

CURRICULUM VITA Scott Stevens Hughes

Education:

- Ph.D. 1983, Geology/Volcanology, Oregon State University
Dissertation: Petrochemical Evolution of High Cascade Volcanic Rocks in the Three Sisters Region, Oregon.
M.S. 1979, Geology, Northern Arizona University
Thesis: Geology of the Southwestern Part of Bill Williams Mtn. Quadrangle, Coconino Co., Arizona.
B.S. 1972, Geology, Virginia Polytechnic Institute and State University

Professional Positions:

- 2001 – present: Professor and Chair, Department of Geosciences, Idaho State University, Pocatello.
2000: Visiting Professor (sabbatical leave), Institute of Nuclear Techniques, Chengdu University of Technology, Chengdu, Sichuan, China.
1991-2001: Assistant and Associate Professor, Department of Geosciences, Idaho State University, Pocatello.
1989-91: Chief of Analytical Division and Assistant Professor, Montana Bureau of Mines and Geology, Montana Tech (U. of Montana), Butte.
1986-89: NASA Research Associate, Departments of Chemistry and Geology; Instructor, Departments of Geology and Nuclear Engineering, Oregon State University, Corvallis.
1985-86: Visiting Associate Professor, Chengdu College of Geology, Chengdu, Sichuan, China.
1983-85: NASA Post-doctoral Research Associate, Departments of Chemistry and Geology; Instructor, Departments of Geology and Nuclear Engineering, Oregon State University, Corvallis.
1973-83: University, government and industry positions – Teaching/Research Assistant (mathematics, geology, engineering, chemistry), Drilling Supervisor, USGS Topographic Field Assistant, Exploration Geologist, Hydrology Technician, Flagstaff Water Production Superintendent.

Professional Societies:

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| Fellow, Geological Society of America | American Geophysical Union |
| Phi Kappa Phi National Honor Society (N.A.U. Chapter) | Sigma Xi |
| International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) | Idaho Academy of Science |

Research Interests:

- Planetary Mafic Volcanism:* (1) Physical volcanology, geochemistry, and petrogenesis of mafic eruptive centers on the eastern Snake River Plain and surrounding regions; (2) Snake River Plain low shield analogs to Mars and Lunar volcanism.
Carbon Sequestration in Basaltic Formations: Petrology, geomorphology and volumetric analysis of basaltic systems to evaluate their potential as carbon sinks for CO₂ emissions related to power plants.
Volcanism and Tectonism in the Pacific Northwest: Geochemistry of Columbia River basalt feeder dikes in northeastern Oregon and western Idaho.
Analytical Geochemistry: Development, implementation and training in techniques for major and trace element geochemical analyses (INAA and ICP-AES).

Honors and Awards:

- Elected to Phi Kappa Phi, NAU Chapter, 1979
Elected Fellow, Geological Society of America, 1999
Best Guidebook Award, Geoscience Information Society, 2000
Outstanding Researcher, Idaho State University, 2004

Courses Instructed at ISU (CT = co-taught):

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| 100-400 = Undergraduate Level | GEOL 405/505 Volcanology |
| 500-600 = Graduate Level | GEOL 406/506 Environmental Geology |
| GEOL 101 Physical Geology | GEOL 411/511 Petrology |
| GEOL 122 Rocks and Stars | GEOL 412/512 Petrology Lab |
| GEOL 210 Earth in Space and Time | GEOL 440/540 Ore Deposits (CT) |
| GEOL 397/597 Workshop on Craters of the Moon (CT) | GEOL 450 Field Camp (CT) |
| GEOL 400/500 Teaching Practicum | GEOL 482 Independent Problems |
| | GEOL 491/591 Seminar (CT) |

GEOL 422/522 Planetary Geology for Teachers
 GEOL 601 Advanced General Geology (CT)
 GEOL 602 Advanced Geomorphology (CT)
 GEOL 603 Geol. Writing Seminar (CT)

GEOL 615 Neutron Activation Analysis
 GEOL 625 Quant. Geochem. Lab (CT)
 GEOL 648 Research Problems

***Students Advised (56 total):**

Postdoctoral Research Associate (1): Linda L. Davis

M.S. Students completed (21): *Primary Advisor:* Mike Reed, Jennifer Parker, Jeff Miller, Paul Wetmore, Jason Casper, Kaleb Scarberry, Katharine Pickett, Claire Grimm Chadwick, Sharon Brady, Myles Miller; *Co-Advisor:* Julie Tullis, Jim Reisterer, Ted Reid, Jacqueline Harvey, Anni Watkins, Chad Johannesen, Karen Wright, David Bates, Kastli Schaller, Mark Ford, Adrian Holmes.

M.S. Students in progress (2): *Primary Advisor:* Gina Iwahashi, Desiree Staires; *Co-Advisor:* none.

M.N.S. Students (2): Tim Gunderson (co-advisor, finished), Diane Butler (primary advisor, in progress).

Graduate Committees as Faculty Representative (completed): 26 masters degrees, 4 doctoral degrees.

Selected Grants and Contracts (at ISU since 1991):

NSF EPSCoR: Geology of the Twin Falls Volcanic Field: Chemical Constraints on the Yellowstone Hotspot Track and Crust/Mantle Magmatism in South Central Idaho (1993-96) \$279,917/three years (PI).

Contract with J.R. Simplot Co: Mineralogic Studies on Phosphate Ore Samples (1993-94) \$15,000 (PI).

NASA Idaho Space Grant Consortium Research Initiation Program: Geochemistry and Petrogenesis of Lunar Mare Basalts: Refinement of Analytical Techniques (1994) \$3,700 (PI).

ISU University Research Committee: Gamma Detector Upgrade in the ISU Neutron Activation Analysis Laboratory (1994) \$22,200 (PI).

MIT/DOE University Research Consortium: Chemical and Petrographic Characterization of Vitrification Products (1995-96) \$129,560 (PI).

DOE/Idaho Water Resources Research Institute: Remediation Technologies at the INEEL, \$287,000/year, FY 96-98 (co-PI).

Idaho State Board of Education: Idaho Virtual Classroom, \$39,556 FY 97 (co-PI).

Idaho State Board of Education: Idaho Virtual Campus, \$197,150 FY 1998-2000 (co-PI).

ISU Technology Oversight Council: Portable AV System for the Classroom, \$8,955 FY 1998 (co-PI).

Idaho State Board of Education: Idaho Virtual Campus Extension, \$148,100 FY 1999-2000 (co-PI).

External Funding 1991 – 1999: \$450k as PI; \$484k as co-PI (\$934k total)

ISU Faculty Research Committee: Geology, Geochemistry, and Mapping by Remote Sensing of Table Butte, \$3,750 FY 2001 (PI).

NASA EPSCoR, Idaho Space Grant Consortium (EPSCoR Planning Grant): Evaluation of multi-scale time-space patterns of crustal deformation, volcanism, climate change, and land use in Idaho using combined spaceborne remote sensing and ground-truthing techniques, \$35,000 FY 2001 (PI).

Idaho Department of Water Resources (through Raytheon/NASA): Application of the SEBAL methodology for estimating evapotranspiration and consumptive use of water through remote sensing (student and outreach support), \$37,340, 5/02 – 12/03 (co-PI, with Nancy Glenn).

NASA EPSCoR, NCC5-577, Idaho Space Grant Consortium: Synthetic Aperture Radar Analysis of Multi-scale Geologic and Environmental Processes in Idaho and the Intermountain West, \$575,000, 8/01 – 7/04; Two year extension with additional \$377,445, 8/04 – 7/06 (co-PI, with Glenn Thackray et al.).

NASA EPSCoR, Idaho Space Grant Consortium: GeoSTAC – Geospatial Training and Analysis Cooperative, \$30,174, 8/02 – 7/03 (co-PI, with Nancy Glenn).

NASA Goddard Space Flight Center: Plains Volcanism and Small Volcanic Edifices on Mars, \$19,353, 8/02-7/05 (co-PI, with Susan Sakimoto).

U.S. Department of the Interior – National Park Service: Craters of the Moon Geologic Resources Assessment, \$15,820, 9/04 – 4/06 (PI).

NOAA: Boise Center Aerospace Laboratory, \$494,739, 10/04 – 9/07 (co-PI, with Nancy Glenn et al.).

NASA Workforce Development Program: NativeView Connections, \$25,000, 3/04 – 2/05, (co-PI, with Nancy Glenn).

NSF Idaho EPSCoR Research Infrastructure Improvement Grant: Portneuf River Project, \$99,648, 7/05 – 5/07 (co-PI, with Dan Ames).

U.S. Department of Energy: Big Sky Partnership, Carbon Sequestration: Development of a National Mafic Rock Atlas, \$277,560, 10/05 – 9/09 (PI).

Idaho SBOE: Creation of a New Learning Community by Integration of Breeze, WebCT, Distance Learning and Smart Screens at Idaho State University, \$59,556, 7/06 – 6/07 (co-PI, with Nancy Glenn et al.).

Idaho National Laboratory (DOE), Center for Advanced Energy Studies: Suitability of layered basalt deposits as targets for industrial carbon sequestration, \$97,784, 4/07 – 9/09 (PI).

External Funding 2000 – present: \$446k as PI; \$1,066k as co-PI (\$1.512M total)

NOTE: List does not include significant funds generated as PI related to contracts for analytical work in the Laboratory for Environmental Geochemistry (~\$10-20k per year), annual contracts with U.S. Geological Survey for R.A. support (~\$24k per year), or annual allocations from the NASA Idaho Space Grant Consortium for K-12 Outreach and related activities (~\$12k per year).

Selected Professional Services and Administrative Activities:

Current:

Chair of Geosciences Department, 2001 – present

Co-Director, ISU Geosciences, Laboratory for Environmental Geochemistry, 1994 – present

Proposal Reviewer for NSF, NASA and other agencies, ongoing; Usually 2-4 proposals per year

Manuscript peer-reviewer; various publications; usually 2-3 papers per year

Affiliate Director and Executive Committee, Idaho NASA Space Grant Consortium, 1992 – present

Advisory Board Member, Idaho Geological Survey, 2001 – present

Affiliate, Idaho National Laboratory, Center for Advanced Energy Studies (CAES), 2007-08

Previous:

Program Director, GeoTechnology curriculum, 2001 – 2004

Originator and Program Director of GeoSTAC – Geospatial Training and Analysis Cooperative, 2001

Chair, Rocky Mountain Section, Geological Society of America, 1998 – 99

Director, Idaho Virtual Campus, ISU Component, 1994 – 2001

Graduate Program Director, ISU Geosciences Dept., 1995 – 2000

Coordinator, Geosciences Weekly Colloquium, 1994 – 2000

Board Member, Friends of the Idaho Museum of Natural History, 1994 – 2003

Assistant Director, Idaho NASA EPSCoR program, 1993-94 and 1995 – 96

Radiation Safety Officer, Idaho State University 1991-92

Director, Montana EPA EPSCoR (MIMES), 1990-91

Radiation Safety Officer, Montana Tech, 1990-01

Selected ISU Academic Committees:

Current:

Radiation Safety Committee, 1991 – present (Chair, 1995 – 2000)

GIS Oversight Committee, 2001 – present

ISU Grant-Funded Compensation Committee, 2007-08

Previous:

Chair, Search Committee, Chair of Civil and Environmental Engineering, 2006-07

Idaho SBOE Research Centers Review Panel, 2006

Search Committee, ISU Chief Research Officer, 2004

Invited Participant, Governor's Forum on Science and Technology, Boise, 2004-05

Chair, College of Arts and Sciences Faculty Release Time Committee, 2002 – 03

Pocatello Community Development Commission, 1999 – 2000

College Sabbatical Review Committee, 1997-99

Geological Society of America, Goal 2 Assessment Committee, 1997 – 98

College Promotion and Tenure Advisory Committee, 1994 – 95

Idaho Academy of Science Annual Conference, Organizing Committee, 1994

ISU Library Collection Development Advisory Committee, 1993 – 94

Nuclear Science Applications Project, 1993 – 94

University Goals Assessment Task Force, 1992 – 93

Symposia Involvement:

Invited Field Trip Guide, Ocean Drilling Program – High Cascades Volcanology, Fall 1987.

Symposium Host, NASA Planetary Geological Mappers Meeting, 1994, Pocatello.

Session Chair, Northwest Scientific Association 68th Annual Meeting, 1995, Idaho Falls.

Conference Chair, 21st Annual Field Conference of the Tobacco Root Geological Society, 1996, Twin Falls.

Conference Chair, Geological Society of America Rocky Mountain Section Meeting, April 1999, Pocatello.

Invited Speaker, Science and Society Symposium and Centennial Celebration, ISU, February 15, 2002, Pocatello.

Meeting Host and Field Trip Guide, Ocean Drilling Program Leg 192, 2nd post-cruise meeting, June 3-7, 2002, Pocatello.

Session Chair, Mars Tectonism and Volcanism, 35th Lunar and Planetary Science Conference, 2004.

Session Chair, Remote Sensing of Volcanoes on Earth, Mars, and Beyond II Posters, American Geophysical Union Fall Meeting, San Francisco, December, 2004.

Steering Committee and Technical Program Committee, Great Rift Science Symposium, October, 2005, Pocatello.

Steering Committee, Lemley 2007 Intermountain Conference on the Environment, September, 2007, Pocatello.

Session co-Chair: Techniques for Studying the Development of Fields of Small Basaltic Vents on Earth and Mars, GSA Annual Meeting, October, 2007, Denver.

Invited Presentations:

- *The Future of the Environment and Resources of the Intermountain West*, Closing Remarks, Lemley 2007 Intermountain Conference on the Environment, September, 2007, Pocatello, Idaho.
- *Small shield volcanoes on the Snake River Plain and their cousins on Mars*, Dept. of Geology, Brigham Young University, October 23, 2003, and Dept. of Geology, Utah State University, February 2, 2004.
- *Remote Sensing 101. "On-Target 2002, 2003, 2004"* Seminars for County Agents, sponsored by the Rocky Mountain NASA Space Grant Consortium and the Utah State University Extension, October 2002—2004.
- *Energy and Environmental Issues in China*, Science and Society Symposium and Centennial Celebration, ISU, February 15, 2002, Pocatello.
- *Geology of Eastern Idaho*. Annual meeting of the Idaho Groundwater Association, Pocatello, Idaho, September 20, 2002.
- *GeoSTAC: GeoSpatial Training and Analysis Cooperative*; presented at the Western Regional Meeting of NASA Space Grant Directors in Madras, Oregon, October 2001.
- *Mafic Volcanism and Environmental Geology of the Eastern Snake River Plain*. The Eighth Biannual Unsaturated Zone Interest Group (UZIG) Meeting, Idaho Falls, August 1, 2001.
- *Quaternary Basaltic Volcanism on the Eastern Snake River Plain, Idaho, USA*. Presentation to the School of Ocean and Earth Sciences and Technology, University of Hawai'i, Manoa, April 2001
- *Environmental Geology Lectures*. Three presentations made to the faculty and students at East China Geological Institute, Jiangxi Province, China, October, 2000.
- *Geology along the Oregon-California Trails in Idaho*. The 15th Annual Oregon California Trails Association Convention, Pocatello, Idaho, August 13, 1997.
- *Geological History of the Snake River Plain*. The 3rd Annual American Falls Shorebird Festival, American Falls, Idaho, August 9, 1997.
- *Is Anyone Out There: Volcanoes on the Terrestrial Planets*. On the Rocks presentation at Western Montana College of the University of Montana, Dillon, November 4, 1996.
- *Comparative Magmatism of the Columbia River Basalt Group and Snake River Plain Basalts: Plume Heads, Tails, or Edges?* lectures presented: Feb. 24, 1994 at Oregon State University, Corvallis; and Mar. 3, 1994 at Utah State University, Logan.
- *Chemical variations in Columbia River Basalt feeder dikes in N.E. Oregon and W. Idaho -- Implications for early Snake River Plain basalt sources*. Annual Meeting, American Geophysical Union, San Francisco, December, 1993.
- *Mafic magmatism and associated tectonism of the central High Cascade Range, Oregon*. U. S. Geological Survey Workshop XLIV: Geological, Geophysical, and Tectonic Setting of the Cascade Range, Monterey, CA, December, 1988.
- *Petrogenetic models of High Cascade intermediate and dacitic volcanics in the Three Sisters Region*. U. S. Geological Survey, Menlo Park, CA, March, 1983.

Other Presentations:

- Many other presentations to Idaho Museum of Natural History Docents on Planetary and Solar System Evolution, Space Exploration, and General Geology, 1991 – present.
- Featured scientist in *Outdoor Idaho: A Trip to the Moon* broadcast and DVD, Copyright © Idaho Public Television, 2007.
- Featured scientist on *Dialogue for Kids*, Idaho Public Television, various times 1996 – present.

Publications

Books Edited:

- Hughes, S., Orr, B. Freiberg, D., and Boyack, D., eds., 2007, Proceedings of the Great Rift Science Symposium: Idaho Museum of Natural History, 203 p.
- Hughes, S.S. and Thackray, G.D., eds., 1999, Guidebook to the Geology of Eastern Idaho: Idaho Museum of Natural History, 342 p.
- Hughes, S.S. and Thomas, R.C., eds., 1996, Geology of the Crook in the Snake River Plain, Twin Falls and Vicinity: Northwest Geology, V. 26, 123 p.

Refereed Journal Articles:

1. Wetmore, P.H., **Hughes**, S.S., Connor, L., and Caplinger, M.L., 2007, Spatial distribution of eruptive centers about the Idaho National Laboratory, *in* Connor, C. and Connor, L., eds., Volcanism, Tectonism, and Siting Nuclear Facilities: Cambridge University Press, in review.
2. Holmes, Adrian A.J., Rodgers, David W., and **Hughes**, Scott S., 2007, Kinematic analysis of fractures in the Great Rift, Idaho: Implications for subsurface dike geometry, crustal extension, and magma dynamics: J. Geophysical Research, revised manuscript in review.
3. **Hughes**, S.S., Lewis, S.E., Bartholomew, M.J., Sinha, A.K., and Herz, Norman, 2004, Geology and geochemistry of Fe-Ti-rich granitic and charnockitic rocks in the central Lovington massif of the Grenvillian Blue Ridge terrane, U.S.A, *in* Tollo, R.P., Corriveau, L., McLelland, J., and Bartholomew, M. J., eds., Proterozoic Tectonic Evolution of the Grenville Orogen in North America: Boulder Colorado, Geological Society of America Memoir no. 197, p. 549-569.
4. **Hughes**, S.S., McCurry, Michael, and Geist, D.J., 2002, Geochemical correlations and implications for the magmatic evolution of basalt flow groups at the Idaho National Engineering and Environmental Laboratory, *in* Link, P.K., and L.L. Mink, eds., Geology, Hydrogeology and Environmental Remediation, Idaho National Engineering and Environmental Laboratory, Eastern Snake River Plain: Geological Society of America Special Paper 353, p. 151-173.
5. Geist, D., Ellisor, R. E., Sims, E. N., and **Hughes**, S. S., 2002, Subsurface volcanology at TAN and controls on groundwater flow, *in* Link, P.K., and L.L. Mink, eds., Geology, Hydrogeology and Environmental Remediation, Idaho National Engineering and Environmental Laboratory, Eastern Snake River Plain: Geological Society of America Special Paper 353, p.45-59.
6. Geist, Dennis, Sims, Elisa, **Hughes**, Scott, and McCurry, Michael, 2002, Open-system evolution of a single cycle of Snake River magmatism, *in* Link, P.K., and L.L. Mink, eds., Geology, Hydrogeology and Environmental Remediation, Idaho National Engineering and Environmental Laboratory, Eastern Snake River Plain: Geological Society of America Special Paper 353, p. 193-204.
7. **Hughes** S.S., P.H. Wetmore, and J.L. Casper, 2002, Evolution of Quaternary tholeiitic basalt eruptive centers on the eastern Snake River Plain, Idaho, *in* Bonnicksen, B., White, C., and McCurry, M., eds., Tectonic and magmatic evolution of the Snake River Plain volcanic province: Idaho Geological Survey Bulletin 30, p. 363-385.
8. **Hughes** S.S. and M. McCurry, 2002, Geochemical evidence for time-space evolution of Snake River Plain rhyolites, *in* Bonnicksen, B., White, C., and McCurry M., eds., Tectonic and magmatic evolution of the Snake River Plain volcanic province: Idaho Geological Survey Bulletin 30, p. 161-176.
9. Wright, K.E., M. McCurry, and S.S. **Hughes**, 2002, Petrology and geochemistry of the Neogene Tuff of McMullen Creek, central Snake River Plain, *in* Bonnicksen, B., White, C., and McCurry M., eds., Tectonic and magmatic evolution of the Snake River Plain volcanic province: Idaho Geological Survey Bulletin 30, p. 177-194.
10. Davis, L.L., **Hughes**, S.S., and Fleisher, Chris, 2001, Characterization of an alkali alumina-borosilicate glass considered for storage of radioactive waste: Environmental Geology, vol. 40, no. 7, p. 829-846.
11. **Hughes** S.S., R.P. Smith, W.R. Hackett, and S.R. Anderson, 1999, Mafic volcanism and environmental geology of the eastern Snake River Plain, *in* **Hughes**, S.S., and Thackray, G.D., eds., Guidebook to the Geology of Eastern Idaho: Idaho Museum of Natural History, p. 143-168.
12. Wetmore, P.H., S.S. **Hughes**, and S.R. Anderson, 1997, Model morphologies of subsurface Quaternary basalts as evidence for a decrease in the magnitude of basaltic magmatism at and near the Idaho National Engineering and Environmental Laboratory, Idaho, *in* Proceedings of the 32nd Engineering Geology and Geotechnical Engineering Symposium, Boise, Idaho, p. 45-58.
13. **Hughes**, S.S., J.L. Casper, and D.J. Geist, 1997, Potential influence of volcanic constructs on hydrogeology beneath Test Area North, Idaho National Engineering and Environmental Laboratory, Idaho, *in* Proceedings of the 32nd Engineering Geology and Geotechnical Engineering Symposium, Boise, Idaho, p. 59-74.

14. Reed M.F., R.C. Bartholomay, and S.S. **Hughes**, 1997, Geochemistry and stratigraphic correlation of basalt lavas beneath the Idaho Chemical Processing Plant, Idaho National Engineering Laboratory: Environmental Geology, V. 30, p. 108-118.
15. Davis, L.L., and S.S. **Hughes**, 1997, Characterization of vitrification products. Proceedings of the 18th Annual U.S. DOE Low-Level Radioactive Waste Management Conference, Salt Lake City, Utah, track 1.01, p. 1-10 (published on diskettes).
16. **Hughes**, S.S., S.E. Lewis, M.J. Bartholomew, A.K. Sinha, T.A. Hudson, and N. Herz, 1997, Chemical diversity and origin of Precambrian charnockitic rocks of the Pedlar massif, Grenvillian Blue Ridge terrane, Virginia: Precambrian Research, v. 84, p. 37-62.
17. **Hughes** S.S., R.P. Smith, W.R. Hackett, M. McCurry, S.R. Anderson, and G.C. Ferdock, 1997, Bimodal magmatism, basaltic volcanic styles, tectonics, and geomorphic processes of the eastern Snake River Plain, Idaho, *in* Link, P.K. and Kowallis, B.J., editors, Proterozoic to Recent Stratigraphy, Tectonics, and Volcanology, Utah, Nevada, Southern Idaho and Central Mexico, Geological Society of America Field Trip Guidebook, Brigham Young University Geology Studies, vol. 42, part 1, p. 423-458.
18. McCurry M., Bill Bonnicksen, C. White, M.M. Godchaux, and S.S. **Hughes**, 1997, Bimodal basalt-rhyolite magmatism in the central and western Snake River Plain, Idaho and Oregon, *in* Link, P.K. and Kowallis, B.J., editors, Proterozoic to Recent Stratigraphy, Tectonics, and Volcanology, Utah, Nevada, Southern Idaho and Central Mexico, Geological Society of America Field Trip Guidebook, Brigham Young University Geology Studies, vol. 42, part 1, p. 381-422.
19. **Hughes** S.S., J.L. Parker, A.M. Watkins, and M. McCurry, 1996, Geochemical evidence for a magmatic transition along the Yellowstone hotspot track, *in* **Hughes**, S.S. and Thomas, R.C., eds., Geology of the Crook in the Snake River Plain, Twin Falls and Vicinity: Northwest Geology v. 26, p. 63-80.
20. McCurry M., A.M. Watkins, J.L. Parker, K. Wright, and S.S. **Hughes**, 1996, Preliminary volcanological constraints for sources of high-grade, rheomorphic ignimbrites of the Cassia Mountains, Idaho: Implications for the evolution of the Twin Falls volcanic center, *in* **Hughes**, S.S. and Thomas, R.C., eds., Geology of the Crook in the Snake River Plain, Twin Falls and Vicinity: Northwest Geology, V. 26, p. 81-91.
21. Parker J.L., S.S. **Hughes**, and M. McCurry, 1996, Physical and chemical constraints on the emplacement of the tuff of Wooden Shoe Butte, Cassia Mountains, Idaho, *in* **Hughes**, S.S. and Thomas, R.C., eds., Geology of the Crook in the Snake River Plain, Twin Falls and Vicinity: Northwest Geology, V. 26, p. 92-106, 1996.
22. Watkins A.M., M. McCurry, and S.S. **Hughes**, 1996, Preliminary report on the stratigraphy and geochemistry of the tuff of Steer Basin, Cassia Mountains, Idaho, *in* **Hughes**, S.S. and Thomas, R.C., eds., Geology of the Crook in the Snake River Plain, Twin Falls and Vicinity: Northwest Geology, V. 26, p. 107-120.
23. Pogue K.R., J.A. DiPietro, S.S. **Hughes**, R.D. Lawrence and S. Rahim, 1992, Late Paleozoic rifting in northern Pakistan: Tectonics, v. 11, no. 4, p. 871-883.
24. Warner R.D., D.S. Snipes, S.S. **Hughes**, R.J. Walker, R.A. Schmitt and J.C. Steiner, 1992, Geochemistry and petrology of Mesozoic dikes in South Carolina: Geol. Soc. Amer. Special Paper 268, p. 333-346.
25. Bartholomew M.J., S.E. Lewis, S.S. **Hughes**, R.L. Badger, A.K. Sinha, 1991, Tectonic history of the Blue Ridge basement and its cover, central Virginia, *in* A. Schultz and E. Compton-Gooding, eds., Geologic Evolution of the Eastern United States, Field Trip Guidebook, NE-SE GSA 1991. VMNH Guidebook 2, 57-90.
26. **Hughes** S.S., J.W. Delano and R.A. Schmitt, 1990, Chemistries of individual mare volcanic glasses: Evidence for distinct regions of hybridized mantle and KREEP component in Apollo 14 magmatic sources: Proc. Lunar Planet. Sci. Conf. 20th, 127-138.
27. Simon S.B., J.J. Papike, D.C. Gosselin, J.C. Laul, S.S. **Hughes** and R.A. Schmitt, 1990, Petrology and chemistry of Apollo 17 regolith breccias: A history of mixing of highland and mare regolith: Proc. Lunar Planet. Sci. Conf. 20th, 219-230.
28. Neal C.R., L.A. Taylor, S.S. **Hughes** and R.A. Schmitt, 1990, The significance of fractional crystallization in the petrogenesis of Apollo 17 Type A and B high-Ti basalts: Geochim. Cosmochim. Acta 54, 1817-1833.
29. **Hughes** S.S., 1990, Mafic magmatism and associated tectonism of the central High Cascade Range, Oregon: J. Geophysical Res. 95, No. B12, 19623-19638.
30. **Hughes** S.S., J.W. Delano and R.A. Schmitt, 1989, Petrogenetic modeling of 74220 high-Ti orange volcanic glass and the Apollo 11 and 17 high-Ti mare basalts: Proc. Lunar Planet. Sci. Conf. 19th, 175-188 .
31. Neal C.R., L.A. Taylor, R.A. Schmitt, S.S. **Hughes** and M.M. Lindstrom, 1989, High alumina (HA) and very high potassium (VHK) basalt clasts from Apollo 14 breccias, part 2 - Whole rock geochemistry: Further evidence for combined assimilation and fractional crystallization within the lunar crust: Proc. Lunar Planet. Sci. Conf. 19th, 147-161.
32. Simon S.B., J.J. Papike, C.K. Shearer, S.S. **Hughes** and R.A. Schmitt, 1989, Petrology of Apollo 14 regolith breccias and ion microprobe studies of glass beads: Proc. Lunar Planet. Sci. Conf. 19th, 1-17.

33. Wang Y.L., S.S. **Hughes**, C.H. Tong, S.H. Xiong, J.C. Li, R.S. Zhou and J.L. Li, 1989, Geochemistry and petrology of Emeishan Basalts and subcontinental mantle evolution in southwestern China: *Chinese Jour. of Geochemistry* 8, 37-53.
34. **Hughes** S.S., J.W. Delano and R.A. Schmitt, 1988, Apollo 15 yellow-brown volcanic glasses: Chemistry and petrogenetic relations to green volcanic glass and olivine normative mare basalts: *Geochim. Cosmochim. Acta* 52, 2379-2391.
35. Simon S.B., J.J. Papike, J.C. Laul, S.S. **Hughes** and R.A. Schmitt, 1988, Apollo 16 regolith breccias and soils: Records of exotic component addition to the Descartes Region of the Moon: *Earth Planet. Sci. Lett.* 89, 147-162.
36. Delano J.W., S.S. **Hughes** and R.A. Schmitt, 1988, Apollo 14 pristine mare glasses, *in* Workshop on Moon in Transition: Apollo 14, KREEP, and Evolved Lunar Rocks, Lunar Planetary Institute, Houston, 7-10.
37. **Hughes** S.S. and E.M. Taylor, 1986, Geochemistry, petrogenesis, and tectonic implications of central High Cascade mafic platform lavas: *Geol. Soc. Amer. Bull.* 97, 1024-1036.
38. Fukuoka T., J.C. Laul, M.R. Smith, S.S. **Hughes** and R.A. Schmitt, 1986, Chemistry of Yamato-791197 Antarctic meteorite: Evidence for its lunar highland origin: *Proc. 10th Symposium on Antarctic Meteorites*, N.I.P.R. Special Issue No. 41, p. 84-95.
39. Gilbert M.C. and S.S. **Hughes**, 1986, Partial chemical characterization of Cambrian basaltic liquids from the Southern Oklahoma Aulacogen: *Oklahoma Geological Survey Guidebook* 23, p. 73-79.
40. **Hughes** S.S., R.A. Schmitt, Y.L. Wang and G.J. Wasserburg, 1986, Trace element and Sr-Nd isotopic constraints on the compositions of lithospheric primary sources of Serra Geral continental flood basalts, southern Brazil: *Geochemical J.* 20, 173-189.
41. **Hughes** S.S. and R.A. Schmitt, 1985, Zr-Hf-Ta fractionation during Lunar evolution: *Proc. Lunar Planet. Sci. Conf. 16th.*, part 1, *J. Geophys. Res.* 90, D31-D45.
42. Dickinson T., G.J. Taylor, K. Keil, R.A. Schmitt, S.S. **Hughes** and M.R. Smith, 1985, Apollo 14 aluminous mare basalts and their possible relationship to KREEP: *Proc. Lunar Planet. Sci. Conf. 15th*, C365-C374.
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