CAROL D. FROST

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EDUCATION

1984 Ph.D., Earth Sciences, University of Cambridge
Isotopic evolution of continental crust: granite petrogenesis and sediment recycling

1979 A.B., *magna cum laude*, Dartmouth College, Highest Distinction in Earth Sciences
Geochronology and depositional environment of a Late Pliocene age Siwalik sequence, Salt Range, Pakistan

ADMINISTRATIVE POSITIONS

December 2014-present **Division Director, Earth Sciences Division, National Science Foundation**

- As division director, I promote excellence in Earth Science research and discovery through oversight of portfolio of basic research and education awards ($178M/year);
- Oversee 40 scientific and administrative division staff, including recruitment, performance appraisal, and succession planning;
- Lead organizational change through division strategic planning and self-study activities; and
- Develop and strengthen partnerships with international, government, and private sector organizations and the general public. I communicate and promote NSF's contributions to the nation's economy, security, and global leadership.

2012-Aug. 31, 2013 **Associate Provost, University of Wyoming**

- Responsible for Undergraduate Education and Academic Budgets ($102.5M/year)
- With provost and the two other associate provosts, guided strategic planning for 2014-2020 and completion of action items for 2009-2014 plan (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/1%20up4_position_paper_2.pdf)
- Performed critical analysis of the $32M annual budget of the College of Arts and Sciences, addressed budgetary shortfalls, and corrected procedures to produce more stable fiscal operations
- Designed and oversaw process of managing staff vacancies to reduce staff by 44 positions as part of $12M budget reductions that took effect July 1, 2013, then revised and continued process to enable reallocation of staff resources to priority areas (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/2%20staff_vacancy_memoq2_jan-13.pdf , http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/3%20staff%20CPM%20process%204-24-13%20-%20staff_cpm.pdf)
- Oversaw faculty committees developing and implementing new undergraduate general education requirements (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/4%20stage3_charge_letter_2-13.pdf)
- Guided faculty committees in developing expertise in innovative pedagogies and selection of versatile learning management system to support them (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/5%20lms_memo_8-13.pdf)
- Initiated an academic leadership program for associate professors who show promise as future department heads, research directors, or other leadership positions
- Together with the Dean of Health Sciences and state leaders in medical sciences, reorganized UW Family Practice Residency Centers in Cheyenne and Casper as an Educational Health Center to enable sustainable, quality medical education and safety-net health care (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/6%20rep_uw_famresidprog.pdf)
- Analyzed faculty retention and prepared strategies for increasing salaries with Associate Provost Ballenger (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-provost/7%20BoT%20salary%20update%207-17-13.pdf)

2010-2012 **Vice President for Special Projects, University of Wyoming**

- Led successful initiative to raise undergraduate assured admission standards at UW in order to increase student success and completion rates (see http://geofaculty.uwyo.edu/cfrost/administrative/vp/1a%20frost_hansen_axelson_admissions.pdf)
- Developed and implemented a strategic plan for raising the quality of graduate education at UW (see http://geofaculty.uwyo.edu/cfrost/administrative/vp/2%20grad_ed_12-2010_r2-11.pdf)
- Coordinated a faculty task force to establish an interdisciplinary program in biodiversity conservation (see http://geofaculty.uwyo.edu/cfrost/administrative/vp/3%20biodiversity_initiative_tf_rep.pdf)
- Initiated and facilitated a faculty steering committee to establish a humanities research center (see http://geofaculty.uwyo.edu/cfrost/administrative/vp/4%20humanities_proposal_9-6-11.pdf)

2008-2010 **Associate Vice President for Research, University of Wyoming**

- Initiated UW's research program in carbon sequestration with a $2.3 million DOE contract, overseeing 11 groups of faculty and student researchers. Subsequently secured $16.9 million in contracts from the Department of Energy and industry sources along with $40 million appropriated by the Wyoming state legislature that established a Carbon Management Institute in the School of Energy Resources
- Reviewed and reorganized UW's core research facilities, establishing uniform operations structures and bringing them into financial compliance with federal regulation governing specialized service facilities
- Co-authored State Science and Technology Plan and Wyoming Economic Index (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-vp-research/1%20wy-science-and-technology-plan-2010.pdf)
- Authored UW's Code of Ethics, Research Conflict of Interest Policy, and trustee Conflict of Interest Policy (see http://geofaculty.uwyo.edu/cfrost/administrative/assoc-vp-research/2a%20code-of-ethics.pdf , http://geofaculty.uwyo.edu/cfrost/administrative/assoc-vp-research/2b%20CONFLICT%20OF%20INTEREST%2010-12-10.pdf , http://geofaculty.uwyo.edu/cfrost/administrative/assoc-vp-research/2c%20UNIVERSITY%20OF%20WYOMING%20BOARD%20OF%20TRUSTEES%2009-17-10.pdf)

2006-2007 **Founding Director, School of Energy Resources, University of Wyoming**

- Implemented the strategic plan for the school, including hiring permanent director and first faculty members; starting research centers, matching grant programs, and graduate student assistantship program; designing undergraduate major; and assisting in fund-raising for an energy resources building

2005-2008 **Associate Head, Department of Geology and Geophysics, University of Wyoming**

- Responsible for faculty and staff performance evaluations, annual reports, departmental plan, and serving as department head in his absence

ACADEMIC POSITIONS

1983-present	Department of Geology and Geophysics, University of Wyoming: assistant professor (1983-1989), associate professor (1989-1995), professor (1995-present)
2004-2005	Visiting Researcher, Institut für Mineralogie, Universität Hannover
1990-1991	Visiting Researcher, Department of Earth Sciences, University Cambridge, and Life Fellow, Clare Hall, University of Cambridge
Fall 1987	Visiting research scientist, Laboratory of Isotope Geochemistry, Eidgenossische Technische Hochschule, Zurich

SELECTED HONORS AND AWARDS

2013	National Ski Patrol Purple Merit Star for saving the life of a heart attack victim while rock climbing at Vedauwoo Crags, Wyoming in June 2013
2008	George Duke Humphrey Award, University of Wyoming (UW's highest faculty award honoring extraordinary teaching, scholarship and service)

2007	"Top Ten Teacher" chosen by UW College of Arts & Sciences students
2001	Carnegie Foundation/CASE Wyoming Professor of the Year
2000-2001	Ellbogen Meritorious Classroom Teaching Award, University of Wyoming
Fall 2000	Presidential Award, University of Wyoming (honoring faculty who are exemplary in balancing the university's educational, research and service goals, and who have made important contributions to the university's national standing)
1998	Fellow, Mineralogical Society of America

RECENT COMMUNITY SERVICE

2011-2014	Wyoming State Geological Survey Advisory Board; President 2014, Vice President 2012-13
2013-2014	Vice President, Educational Health Center of Wyoming Board of Directors
2011-2013	President, Phi Beta Kappa Alpha of Wyoming
2007-2010	Councilor, Mineralogical Society of America
2005-2006	Search Committee, President of the University of Wyoming
2005-2009	Board of Professional Geologists, State of Wyoming; Secretary-Treasurer of the Board 2006-2009
2005-2010	Co-chair, UNESCO project IGCP-510 "A-type granites and related rocks through time." Held annual workshops and field trips for international group of scientists
2000-03, 07-15	Kick-off speaker on geology of Wyoming for Leadership Wyoming, a program for state leaders organized by UW and the Wyoming Business Alliance

SELECTED PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Lectureships

Spring 2015	Phi Beta Kappa Alpha of Wyoming address, "As nearly free as possible: liberated by the liberal arts"
Fall 2014	Saturday University, University of Wyoming, Gillette, Wyoming
Spring 2011	Saturday University, University of Wyoming, Jackson, Wyoming
Fall 2000	Presidential Speaker, University of Wyoming
1997-1998	Mineralogical Society of America Lecturer

Review/editorial boards

2009-2013	Science Editor, *Geosphere*
2005-2009	Associate Editor, *Geosphere*
1994-1996	Associate Editor, *Geological Society of America Bulletin*
1991-1993	Editorial Board, *Geology*

Grant review panels

2011	Panel member, Tectonics, National Science Foundation
2008-2007	Panel member, Post-doctoral Fellowships and Research Experience for Undergraduates, National Science Foundation
2000-2003	Panel member, Solid & Environmental Earth Sciences, Canadian National Science & Engineering Research Council
1994-1996	Panel member, Petrology and Geochemistry, National Science Foundation
1993-1994	Panel member, Graduate Fellowships, National Science Foundation

Guest editor, *Rocky Mountain Geology* Special issue on carbon dioxide sequestration, October 2010
Guest editor, *Lithos* A-type granites and related rocks through time, special issues in 2007 and 2012
Guest editor, *Canadian Journal of Earth Sciences* Special issue on the Wyoming Province, October 2006
Guest editor, *Rocky Mountain Geology* Special issues on Proterozoic magmatism in Fall 1999 and Spring 2000

Licensure Licensed Professional Geologist, State of Wyoming PG-2591

Professional training

2012	State Higher Education Executive Officers (SHEEO)/Lumina Foundation Academy for State Policy Leadership in Higher Education

2011 Program on Negotiation for Senior Executives at Harvard Law School
2010 Legal Issues in Higher Education at the University of Vermont
2010 75th National Leadership Forum, American Council on Education, Washington D.C.

TEXTBOOK

Frost, B.R., and Frost, C.D., 2014, *Essentials of Igneous and Metamorphic Petrology*, Cambridge University Press, published in November 2013, ISBN 978-1-107-02754-1.

PUBLICATIONS

Selected recent publications of >125 total are listed; a complete bibliography will be provided on request. H-factor = 36; that is, 36 of my publications have been cited by others 36 or more times.

Frost, C.D., Frost, B.R., and Beard, J.S., On silica-rich granitoids and their eruptive equivalents. Centennial article, *American Mineralogist*, in press October 2015.

Frost, C.D., 2014, Mapping the Teton Range. *Rocky Mountain Geology,* 42, 198.

Duke, G.I., Carlson, R.W., Frost, C.D., Hearn, B.C., Eby, G.N., 2014, Continent-scale linearity of kimberlite-carbonatite magmatism, mid-continent North America. *Earth and Planetary Science Letters*, 403, 1-14.

Quillinan, S., Frost, C.D., 2014, Carbon isotope characterization of Powder River Basin Coal Bed Waters: Key to minimizing unnecessary water production and implications for exploration and timing of biogenic gas. *International Journal of Coal Geology*, 126,106-119, doi:10.1016/j.coal.2013.10.006.

McLaughlin, J.F., Bagdonas, D., Frost, C.D., Frost, B.R., 2013, *Geologic Map of the Stampede Meadows quadrangle, Fremont County, Wyoming.* Wyoming State Geological Survey Bedrock Geologic Map, 1:24,000 scale.

McArthur, K.L., Frost, C.D., Barnes, C.G., Prestvik, T., Nordgulen, Ø., 2013, Tectonic reconstruction and sediment provenance of a far-traveled oceanic nappe, Helgeland Nappe Complex, west-central Norway. *Journal of the Geological Society of London*, doi 10.1144/SP390.3

Marko, W.T., Barnes, C.G., Yoshinobu, A.S., Frost, C.D., Nordgulen, Ø., 2013, Geology, geochemistry, and emplacement conditions of the Vega instrusive complex: an example of large-scale crustal anatexis in north-central Norway. *Journal of the Geological Society of London*, doi 10.1144/SP390.x.

Frost, C.D., and Frost, B.R., 2013, Proterozoic Intraplate Ferroan Magmatism. *Precambrian Research*, v. 228. p. 151-163.

Mailloux, J., Ogle, K., Frost, C.D., 2013, Using a Bayesian statistical model to determine the amount of coal bed natural gas coproduced water in the Powder River, Wyoming and Montana. *Hydrologic Processes*, doi: 10.1002/hyp9784.

Quillinan, S.A., McLaughlin, J.F., Frost, C.D., 2012, Geochemical and stable isotopic analysis of the Tongue River and associated tributaries in the Powder River Basin: an analysis of the cause of annual elevated salinity in spring runoff. *Wyoming State Geological Survey Report of Investigation* No. 63, 15 pages.

Barnes, C.G., Frost, C.D., Nordgulen, O., Prestvik T., 2012, Magma hybridization in the middle crust, possible consequences for MASH magmatism. *Geosphere*, v. 8, 518-533.

Frost, C.D., and Mailloux, J.M., 2011, Establishing appropriate water quality numeric standards under the Clean Water Act: lessons from a case study of coalbed methane produced water discharge to the Powder River, Wyoming and Montana. *Wyoming Law Review*, v. 11, no. 1, 1-23.

Schwartz, J. J. Snoke, A.W., Cordey, F., Johnson, K., Frost, C.D., Barnes, C.G., LaMaskin, T.A., Wooden, J.L., 2011, Late Jurassic Magmatism, Metamorphism and Deformation in the Blue Mountains Province, northeast Oregon. *Geological Society of America Bulletin*, v. 123, 2083-2111.

Nelson, S.T., Hart, G.L., Frost, C.D., 2011, A reassessment of Mojavia and a new Cheyenne Belt alignment in the eastern Great Basin. *Geosphere*, v. 7, 513-527.

McLaughlin, J.F., Frost, C.D., Sharma, S., 2011, Isotopic analysis of Atlantic Rim waters, Carbon County, Wyoming: a new tool for characterizing coalbed natural gas systems. *Amer. Assoc. Petroleum Geologists Bulletin*, v. 95, 191-217.

Frost, C.D., and Frost, B.R., 2011, On ferroan (A-type) granites: their compositional variability and modes of origin. *Journal of Petrology,* v. 52, 39-53.

Frost, C.D. and Jakle, A.C., 2010, Geologic carbon sequestration in Wyoming: prospects and progress. *Rocky Mountain Geology*, v. 45, 83-91.

Stewart, E.D., Link, P.K., Fanning, C.M., Frost, C.D., McCurry, M., 2010, Non-North American sediment in the Mesoproterozoic upper Belt Supergroup and Lemhi Group: new constraints on a proto-Rodinia. *Geology*, v, 38,

927-930.

Frost, C.D., Brinck, E.L., Mailloux, J., Sharma, S., Campbell, C.E., Carter, S.A., Pearson, B.N., 2010, Innovative approaches for tracing water co-produced with coalbed natural gas: applications of strontium and carbon isotopes of produced water in the Powder River Basin, Wyoming and Montana (invited). In K.J. Reddy (ed.) *Coalbed Methane: Energy and Environment*, Nova Science Publishers, New York, p 59-80.

Frost, C.D., Frost, B.R., Lindsley, D.H., Chamberlain, K.R., Swapp, S.M., Scoates, J.S., 2010, Geochemical and isotopic evolution of the anorthositic plutons of the Laramie anorthosite complex: explanations for variations in silica activity and oxygen fugacity of massif anorthosites. *Canadian Mineralogist*, v. 48, 925-946.

Brinck, E.L., Frost, C.D., 2009, Evaluation of amendments used to prevent sodification of irrigated fields. *Applied Geochemistry*, v. 24, 2113-2122, doi:10.1016/j.apgeochem.2009.09.001.

Fenner, J.N., and Frost, C.D. 2009, Modern Wyoming plant and pronghorn isoscapes and their implications for archaeology. Journal of Geochemical Exploration, v. 102, 149-156. Doi:10.1016/j.gexplo.2008.09.003.

Frost, B.R., and Frost, C.D., 2008, A geochemical classification for feldspathic rocks. *Journal of Petrology*, v. 49, 1955-1969. Doi:10.1093/petrology/egn054.

Sharma, S., and Frost, C.D., 2008, Tracing coal bed natural gas co-produced water using stable isotopes of carbon. *Ground Water,* v. 46, 329-334.

Frost, B.R., and Frost, C.D., 2008, On Charnockites. *Gondwana Research,* v. 12, 30-44. doi:10.1016/j.gr.2007.07.006.

Barnes, C.G., Frost, C.D., McArthur, K., Barnes, M.A., Allen, C.M., Nordgulen, Ø., Prestvik, T., and Yoshinobu, A.S., 2007, Timing of sedimentation, metamorphism, and plutonism in the Helgeland Nappe Complex, north-central Norwegian Caledonides. *Geosphere* v. 3, 683-703 doi:10.1130/GES00138.1.

CONTRACTS AND GRANTS

Career total $11.7M; selected recent awards are listed. Information about other awards provided upon request.

"Dr. John C. Reed, Jr., pioneering geologist, mountaineer, and author of *Creation of the Teton Landscape*." C. Frost, University of Wyoming/National Park Service research program, $3,757, 5/1/13 to 4/30/14.

"Early Earth tectonics and uranium source rocks: mapping the Archean geology of the Granite Mountains, central Wyoming Province." C.D. Frost and B.R.Frost, U S Geological Survey EDMAP $21,411, 6/1/11-5/31/12.

"The mineralogy and provenance of Wyoming uranium roll-front deposits and their significance to in-situ recovery mining processes." S.M. Swapp, B.R. Frost, J.F. McLaughlin, R.W. Gregory, C.D. Frost, SER Uranium Technologies Research Program, $227,449, 5/1/11-4/30/14.

"Acquisition of a MC-ICPMS for the University of Wyoming." Sims, K., Chamberlain, K., Frost, C. National Science Foundation MRI-0960270. $874,225. 6/1/2010.

"Site Characterization of the highest-priority geologic formations for CO_2 storage in Wyoming." C. Frost, Principal Investigator. Department of Energy National Energy Technology Laboratory. $4,975,000 plus $11,900,000 from industry, state and other sources. 1/1/2010-12/31/2012. (Note: PI transferred from Frost to R. Surdam on 2/1/2010 when Surdam was hired as Director of Carbon Management at the School of Energy Resources.)

"Carbon sequestration monitoring activities." C. Frost, Principal Investigator. Department of Energy National Energy Technology Laboratory. $2,381,470. 9/1/2008-8/30/2010.

"A vital link for the reconstruction of terranes of the North American Cordillera: the Baker Terrane, NE Oregon. A.W. Snoke and C.D. Frost, National Science Foundation EAR0610084, $183,635, 06/1/07-5/31/11.

"Environmental tracers applied to quantifying impact of CBNG-related water production on surface and ground water and soil in the Powder River Basin, Wyoming. C. D. Frost. Department of Energy 42605Task4 $240,621, 6/02/06-5/31/08.

"High pressure granulite metamorphism in the Tetons: the earliest record of Himalayan-style tectonics?" B.R. Frost, C. D. Frost and S. Swapp, NSF EAR 0537670, $215, 939 6/1/06-5/30/11.

TEACHING

Courses taught include: GEOL 1000 Earth Science and Society, GEOL 1100 Physical Geology, GEOL 2000 Foundations of Geology I: Earth System Science, GEOL 2020 Petrology, GEOL 4060 Rocky Mountain Field Trip, GEOL 4200 Planetary Geology, GEOL 4025 Igneous and Metmorphic Petrology, GEOL 4490 Geochemistry, GEOL 5050 Isotope Geology, and various seminar courses.

While in upper administration I continued to teach one course and give several guest lectures each year.

Graduate Students and Post-doctoral Research Associates under my supervision
Supervised 3 post-doctoral fellows, 6 PhD students, 24 M.S. students, 5 undergraduate senior theses and hosted 2 sabbatical visitors. In addition, trained many other graduate students in the radiogenic isotope laboratory; I typically served as a member of these students' graduate committees.

PERSONAL

Married to Eric W. Nye for 34 years, two grown children, Charles (25) and Ellen (23)
Outdoor Emergency Care instructor, National Ski Patrol
Senior Patroller, Medicine Bow Nordic Ski Patrol
Hobbies: rock climbing, hiking, Nordic and telemark skiing, piano