibration during cooling in the mantle: *American Mineralogist*, v 70, p 30-39.
- Smith, D. and Ehrenberg, S. N., 1984, Zoned minerals in garnet peridotites from the Colorado Plateau: implications for mantle metasomatism and kinetics. *Contributions to Mineralogy and Petrology*, v 86, p 274-285.
- Wilson, C. R. and Smith, D., 1984, Cooling rate estimates from mineral zonation: resolving power and applications--Appendix. *Kimberlite III Documents, Annales Scientifique de Universite de Clermont - Ferrand*, v 74, p 179-182.
- Wilson, C. R. and Smith, D., 1984, Cooling rate estimates from mineral zonation: resolving power and applications: In *Kimberlites. II. The Mantle and Crust-Mantle Relationships* (J. Kornprobst, ed.), p 265-275.
- Hunter, W. C. and Smith, D., 1981, Garnet peridotite from Colorado Plateau ultramafic diatremes: hydrates, carbonates, and comparative geothermometry: *Contributions to Mineralogy and Petrology*, v 76, p 312-320.

- Smith, D. and Roden, M. F., 1981, Geothermometry and kinetics in a two-spinel periodotite nodule, Colorado Plateau: *American Mineralogist*, v 66, p 334-345.
- Smith, D., 1979, Hydrous minerals and carbonates in peridotite inclusions from the Green Knobs and Buell Park kimberlitic diatremes on the Colorado Plateau: In The Mantle Sample: Inclusions in Kimberlites and Other Volcanics, Boyd, F. R., and Meyer, H. O. A., eds., Amer. Geophys. Union: Proc. Sec. Intern. Kimb. Conf., v 2, p 345-356.
- Roden, M. F. and Smith, D., 1979, Field geology, chemistry, and petrology of Buell Park minette diatreme, Apache County, Arizona: In Kimberlites, Diatremes, and Diamonds: Their Geology, Petrology, and Geochemistry, Boyd, F. R., and Meyer, H. O. A., eds., Amer. Geophys. Union: Proc. Sec. Intern. Kimb. Conf., v 1, p 364-381.
- Arculus, R. J., and Smith, D., 1979, Eclogite, pyroxenite and amphibolite inclusions in the Sullivan Buttes Latite, Chino Valley, Yavapai County, Arizona: In The Mantle Sample: Inclusions in Kimberlites and Other Volcanics, Boyd, F. R., and Meyer, H. O. A., eds., Amer. Geophys. Union: Proc. Sec. Intern. Kimb. Conf., v 2, p 309-317.
- Roden, M. F., Smith, D., and McDowell, F. W., 1979, Age and extent of potassic volcanism on the Colorado Plateau: *Contributions to Mineralogy and Petrology*, v 43, p 279-284.
- Smith, D. and Zientek, M., 1979, Mineral chemistry and zoning in eclogite inclusions from the Colorado Plateau: *Contributions to Mineralogy and Petrology*, v 69, p 119-131.
- Sasaki, A. and Smith, D., 1979, Sulfur isotopic evidence of diabase-granophyre-sedimentary rocks interaction, Sierra Ancha, central Arizona: *Geochemical Journal*, v 13, p 227-229.
- Bartholomew, R. B., Lene, G., and Smith, D., 1978, Imaginary continents: a geologic puzzle: *Journal of Geological Education*, v 26, p 195-197.
- Smith, D., 1977, The origin and interpretation of spinel-pyroxene clusters in peridotite: *Journal of Geology*, v 85, p 476-482.
- Smith, D., 1977, Titanochondrodite and titanoclinohumite derived from the upper mantle in the Buell Park kimberlite, Arizona, USA: A discussion: *Contributions to Mineralogy and Petrology*, v 61, p 213-215.
- Smith, D. and Arculus, R. J., 1977, Chino Valley: Field Trip Guide, Second International Kimberlite Conference, 2 p.
- McGetchin, T. R., Smith, D., Ehrenberg, S. N., Roden, M., and Wilshire, H. G., 1977, Navajo kimberlites and minettes: Field Trip Guide, Second International Kimberlite Conference, 37 p.
- Smith, D. and S. Levy, 1976, Petrology of Green Knobs diatreme, New Mexico, and implications for the mantle below the Colorado Plateau: *Earth Planetary Science Letters*, v 19, p 107-125.
- Smith, D. and L. T. Silver, 1975, Potassic granophyre associated with Precambrian diabase, Sierra Ancha, central Arizona: *Geological Society of America Bulletin*, v 86, p 503-513.
- Schmitt, H. H., Swann, G. A., and Smith, D., 1974, The Buell Park kimberlite pipe, northeastern Arizona: *Geological Society of America Field Trip Guide, Flagstaff Meeting*, p 672-698.
- Smith, D., 1974, Pyroxene-olivine-quartz assemblages in rocks associated with the Nain anorthosite massif, Labrador: *Journal of Petrology*, v 15, p 58-78.
- Smith D., 1972, Stability of iron-rich pyroxene in the system $\text{CaSiO}_3\text{-FeSiO}_3\text{-MgSiO}_3$: *American Mineralogist*, v 57, p 1413-1428.
- Smith, D., 1971, Iron-rich pyroxenes: *Carnegie Inst. Wash. Year Book*, v 69, p 285-290.
- Lindsley, D. H., Smith, D., and S. E. Haggerty, 1971, Petrography and mineral chemistry of a differentiated flow of Picture Gorge basalt near Spray Oregon: *Carnegie Institution of Washington Year Book*, v 69, p 264-285.

- Smith, D. and D. H. Lindsley, 1971, Stable and metastable augite crystallization trends in a single basalt flow: *American Mineralogist*, v 56, p 225-233.
- Smith, D., 1971, Stability of the assemblage iron-rich orthopyroxene-olivine-quartz: *American Journal of Science*, v 271, p 370-382.
- Smith, D., 1971, Reconnaissance experiments with compositions on the join $Fs_{85}En_{15}$ - Wollastonite in the pyroxene quadrilateral: *Carnegie Institution of Washington Year Book*, v 70, p 125-129.
- Smith, D. and L. W. Finger, 1971, Unit cell parameters of synthetic clinopyroxenes on the join $Fs_{85}En_{15}$ - Wollastonite in the pyroxene quadrilateral: *Carnegie Institution of Washington Year Book*, v 70, p 129-130.
- Boyd, F. R. and D. Smith, 1971, Compositional zoning in pyroxenes from lunar rock 12021, Oceanus Procellarum: *Jour. Petrology*, v 12, p 439-464.
- Smith, D., and L. W. Finger, 1971, Magnesian pyroxferroite in lunar rock 12021: *Carnegie Institution of Washington Year Book*, v 70, p 133-134.
- Smith, D., 1970, Mineralogy and petrology of the diabasic rocks in a differentiated olivine diabase still complex, Sierra Ancha, Arizona: *Contrib. Mineral. Petrology*, v 27, p 95-113.
- Smith, D., 1970, Stability of iron-rich orthopyroxene: *Carnegie Institution of Washington Year Book*, v 68, p 229-231.
- Smith, D. and A. L. Albee, 1967, Petrology of a piemontite-bearing gneiss, San Geronio Pass, California: *Contributions to Mineralogy and Petrology*, v 16, p 189-203.

Teaching

Recipient "Knebel Distinguished Teaching Award" by vote of undergraduate and graduate geology majors, 1990

Undergraduate Courses

- Geo 303: Introduction to Geology (sections typically have >150 students)
- Geo 401: Physical Geology
- Geo 416k: Crystallography and Optical Mineralogy
- Geo 416k (revised 1991): Earth Materials
- Geo 416L: Igneous Rocks
- Geo 426P: Igneous and Metamorphic Rocks
- Geo 320k: Elementary Field Geology
- Geo 660: Field Geology
- Geo 279h: Honors Tutorial Courses: Topics related to volcanism on the Colorado Plateau, diffusion models, flow structures in granite, topaz pegmatite, and meteorite genesis.
- Geo 357: Evolution of Geologic Provinces

Graduate Courses

- Geo 380m: Elements of Mineral Identification
- Geo 390m: Thermodynamics of Geologic Processes
- Geo 391n: Analytical Techniques and Applications in Geology
- Geo 386k: Igneous Petrology
- Geo 391: Theoretical Petrology

Geo 391: Research in Analytical Techniques
Geo 391: The Mantle: Geophysics, Petrology, and Structure
Geo 391: Theories of the Earth
Geo 394: Special Granite Seminar

Graduate Students

Ph.D. degrees supervised:

- Dennis P. Dunn (2002) Xenolith mineralogy and geology of the Prairie Creek lamproite province, Arkansas.
- J. C. A. Riter (1999) Geochemical and tectonic evolution of the Colorado Plateau mantle lithosphere: Evidence from Grand Canyon mantle xenoliths.
- L. Borg (1995) The origin and evolution of magmas from the Lassen region of the southernmost Cascades. (cosupervision with D. S. Barker)
- L. L. Davis (1993) Potassic mafic rocks at Two Buttes, Colorado.
- D. Wark (1989) Field, Geochemical, and Isotopic Constraints on the Genesis of Rhyolite Ash-flow Tuffs and Related Rocks, Tomochic Volcanic Center, Sierra Madre Occidental, Mexico.
- J. Wittke (1984) Geochemistry and Isotope Geology of Basalts of the Arizona Transition Zone (Yavapai County) and Their Tectonic Significance.
- G. N. Tyner (1984) Geology and Petrogenesis of the Sullivan Buttes Latite, Yavapai County Arizona: Field and Geochemical Evidence.
- J. R. Garrison, Jr. (1979) Petrology and Geochemistry of the Precambrian Coal Creek Serpentinite Mass and Associated Metamorphosed Basaltic and Intermediate Rocks, Llano Uplift, Texas.
- W. C. Hunter (1979) The Garnet Ridge and Red Mesa Kimberlitic Diatremes, Colorado Plateau: Geology, Mineral Chemistry, and Geothermobarometry.

M.A. degrees supervised:

- Stapleton, C. (1991) Igneous-textured mafic xenoliths from the Sullivan Buttes Latite in Chino Valley, Arizona.
- J. Manchester. (1989) Petrology and Significance of Sphene Eclogite Xenoliths from the Sullivan Buttes Latite, Yavapai County, Arizona.
- Wilkerson, A. (1987) Origin, and Evolution of Garnet-Pyroxene Rocks of the Northern Llano Uplift, Central Texas.
- Barron, B. R. (1985) Diffusion rate estimates from pyroxene, Garnet Ridge, Arizona.
- Caskey, D. J. (1979) Geology and Hydrothermal Alteration of the Iron Beds Area, Hinsdale County, Colorado.
- Tyner, G. N. (1979) Field Geology, Petrology, and Trace Element Geochemistry of the Sullivan Buttes Latite, Yavapai County, Arizona.
- Moseley, M. G. (1977) Geochemistry and Metamorphic History of the Whitt Metagabbro, Llano County, Texas.
- Van Allen, B. R. (1978) Hydrothermal Iron Ore and Related Alterations in Volcanic Rocks of La Perla, Chihuahua, Mexico.
- Roden, M. F. (1977) Field Geology and Petrology of the Minette Diatreme at Buell Park, Apache County, Arizona.
- Salyapongse, S. (1978) Petrography and Petrology of Granitic Rocks of Llano Uplift, Texas.

Special Student and Faculty Services

Graduate Adviser, Department of Geological Sciences, 1987 - 1990

Geological Sciences Electron Probe Laboratory, 1971 to about 1990

I have been one of the several faculty responsible for the departmental electron microprobe laboratory. The laboratory primarily is for teaching and for graduate student and faculty research. My NSF grants have been an important source of support for the laboratory. I obtained and mounted most of the standards used by the facility.

Associate Chairman, Geological Sciences, Jan 1995 - June 1995 and 1990 - 1992

Current and Future Research Plans

I am trying to decipher patterns of temperature variation, solid flow, and fluid and melt movement below the earth's crust. I want to clarify the driving forces of plate tectonics and the causes of magmatism and crustal deformation. Typical samples studied are igneous rocks from the southwestern U.S. and Africa. Many of these samples are mantle fragments carried up by volcanic eruptions. Rates at which minerals in these rocks respond to changes in pressure and temperature are of particular interest. Other subjects of interest include the following: trace element and isotope geochemistry of mantle rocks; geologic history of the southwestern US; kinetics in rocks at high temperatures; minerals as pressure-temperature indicators.

Research Grants

National Science Foundation Grant EAR-9218864, "Mantle Evolution, Mineral Kinetics, and Tectonics," Jan 1, 1993 - June 1, 1995. (\$86,000)

National Science Foundation Grant EAR-9003768, "Two Buttes, CO., Mantle Evolution and Potassic Magmas," June 1, 1990 - May 31, 1992. (\$39,500)

National Science Foundation Grant EAR-8816434, "Mantle processes, trace elements and kinetics," Jan. 1, 1989 - Dec. 31, 1990. (\$45,000).

National Science Foundation Grant EAR-8504404, "Peridotite Nodules: Guides to Processes in the Upper Mantle," July 1, 1985 - Dec. 31, 1986. (\$30,000).

National Science Foundation Grant EAR83-19716, "Acquisition of an electron microprobe analyzer", March 1, 1984 - Aug. 31, 1985. (\$150,000). (Co-investigator with W. D. Carlson and L. S. Land).

National Science Foundation Grant EAR-8306385, "Compositional Gradients in Peridotite: Observations and Numerical Models", Nov. 1 1983 - April 30, 1985. (\$51,700). (Co-investigator with C. Wilson).

National Aeronautics and Space Administration Training Grant NGT44-012-800, "Use of a basaltic magmas to characterize processes in planetary interiors: a test case in the southwestern United States", May 1, 1982 - July 31, 1982. (\$4,100). (Co-investigator with J. Wittke).

National Science Foundation Grant EAR-8108578, Amendment No. 01 (as above), July 1, 1982 - Dec. 31, 1983. (\$47,958).

National Science Foundation Grant EAR-8108578, "Measurement and Interpretation of Compositional Gradients in Peridotite", July 1, 1981 - Dec. 31, 1982. (\$30,000). (Co-investigator with C. Wilson).

National Science Foundation Grant EAR-7812959, "Renovation and improvement of electron probe microanalyzer", Feb. 1, 1979 - July 31, 1980. (\$35,400). (Co-investigator with D. S. Barker, L. S. Land).

National Science Foundation Grant EAR 76-12368, Amendment A01, "Volcanic rocks and inclusions as guides to processes within the earth", July 1, 1978 - Dec. 31, 1980. (\$45,000).

University Research Institute Faculty Research Assignment, "Preparation of publications on processes in the upper mantle, with examples from the mantle beneath the western United States", Jan. 15, 1980 - May 31, 1980.

National Science Foundation Grant EAR 76-12368, "A model for the mantle beneath the Colorado Plateau based on kimberlites and associated volcanism", June 1, 1976 - Nov. 30, 1978. (\$38,000).

University Research Institute Summer Research Award, 1976. "A comparative study of upper mantle fragments from southwestern North America", (\$3,407).

National Science Foundation Grant GA-41414, "A study of kimberlite tuff, ultramafic inclusions in the tuff, and associated volcanic rocks of the Zilditloi field, Colorado Plateau", Jan. 1 1974 - June 30, 1976. (\$30,500).

National Science Foundation Grant GA-21063, "Petrographic and electron microprobe study of iron-rich pyroxenes and olivines", Oct. 1, 1971-March 1, 1974. (\$23,200).

Abstracts Published

Smith, D., 2017, Trace elements in Cr-pyrope from the Navajo Field of the Colorado Plateau: evidence for mixing in the mantle wedge during low-angle subduction. Geological Society of America Annual Fall Meeting, 85-6 (Poster at link: <https://gsa.confex.com/gsa/2017AM/meetingapp.cgi/Paper/297476>)

Behr, W.B., Smith, D., 2016, Deformation in the mantle wedge associated with Laramide flat slab

- subduction and implications for surface deformation during the Laramide orogeny, AGU Annual Meeting in San Francisco, CA.
- Behr, W. M., Smith, D., and Bernard, R. (2015), Constraints from Xenoliths on Cenozoic Deformation and Rheology of the Western North American Mantle Lithosphere. American Geophysical Union Fall Meeting Abstract T34C-06.
- Behr, W. M., and Smith, D., 2015, Olivine fabric transitions associated with hydration, dehydration and shear above the Farallon flat slab. Geol. Soc. America Abstracts paper 281-4
- Behr, W. M., and Smith, D., 2014, A- to B-Type olivine fabric transitions associated with hydration, dehydration and shear above the Farallon flat slab. American Geophysical Union, Fall Meeting Abstract
- Behr, W. M., and Smith, D., 2013, Deformation in the mantle wedge associated with Laramide flat-slab subduction. American Geophysical Union, Fall Meeting Abstract T53-2457.
- Smith, D., 2008, A Metaserpentinite and Related Xenoliths From the Colorado Plateau: Implications for the Mantle Wedge During Low-angle Subduction. Eos, Trans. American Geophysical Union, Fall Meeting Abstract V41A-2066.
- Smith, D., and Griffin, W. L., 2003, Navajo garnetites and rock-water interactions in the mantle. Eos, Trans. American Geophysical Union, Fall Meeting Abstract V22B-0591.
- Dunn, D., Smith, D., and Bergman, S. C., 2003, Mantle xenoliths from the Prairie Creek lamproite province, Arkansas, USA. Extended Abstracts 8th International Kimberlite Conference FLA-0119, 4 p.
- Smith, D., Moser, D. E., Connelly, J. N., Manser, K., and Schulze, D. J., 2002, U-Pb ages of eclogites, garnetites, and Cenozoic rock-water reactions in Proterozoic mantle below the Colorado Plateau. Geological Society of America Abstracts v 34, p 253,
- Smith, D., 2001, Mineral homogeneity in peridotite xenoliths from minette at Buell Park, AZ: kinetics, thermometry, and the Colorado Plateau mantle. Geological Society America Abstracts, v 33, A50.
- Dunn, D., Smith, D., McDowell, F. W., and Bergman, S. C., 2000, Mantle and crustal xenoliths from the Prairie Creek lamproite province, Arkansas. Geological Society America Abstracts, v 32, A386.
- Smith, D., 1998, Evolution of New Mexico mantle and relationships to tectonic provinces. Eos (Transactions American Geophysical Union) v. 79. F946.
- Smith, D., Housh, T. B., Mack, L. E., McDowell, F. W., and Gregory, R. T., 1997, Implications of an isotopic characterization of a Colorado Plateau eclogite. Eos (Transactions American Geophysical Union), v 78, p F750.
- Smith, D., 1997, Water-rock interactions and silica enrichment in the mantle: evidence from Colorado Plateau xenoliths. Geological Society of America Abstracts, v 29, p A-89.
- Smith, D. and Riter, J. C. A., 1996, Genesis and evolution of low-Al orthopyroxene in spinel peridotite xenoliths, Grand Canyon field, Arizona. Geological Society of America Abstracts, v 28, p A-290.
- Esperanca, S., Carlson, R. W., Shirey, S. B., and Smith, D., 1996, Re-Os evidence on the source and formation age of the lower crust of central Arizona. Eos (Transactions American Geophysical Union), v 77, p F831-832.
- Smith, D. and Riter, J. C. A., 1995, Xenoliths, mantle processes, and dynamics of the Colorado Plateau. Eos (Transactions American Geophysical Union), v 76, p F605.
- Smith, D., Housh, T., and Riter, J. C. A., 1995, Mantle evolution and implications for stability and uplift of the Colorado Plateau. Leon T. Silver 70th Birthday Symposium and Celebration,

- Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California, p 63-65.
- Smith, D. and Riter, J. C. A., 1994, Mantle xenoliths and the Colorado Plateau. Geological Society of America Abstracts, v 26, p 63-64.
- Smith, D., 1993, Ultramafic reaction zones in Colorado Plateau xenoliths: recorders of sub-Moho hydration. Eos (Transactions American Geophysical Union), p 637.
- Riter, J. C. A. and Smith, D., 1993, Analysis of Grand Canyon Cr-diopside spinel peridotite and pyroxenite xenoliths. Eos (Transactions American Geophysical Union), p 637.
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