

CURRICULUM VITAE - JAMES I. DREVER

EDUCATION:

B.A. Cambridge University (England), 1964, Chemistry

Ph.D. Princeton University, 1968, Geochemistry

Dissertation: Electrophoresis and the study of clay minerals in Recent sediments. Advisor: H.D. Holland.

Fellowships: 1966-68, Harold W. Dodds Fellowship, Princeton University: "among the most distinguished available to students who have completed the General Examination ... without regard to department or field of study."

PROFESSIONAL APPOINTMENTS:

2005- Emeritus Professor, University of Wyoming.

1993- J.E. Warren Distinguished Professor of Energy and the Environment, UW

2002-2005 Dept. Head, Dept. of Geology & Geophysics, University of Wyoming.

1977-2005 Professor, Dept. of Geology & Geophysics, University of Wyoming.

1974-77 Associate Professor, Geology Department, University of Wyoming.

1971-74 Assistant Professor, Geology Department, University of Wyoming.

1969-71 Assistant Research Oceanographer, Scripps Institution of Oceanography, University of California, San Diego.

1968-69 Postgraduate Research Oceanographer, Scripps Institution of Oceanography.

Registered Professional Geologist in Wyoming, 1992-

Sabbaticals:

2001-2002, von Humboldt Award recipient, University of Freiburg, Germany; Visiting Professor, Université Paul Sabatier, Toulouse, France.

1994-95, Chercheur associé, Centre de Géochimie de la Surface, CNRS, Strasbourg, France.

1979-80 and 1987-88, Visiting Professor, Swiss Federal Institute for Water Resources and Water Pollution Control (EAWAG), Swiss Federal Institute of Technology, Zürich.

RESEARCH INTERESTS: Geochemistry of surface and ground waters; weathering processes, particularly effects of organic acids and plants; global geochemical cycles; effects of acid deposition on surface waters; chemical and microbial aspects of contaminant migration; environmental impacts of mining; geochemical aspects of waste disposal.

SERVICE TO PROFESSIONAL ORGANIZATIONS, HONORS ETC:

President, The Geochemical Society 2004 & 2005

Vice-President, The Geochemical Society, 2002 & 2003

Principal Editor, Elements, 2010-2012

Associate editor, Geochemical Journal (Geochemical Society of Japan), 2003-2008

Editor-in-Chief, Chemical Geology, 1995-2001; Editorial Board, Chemical Geology, 1977-85, 2001-2006

Guest editor, Environmental Science & Technology, 1998

Associate editor, Geochimica et Cosmochimica Acta, 1982-94

Editorial Board, Geology, 1984-86

Councilor, The Geochemical Society, 1985-88

Fellow, The Mineralogical Society of America, 1989-

Fellow, The Geological Society of America, 1994-

ACS Petroleum Research Fund Advisory Board, 2003-2009

Scientific Advisory Committee, Rocky Mountain Regional Hazardous Substances Research Center (Fort Collins), 2002-2005

NASA Review Panel "Mars Fundamental Research Program" 2004.

Peer Review Panel for the Early Site Suitability Evaluation of the Potential Repository Site at Yucca Mountain, Nevada, 1991 (for DOE)

Invited observer/reviewer, USGS Retreat on Earth Science Studies for the Yucca Mountain Project, 1989.

NSF Panels (Seabed Assessment, IDOE, 1981-83; Environmental Geochemistry and Biogeochemistry, 1996; Life in Extreme Environments, 1997; Critical Zone Observatories, 2007)

Director, NATO Advanced Research Workshop "The Chemistry of Weathering", Rodez, France, 1984.

Organizing Committee, for NATO Advanced Study Institute "Physical and Chemical Weathering in Geochemical Cycles", Aussois, France, 1985.

Mineralogical Society of America MSA Award Committee, 1985-87.

National Atmospheric Deposition Program review panel for Materials Effects, 1986.

Director, EPRI/EPA/NCASI Workshop on weathering processes and acid deposition, 1986.

Alexander von Humboldt Foundation Award, Germany, for "outstanding achievements in research and contributions to international cooperation and understanding," 2001.

Participant in Working Group on Potential Role of Contaminants in Declines of Pelagic Organisms declines in the Upper San Francisco Estuary. National Center for Ecological Analysis and Synthesis, 2007-2010.

Member, Technical Qualifications Review Board, US EPA, 2008,

Symposium "Rates of Geochemical Processes and their Application to Natural Systems" held

in honor of James I. Drever. Goldschmidt International Geochemistry Conference, Vancouver, BC, July 2008. Published as special issue of Chemical Geology.

University of Wyoming awards:

President's Award for Scholarly Work, 1993

J.E. Warren Distinguished Professorship of Energy and the Environment, 1993-

UW President's Speaker Series lecturer, 1999

George Duke Humphrey Outstanding Faculty Award, 2004

A&S Distinguished Emeritus Faculty Award, 2005

Proposal reviewer for:

NSF (Geochemistry Program, Hydrology Program, Hydrologic Sciences Program, Environmental Geosciences Program, Geography and Regional Science Program, Geology Program, Geologic Record of Global Change Program, Petrology Program, Office of Polar Programs, Surficial Processes Program, Stratigraphy & Paleontology Program, Geology & Paleontology Program, Marine Chemistry Program, Submarine Geology & Geophysics Program, Thermodynamics and Mass Transfer Program, Environmental Geochemistry and Biogeochemistry Program, Life in Extreme Environments Program, Critical Zone Observatories, International Programs, International Decade of Ocean Exploration, RANN), National Institute for Global Environmental Change

EPA (various programs)

DOE (various programs)

USGS (various programs)

NASA

ACS Petroleum Research Fund

USDA National Research Initiative Competitive Grants Program

Abandoned Coal Mine Lands Research Program.

National Sciences and Engineering Research Council of Canada

Netherlands Geosciences Foundation

National Environmental Research Council (UK)

Israel Science Foundation

U.S.-Israel Binational Science Foundation

International Science and Technology Center

Swiss National Science Foundation

International Science Foundation (George Soros)

MONTS

Virginia Water Resources Research Center

Hudson River Foundation

Cottrell Foundation

Manuscript reviewer for: Academic Press, American Chemical Society Symposium Series, American Journal of Science, American Mineralogist, American Scientist, Applied Geochemistry, Aquatic Geochemistry, Archives of Environmental Contamination and

Toxicology, Arctic and Alpine Research, Biogeochemistry, Canadian/American Conferences on Hydrogeology, Canadian Journal of Earth Sciences, Catena, Chemical Geology, Clays and Clay Minerals, Colloids & Surfaces, Comptes Rendus de l'Académie des Sciences (Paris), Contributions to Geology, Contributions to Mineralogy & Petrology, DNAG, Earth & Planetary Science Letters, Encyclopedia of Earth System Science, Environmental Contamination and Toxicology, Environmental Science & Technology, European Journal of Soil Science, Geochemical Journal (Japan), Geochimica et Cosmochimica Acta, Geological Society of America Bulletin, Geology, Global and Planetary Change, Global Biogeochemical Cycles, Harcourt Brace Jovanovich, Hydrological Processes, Initial Reports of the Deep Sea Drilling Project, In Situ, Journal of Geological Education, Journal of Geology, Journal of Geophysical Research, Journal of Hydrology, Journal of Mathematics Applied in Medicine and Biology, Journal of Sedimentary Petrology, Journal of Soil & Water Conservation, Macmillan, Marine Chemistry, Marine Geology, Minerals and Metallurgical Processing, National Geographic Research, National Research Council Studies in Geophysics, Nature, Paleoceanography, Precambrian Research, Prentice-Hall, Princeton University Press, Science, Water, Air & Soil Pollution, Water Resources Research, various symposia.

Invited Lectures

University of California, Berkeley; UC San Diego; UC Davis; UCLA; University of Southern California; Portland State University; Northwestern University; University of Virginia; Georgia Institute of Technology; Syracuse University; Pennsylvania State University; University of Connecticut; Swiss Federal Institute of Technology; Universität Bern (Switzerland); Universität Bayreuth (Germany); Hahn-Meitner-Institut für Kernforschung (Berlin, Germany); Gesellschaft für Strahlen- und Umweltforschung (Munich, Germany); University of New Mexico; Colorado State University; Princeton University; Harvard University; Vrije Universiteit Amsterdam (Netherlands); Universität Freiburg (Germany); Université Louis Pasteur (Strasbourg, France), Université Paul Sabatier (Toulouse, France); Universidad Autonoma de Mexico; Universidad Autonoma de Baja California Sur; University of Texas, Austin (Oliver Lecture in Hydrology).

Society memberships: Geochemical Society, Geological Society of America (fellow), International Association for Geochemistry and Cosmochemistry, Mineralogical Society of America (fellow).

PUBLICATIONS:

Books

- Drever, J.I. (2014) (editor) Surface and Ground Water, Weathering, and Soils. Treatise on Geochemistry Second Edition Vol.7 (series eds. H.D.Holland and K.K.Turekian), Elsevier, Oxford, 561 p.
- Drever, J.I. (2003) (editor) Surface and Ground Water, Weathering, and Soils. Treatise on Geochemistry Vol.5 (series eds. H.D.Holland and K.K.Turekian), Elsevier, Oxford, 626 p
- Drever, J. I. (1997) The Geochemistry of Natural Waters, Third Edition. Prentice-Hall, Upper Saddle River, N.J., 436 p.
Fourth Edition in progress.

- Drever, J. I. (1988) The Geochemistry of Natural Waters, Second Edition. Prentice-Hall, Englewood Cliffs, N.J., 437 p.
- Drever, J. I. (1985) (editor) The Chemistry of Weathering. NATO Advanced Science Institute Series, Reidel, 324 p.
- Drever, J. I. (1982) The Geochemistry of Natural Waters. Prentice-Hall, Englewood Cliffs, N.J., 388 p.
(Russian language edition published by MIR, Moscow, 1985, 440 p.)
- Drever, J. I. (1977) (editor) Sea Water: Cycles of the Major Elements. Benchmark Papers in Geology, Dowden, Hutchinson & Ross, 344 p.

Articles

- Graly, J.A., Drever, J.I. and Humphrey, N.F. (2017) Calculating the balance between atmospheric CO₂ drawdown and organic carbon oxidation in subglacial hydrochemical systems. Global Biogeochemical Cycles v. 31, p. 709-727.
- Heller, P.L., Ratigan, D., Trampush, S. Noda, A. McElroy, B., Drever, J. and Huzurbazar, S. (2015) Origins of bimodal stratigraphy in fluvial deposits: an example from the Morrison Formation (upper Jurassic), western U.S.A.. J. Sedimentary Research v. 85, p. 1466-1477.
- Brooks, M. L., Fleishman, E., Brown, L. R., Lehman, P. W., Werner, I., Scholz, N., Mitchelmore, C., Lovvorn, J. R., Johnson, M. L., Schlenk, D., van Drunick, S., Drever, J. I., Stoms, D. M., Parker, A. E. and Dugdale, R. (2012) Life Histories, Salinity Zones, and Sublethal Contributions of Contaminants to Pelagic Fish Declines Illustrated with a Case Study of San Francisco Estuary, California, USA Estuaries and Coasts v. 35, p. 603-621.
- Brinck, E.L., Drever, J.I., and Frost, C.D. (2008) The geochemical evolution of water co-produced with coal bed natural gas in the Powder River Basin, Wyoming, Environmental Geosciences v. 15(4), p. 153-171.
- Jin, S., Drever, J.I. and Colberg, P.J.S. (2007) Effect of copper on sulfate reduction in bacterial consortia enriched from metal-contaminated and uncontaminated sediments. Environmental Toxicology and Chemistry v. 26, p. 225-230.
- Anderson, S.P., Blum, J., Brantley, S.L., Chadwick, O., Chorover, J., Derry, L.A., Drever, J.I., Hering, J.G., Kirchner, J.W., Kump, L.R., Richter, D., and White, A.F. (2004) Proposed initiative would study Earth's weathering engine. EOS v. 58(28) p. 265-269.
- Drever, J.I. (2002) Calcite in Granite: why does it matter? Humboldt Kosmos (Mitteilung der Alexander von Humboldt-Stiftung) v. 79, p. 27-28.
- Sullivan, A.B. and Drever, J.I. (2001) Geochemistry of suspended particles in a mine-affected mountain stream. Applied Geochemistry v.16, p. 1663-1676.
- Sullivan, A.B. and Drever, J.I. (2001) Spatiotemporal variability in stream chemistry in a high-elevation catchment affected by mine drainage. Journal of Hydrology, v.252, p. 237-250.
- Anderson, S.P., Drever, J.I., Frost, C.D., and Holden, P. (2000) Chemical weathering in the foreland of a retreating glacier. Geochim. Cosmochim. Acta v. 64, p. 1173-1189.
- Poulson, S.R. and Drever, J.I. (2000) Organic contaminant stable isotope geochemistry, and application to contaminant characterization and remediation. In Groundwater Research (ed. Rosbjerg et al.) Balkema, Rotterdam. P. 335-336.
- Carrillo-Chávez, A., Drever, J.I., and Martínez, M. (2000) Arsenic content and groundwater geochemistry of the San Antonio-El Triunfo, Carrizal and Los Planes aquifers in southernmost Baja California, Mexico. Environmental Geology v. 39, p. 1295-1303.

- Hoch, A.R., Reddy, M.M., and Drever, J.I. (1999) The importance of mechanical disaggregation in chemical weathering in a cold alpine environment, San Juan Mountains, Colorado. Geol. Soc. Amer. Bull. v. 111, p. 304-314.
- Poulson, S.R., Harrington, R.R., and Drever, J.I. (1999) The solubility of toluene in aqueous salt solutions. Talanta v. 48, p. 633-641.
- Harrington, R.R., Poulson, S.R., Drever, J.I., Colberg, P.J.S., and Kelly, E.F. (1999) Carbon isotope systematics of monoaromatic hydrocarbons: Vaporization and adsorption experiments. Organic Geochemistry v. 30, p. 765-775.
- Poulson, S.R. and Drever, J.I. (1999) Stable isotope (C, Cl, H) fractionation during vaporization of trichlorethylene. Environmental Science & Technology v. 33, p. 3689-3694.
- Carrillo, A. and Drever, J.I. (1998) Environmental assessment of the potential for arsenic leaching into groundwater from mine wastes in Baja California Sur, Mexico. Geofisica Internacional, v. 37, p. 35-39.
- Carrillo, A. and Drever, J.I. (1998) Adsorption of Arsenic by natural aquifer material in the San Antonio-El Triunfo mining area, Baja California, Mexico. Environmental Geology v. 35, p. 251-257.
- Stillings, L.L., Drever, J.I., and Poulson, S.R. (1998) Oxalate adsorption at a plagioclase (An₄₇) surface and models for ligand-promoted dissolution. Environmental Science and Technology, v. 32, p. 2856-2864.
- Sullivan, A.B., Drever, J.I., and McKnight, D.M. (1998) Diel variation in element concentrations, Peru Creek, Summit County, Colorado. J. Geochem. Exploration v. 64, p. 141-145.
- Drever, J.I. (1997) Catchment mass balance. In Geochemical Processes, Weathering and Groundwater Recharge in Catchments, (Sæther, O.M. and de Caritat, P., Eds), Balkema, p. 241-261.
- Drever, J.I. and Stillings, L.L. (1997) The role of organic acids in mineral weathering. Colloids and Surfaces, v. 120, p. 167-182.
- Anderson, S. P., Drever, J. I., and Humphrey, N. F. (1997) Chemical weathering in glacial environments. Geology, v. 25, p. 399-402.
- Finley, J.B. and Drever, J.I. (1997) Chemical mass balance and rates of mineral weathering in a high-elevation catchment, West Glacier Lake, Wyoming. Hydrological Processes, v. 11, p. 745-764.
- Poulson, S.R., Drever, J.I., and Stillings, L.L. (1997) Aqueous Si-oxalate complexing, oxalate adsorption onto quartz, and the effect of oxalate upon quartz dissolution rates. Chemical Geology, v. 140, p. 1-7.
- Poulson, S.R., Colberg, P.J.S, and Drever, J.I. (1997) The toxicity of heavy metals (Ni, Zn) to *Desulfovibrio desulfuricans*. Geomicrobiol. J., v. 14, p. 41-49.
- Poulson, S.R., Drever, J.I., and Colberg, P.J.S. (1997) Estimation of K_{OC} values for deuterated benzene, toluene, and ethylbenzene, and application to ground water contamination studies. Chemosphere, v. 35, p. 2215-2224.
- Drever, J.I. (1996) Reply to the Comment by T.A. Jackson on "The effect of land plants on weathering rates of silicate minerals". Geochimica et Cosmochimica Acta, v. 60, p. 725.
- Anderson, S.P., Drever, J.I., and Humphrey, N.F. (1996) Glacial chemical weathering regimes in relation to the continental norm. Fourth International Symposium on the Geochemistry of the Earth's Surface (ed. S.H. Bottrell) International Association of Geochemistry and

- Cosmochemistry, p. 529-533.
- Poulson, S.R., Drever, J.I., and Stillings, L.L. (1996) An experimental study of aqueous Si-oxalate complexing and oxalate adsorption onto quartz. Fourth International Symposium on the Geochemistry of the Earth's Surface (ed. S.H. Bottrell) International Association of Geochemistry and Cosmochemistry, p. 624-627.
- Poulson, S.R. and Drever, J.I. (1996) Aqueous complexing of nickel and zinc with 3-[N-morpholino]propanesulfonic acid, and the solubility products of nickel and zinc hydroxides. Talanta v. 43, p. 1975-1981.
- Uhrie, J.L., Drever, J.I., Colberg, P.J.S., and Nesbitt, C.C. (1996) In-situ immobilization of heavy metals associated with uranium leach mines through bacterial sulfate reduction, Hyrometallurgy, v. 43, p. 231-240.
- Clow, D.W. and Drever, J.I. (1996) Weathering rates as a function of flow through an alpine soil. Chemical Geology, v. 132, p. 131-141.
- Hoch, A.R., Reddy, M.M., and Drever, J.I. (1996) The effect of iron content and dissolved O₂ on dissolution rates of clinopyroxene at pH 5.8 and 25°C: preliminary results. Chemical Geology, v. 132, p. 151-156.
- Stillings, L.L., Drever, J.I., Brantley, S.L., Sun, Y., and Oxburgh, R. (1996) Rates of feldspar dissolution at pH 3-7 with 0-8 mM oxalic acid. Chemical Geology, v. 132, p. 79-89.
- Drever, J.I. (1997) Weathering processes. In Geochemical Processes, Weathering and Groundwater Recharge in Catchments, (Sæther, O.M. and de Caritat, P., Eds), Balkema, p. 3-19.
- Finley, J.B., Drever, J.I., and Turk, J.T. (1995) Sulfur isotope dynamics in a high-elevation catchment, West Glacier Lake, Wyoming. Water, Air, and Soil Pollution, v. 79, p. 227-241.
- Rittle, K.A., Drever, J.I., and Colberg, P.J.S. (1995) Precipitation of arsenic during bacterial sulfate reduction. Geomicrobiology Journal, v. 13, p. 1-11.
- Tawfic, T.A., Reddy, K.J., Gloss, S.P., and Drever, J.I. (1995) Reaction of CO₂ with clean coal technology solid wastes to reduce contaminant mobility. Water, Air, and Soil Pollution, v. 84, p. 385-398.
- Drever, J.I. and Clow, D.W. (1995) Weathering rates in catchments. Reviews in Mineralogy, v. 31, p. 463-483.
- Oxburgh, R., Drever, J.I., and Sun, Y.-T. (1994) Effect of pH and mineral composition on the low-temperature dissolution of plagioclase feldspars. Geochimica et Cosmochimica Acta, v. 58, p. 661-669.
- Drever, J.I. (1994) The effect of land plants on mineral weathering rates. Geochimica et Cosmochimica Acta, v. 58, p. 2325-2332.
- Drever, J.I., Murphy, K.M., and Clow, D.W. (1994) Field weathering rates versus laboratory dissolution rates: an update. Mineralogical Magazine, v. 58A, p. 239-240.
- Drever, J.I. and Vance, G.F. (1994) Role of soil organic acids in mineral weathering processes. The Role of Organic Acids in Geological Processes (ed. E.D. Pittman and M.D. Lewan), Springer-Verlag, p. 138-161.
- Drever, J.I. (1994) Durability of stone: Mineralogical and textural perspectives. Proc. Dahlem Conference on Durability and Change: The Science, Responsibility, and Cost of Sustaining Cultural Heritage. Wiley, p. 27-37.
- Orna, M.V., Anderson, R., Bender, B., Cramer, F., de Witte, E., Drever, J.I., Ehling, A., Heckl, W.M., Lowenthal, D., Madsden, H.B., Melnick, R.Z., Samuel, D., and Westheimer, F.H. (1994) Group Report: What is durability in artifacts and what inherent factors determine it?

- Proc. Dahlem Conference on Durability and Change: The Science, Responsibility, and Cost of Sustaining Cultural Heritage. Wiley, p. 51-66.
- Doehne, E. and Drever, J.I. (1994) Report of the Impromptu Discussion Session on Stone Conservation. Proc. Dahlem Conference on Durability and Change: The Science, Responsibility, and Cost of Sustaining Cultural Heritage. Wiley, p. 287-289.
- Drever, J.I. (1994) Introduction to weathering processes. *In* Geochemical Processes, Weathering and Ground Water Recharge in Catchments., Short Course Notes. Norwegian Geological Survey Report No. 94.080 (13 p).
- Drever, J.I. (1994) Inorganic aspects of catchment mass balance. *In* Geochemical Processes, Weathering and Ground Water Recharge in Catchments., Short Course Notes. Norwegian Geological Survey Report No. 94.080 (19 p).
- Reddy, K.J., Gloss, S.P., Tawfic, T.A., and Drever, J.I. (1994) Immobilization of contaminants in alkaline solid wastes derived from fossil energy conversion process. Biogeochemistry of Trace Elements (ed. Adriano, D.C., Chen, Z.-S., and Yang, S.-S.) Special issue of Environmental Geochemistry and Health, v. 16, p. 69-80.
- Drever, J.I. and Swoboda-Colberg, N.G. (1993) Mineral weathering rates from small-plot experiments, WMP site, Bear Brooks, Maine, USA. Experimental Manipulations of Biota and Biogeochemical Cycling in Ecosystems—Approach, Methodologies, Findings, ed. L. Rasmussen, T. Brydges, and P. Mathy. Commission of the European Communities, Brussels, p. 214-216.
- Mazor, E., Drever, J.I., Finley, J., Huntoon, P.W., and Lundy, D.A. (1993) Hydrochemical implications of groundwater mixing: An example from the southern Laramie Basin, Wyoming. Water Resources Research, v. 29, p. 193-205.
- Finley, J.B. and Drever, J.I. (1993) Sulfate sources in the Glacier Lakes catchment, Snowy Range, Wyoming. Applied Geochemistry, Supp. Issue 2, p. 185-188.
- Reddy, K.J., Drever, J.I., and Hasfurther, V.R. (1993) Chemical modeling to predict the chemistry of leachates from alkaline solid wastes. Applied Geochemistry, Supp. Issue 2, p. 155-158.
- Swoboda-Colberg, N.G. and Drever, J.I. (1993) Mineral dissolution rates in plot-scale field and laboratory experiments. Chemical Geology, v. 105, p. 51-69.
- Drever, J.I. and Finley, J.B. (1993) Weathering and pedogenesis at the watershed scale: high-elevation catchments in silicate terrains. Chemical Geology, v. 107, p. 289-291.
- Finley, J.B. and Drever, J.I. (1992) Chemical hydrograph separation using field and experimental data with implications for solute cycling in an alpine catchment. Water-Rock Interaction: Proc. 7th Int. Conf. on Water-Rock Interaction, ed. Kharaka, Y.K. and Maest, A.S., Balkema, Rotterdam, v. 1, p. 553-556.
- Moncure, G., Jankowski, P.A., and Drever, J.I. (1992) The hydrochemistry of arsenic in reservoir sediments, Milltown, Montana. Water-Rock Interaction: Proc. 7th Int. Conf. on Water-Rock Interaction, ed. Kharaka, Y.K. and Maest, A.S., Balkema, Rotterdam, v. 1, p. 513-520.
- Swoboda-Colberg, N.G. and Drever, J.I. (1992) Mineral dissolution rates: A comparison of laboratory and field studies. Water-Rock Interaction: Proc. 7th Int. Conf. on Water-Rock Interaction, ed. Kharaka, Y.K. and Maest, A.S., Balkema, Rotterdam, v. 1, p. 115-125.
- Drever, J.I. and Zobrist, J. (1992) Chemical weathering of silicate rocks as a function of elevation in the southern Swiss Alps. Geochimica et Cosmochimica Acta, v. 56, p. 3209-3216.
- Reddy, K.J., Drever, J.I., and Hasfurther, V.R. (1991) The effect of a CO₂ pressure process on the solubilities of major and trace elements in oil shale solid wastes. Environmental Science and Technology, v. 25, p. 1466-1469.

- Reddy, K.J., Lindsay, W.L., Workman, S.M., and Drever, J.I. (1990) Measurement of calcite ion activity products in soils. Soil Science Society of America Journal, v. 54, p. 67-71.
- Zobrist, J. and Drever, J.I. (1990) Weathering processes in alpine watersheds sensitive to acidification. In "Acidification Processes in Remote Mountain Lakes", ed. M. Johannessen, R. Mosello and H. Barth, CEC Brussels (Belgium), p. 149-161.
- Mast, M.A., Drever, J.I., and Baron, J. (1990) Chemical weathering in the Loch Vale Watershed, Rocky Mountain National Park, Colorado. Water Resources Research, v. 26, p. 2971-2978.
- Drever, J.I. and Swoboda-Colberg, N. (1989) Application of laboratory-derived mineral dissolution rates to weathering in the field. Water-Rock Interaction, WRI-6, editor D.L. Miles, Balkema, Rotterdam, p. 211-214.
- Reddy, K.J., Drever, J.I., Essington, M.E., and Lindsay, W.L. (1989) Strontium supplement to Technical Bulletin 134: Selection of standard free energies of formation for use in soil chemistry. Technical Bulletin LTB89-2, Agricultural Experiment Station, Colorado State University, 24 p.
- Drever, J. I., Li, Y.-H., and Maynard, J. B. (1988) Geochemical cycles: The continental crust and the oceans. In Chemical Cycles in the Evolution of the Earth, editors C.B. Gregor, R. M. Garrels, F. T. Mackenzie, and J.B. Maynard. Wiley-Interscience, New York, p. 17-53.
- Walker, J. C. G. and Drever, J. I. (1988) Geochemical cycles of atmospheric gases. In Chemical Cycles in the Evolution of the Earth, editors C. B. Gregor, R. M. Garrels, F. T. Mackenzie, and J. B. Maynard. Wiley-Interscience, New York, p. 55-76.
- Rochette, E. A., Drever, J. I., and Sanders, F. S. (1988) Chemical weathering in the West Glacier Lake Drainage Basin, Snowy Range, Wyoming: Implications for future acid deposition. Contributions to Geology, v. 26, p. 29-44.
- Drever, J.I. (1988) Background Paper on Geochemistry. Final Report of the Special Programme on Global Transport Mechanisms in the Geosciences. North Atlantic Treaty Organization, p. 64-69.
- Jenkins, M. D., Drever, J. I., Reider, R. G., and Buchanan, T. (1987) Chemical composition of fresh snow on Mount Everest. Journal of Geophysical Research, v. 92, p. 10999-11002.
- Mast, M. A. and Drever, J. I. (1987) The effect of oxalate on the dissolution rates of oligoclase and tremolite. Geochimica et Cosmochimica Acta, v. 51, p. 2559-2568.
- Bumb, A. C., McKee, C. R., Way, S. C., Drever, J. I., and Halepaska, J. (1987) Ammonia and nitrate migration from the vadose zone to the ground water system: Containment, recovery, and natural restoration. Proceedings of the First National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods, National Water Well Association, Dublin, Ohio, p. 95-123.
- Drever, J. I. and Hurcomb, D. R. (1986) Neutralization of atmospheric acidity by chemical weathering in an alpine drainage basin in the North Cascade Mountains. Geology, v. 14 p. 221-224.
- Fahey, T. J., Yavitt, J. B., Blum, A. B., and Drever, J. I. (1985) Controls of soil solution chemistry in lodgepole pine forest ecosystems, Wyoming. In Planetary Ecology, editors D. E. Caldwell, J. A. Brierly and C. L. Brierly, Van Nostrand Reinhold, New York, p. 473-484.
- Bumb, A. C., Drever, J. I., and McKee, C. R. (1985) In-situ determination of dispersion coefficients and adsorption parameters for contaminants using a push-pull test. Proc. 2nd. Int. Conf. on Ground Water Quality Research, Oklahoma St. Univ., 186-90.
- Mott, L. V. and Drever, J. I. (1983) Origin of uraniferous phosphatic beds in Wilkins Peak

- Member of the Green River Formation, Wyoming. American Association of Petroleum Geologists Bulletin, v. 67, p. 70-82.
- Antweiler, R. C. and Drever, J. I. (1983) The weathering of a late Tertiary volcanic ash: importance of organic solutes. Geochimica et Cosmochimica Acta, v. 47, p. 623-629.
- Bumb, A., McKee, C. R., Reverand, J., Halepaska, J., Drever, J. I., and Way S. C. (1984) Ammonia and nitrate in groundwater: assessment of containment and restoration options. Environmental Symposium '84, Orlando Florida, p. 81-118.
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Sea Drilling Project, v. 35, p.741-747.

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GRANTS AND CONTRACTS:

NSF Biocomplexity—Incubation Activity: “Developing conceptual and mathematical approaches to model transport and transformation of elements through a geothermal landscape.” \$99,984, 2000-2003 (P.J.S. Colberg, B. Chen, J.I. Drever, R.O. Hall, N.W. Hinman).

NASA Planetary Instrument Definition and Development Program “Thermal oxidative pyrolysis and evolved gas analyzer (TOPEGA), \$494,493, 1998-2000 (J.A. Schmidt (Ball Aerospace & Technologies Corp.), G. Kopp, J.I. Drever, T. Hochwitz)

NSF Major Research Instrumentation: "Acquisition of a stable isotope facility to study terrestrial processes and their interaction with climate and the environment." \$335,000, 1998-2001 (J.M. Welker, J.I. Drever, S.T. Jackson, S.R. Poulson, W.K. Smith).

Wyoming Water Research Center: “The use of stable isotopes (N, O) to trace sources of nitrate

contamination and to document denitrification in ground waters" \$25,000, 1997-98, \$15,000 1998-99 (S.R. Poulson and J.I. Drever).

NSF Environmental Geochemistry and Biogeochemistry Program "Stable isotope analysis of the fate and mobility of organic contaminants in soils and groundwater" \$150,000, 9/1/96-8/31/98 (S.R. Poulson, J.I. Drever, P.J.S. Colberg, E.F. Kelly)

NSF EPSCoR: "Biogeochemistry of trace elements in aquatic ecosystems: new perspectives" \$2,400,000, 1995-1998 (with faculty in Chemistry and Zoology & Physiology)

EPA EPSCoR "Development of geomicrobial processes for remediation of metal/organic contamination in soils, sediments, and ground water," \$163,332, 1995-97 (P.J.S. Colberg and J.I. Drever).

Wyoming Water Resources Center: "Distribution coefficient (K_d) values for the partitioning of Pb, Cd, Cu, and As between Wyoming soils and pore waters: comparing measured and predicted values," \$18,454, 1994-1995; \$13,055 for 1995-96 (J.I. Drever and L.L. Stillings)

U.S. Air Force Office of Scientific Research: "Adsorption of hazardous organic compounds by mineral surfaces," \$592,170, 1994-1996 (K.T. Carron, D.A. Buttrey, J.I. Drever, G.F. Vance, and M.B. Allen)

NSF (EPSCoR ADP) and State of Wyoming "Groundwater Research Cluster", approximately \$3,000,000 among 9 faculty over 3 years, 1992-1994.

Wyoming Water Research Center: "In situ immobilization of heavy metals associated with uranium leach mining." \$22,440, 1992-93.

NSF (Scientific Instrumentation Program) \$70,000 Funds to purchase an automated X-ray diffractometer, 1992.

U.S. Air Force: "A new approach to the determination of bioavailable metals in surface waters," \$334,475, 1991-94 (Co-PI with H. L. Bergman, Zoology Dept.)

Electric Power Research Institute "Development of a CO₂ pressure technique for chemical stabilization of alkaline CCT wastes." \$116,849, 1990-1991 (K.J. Reddy, J.I. Drever and S.P. Gloss).

Wyoming Water Research Center. "Hydrology and geochemistry of an arkosic artesian aquifer, the New Fork Tongue of the Wasatch Formation, Green River Basin, Wyoming." \$16,571, 1991-92.

ENSR Corporation: "Geochemistry of Milltown Reservoir sediments." \$27,445, 1990-93.

EPA: "Watershed Manipulation Project: A field study of processes which regulate surface water acidity". U. Wyoming sub-project, \$203,770, 1990-93.

Wyoming Water Research Center: "Soil-water interaction as a control on surface-water chemistry, West Glacier Lake Basin, Snowy Range, Wyoming". \$45,767, 1989-91.

Wyoming Water Research Center: "Hydrology and recharge mechanics of alpine carbonate terranes in Wyoming thrust belt mountain ranges". \$40,680 for 1989-1990 (P.W. Huntoon & J.I. Drever). Renewal by J.I. Drever and P.W. Huntoon funded for \$12,395 for 1990.

USDA, Forest Service: "Water from snowpack". \$30,000, 1988-90.

Wyoming Water Research Center: "Importance of chemical weathering, soil-water interaction, and in-lake processing as controls on surface water chemistry at West Glacier Lake, Snowy Range, Wyoming", \$15,000, 1988 (with F.S. Sanders).

Co-principal investigator (with H. L. Bergman, Zoology Dept.): U.S. Geological Survey: "Development of biologically relevant methods for determination of bioavailable Al in surface waters". \$173,533, 1988-1990.

Wyoming Water Research Center: "Seasonal variability and transport of acidic materials and selected trace elements in surface waters at the West Glacier Lake Watershed, Snowy Range, Wyoming", \$29,782, 1987-88 (with F. S. Sanders).

Co-principal investigator (with W. A. Reiners and D. H. Knight), U. S. Forest Service: "Acid neutralization in Glacier Lakes Basin, Medicine Bow Mountains" \$78,487, 1987-88.

DOE (through Western Research Institute): "Geochemical modeling related to the surface disposal of processed oil shale solid waste" \$186,000, 1987-89 (with K.J. Reddy and V. Hasfurther).

EPA, Cation Supply Task Group, Watershed Manipulation Project, Univ. of Wyoming sub-contract, \$245,112, 1986-1989.

Co-principal investigator (with F.S. Sanders, WWRC), U.S. Geol. Survey: "Temporal variability and fluxes of acidic materials and selected trace elements in the surface waters of West Glacier Lake, Snowy Range Mountains, WY." \$59,930, 1986-88.

Co-investigator on U.S. Nuclear Regulatory Commission project, "Flow of Groundwater and Transport of Contaminants Through Saturated Fractured Geologic Media from High-Level Radioactive Waste". \$1,200,000, 1985-88 (P.I. S.C. Way, In-situ, Inc.)

Co-investigator on U.S. Forest Service project "Characterization of High Elevation Research Sites for Atmospheric Deposition Studies" (P.I. J. H. Gibson, Colorado State Univ.), 1985-87.

Co-principal investigator (with D.H. Knight and W.A. Reiners), Eisenhower Consortium/U. S. Forest Service, "Acid neutralization in Rocky Mountain coniferous forest ecosystems". \$59,444, 1985-86.

NATO Scientific Affairs Division: Support of advanced research workshop "The Chemistry of Weathering". 1,000,000 Belgian Francs (approx \$20,000), 1984.

NSF (Environmental Geosciences): Rock weathering: geochemical and biological controls. \$135,615, 1983-86.

Office of Water Policy/USGS: Processes controlling the composition of infiltrating water in forested mountain watersheds. \$13,662, 1983-84.

Collaborating Investigator on EPRI Project "Lake Acidification and Fisheries", PI H.L. Bergman (Zoology Dept). Project had a budget of about \$3 million, 1983-88.

NSF (Submarine Geology & Geophysics): Isotopic, chemical and mineralogical studies of sediments, pore waters, and altered igneous rocks sampled by the Deep Sea Drilling Project: III. Chemical and mineralogical studies of sediments and altered basalts. \$44,400, 1978-80.

NSF (Geochemistry): Research on the chemistry of weathering of volcanic rocks. \$44,300,

1978-80.

NSF (Submarine Geology & Geophysics): Alteration of igneous rocks sampled on Leg 45 of the DSDP. \$17,100, 1977-78.

EPA: A cooperative project to evaluate surface and ground water problems associated with potential strip mine sites. Wyoming Geochemistry Sub-Project, \$197,727, 1975-81.

Wyoming Environmental Institute/ARCO: Impact of proposed strip mining on water quality, Thunder Basin, Wyoming. \$22,800, 1973-74.

NSF (Geochemistry): Controls on the chemical composition of surface waters in the Absaroka Mountains, Wyoming, and Teels Marsh, Nevada. \$35,700, 1973-75.

NSF (Submarine Geology & Geophysics): Research on diagenetic reactions of silicates in cores taken by the Deep Sea Drilling Project. \$66,900, 1972-76.

COURSES TAUGHT (University of Wyoming):

Geochemistry of Natural Waters (senior/graduate)

Clay Mineralogy (graduate)

Geochemical Analytical Methods (graduate, shared)

Water Quality Modeling (graduate)

Geochemistry (senior/graduate)

Non-Clastic Sedimentation (senior/graduate)

Introduction to Oceanography (undergraduate)

Foundations of Geology I: Chemical Evolution of the Earth (undergraduate, shared)

Physical Geology (freshman, shared)

Various graduate seminars, including

Global Geochemical Cycles

Stable Isotopes in Low-Temperature Processes

Dissolved Organics in Natural Waters

Acid Deposition and Surface Water Chemistry

Environmental Geochemistry of Heavy Metals and Metalloids

FORMER GRADUATE STUDENTS

PhD

W.R. Miller (US Geological Survey, Denver)(retired)

C.L. Smith (USGS, Denver)(retired)

J.D. Murphy (joint with R.C. Surdam) (was Tenneco, now private consultant)(member UW A&S Board of Visitors)

B.A. Kimball (USGS, Salt Lake City)

R.C. Antweiler (USGS, Denver)

J.B. Shanley (USGS, New Hampshire)

M.A. Mast (USGS, Denver)

D.C. Clow (USGS, Denver)
J.B. Finley, Jr. (was Faculty, U. Miami of Ohio, now consultant, Fort Collins)
A. Carrillo (Faculty Universidad Nacional Autonoma de Mexico)
A.R. Hoch (was NRC Postdoc, USGS, faculty, Lawrence Univ., Wisc, now Director Laramie
Rivers Conservation District)
A. B. Sullivan (Wigner Fellow, Oak Ridge National Laboratory, now USGS Vancouver WA)

MS

C.D. Sands (High school teacher)
L.V. Mott (PhD in marine archaeology Texas A&M; now Senior Research Fellow, Dept. of
History, Univ. Minnesota)
W.L. Dam (Nuclear Regulatory Commission, Now private consultant)
D.R. Hurcomb (US Bureau of Reclamation)
J.M. Mason (Consultant, Wisconsin)
A.E. Blum (PhD Yale, currently USGS, Boulder)
E.A. Rochette (PhD Oregon St., Soils; Postdoc Stanford)
M. Blanchard (Peace Corps, Africa)
R.M. Oxburgh (PhD Columbia, was faculty, Univ. Edinburgh, UK, now in video production
business, London)
K.A. Rittle (Consultant, TriHydro Corp., Laramie)
J.L. Uhrie (PhD Mich. Tech, Phelps Dodge Mining Company, AZ)
K.M. Murphy (Consulting, Laramie, WY)
Y. Sun (Consulting, Houston, TX)
A.A. Bell (Consulting, Dallas, TX)
R. R. Harrington (was with Exxon; now Texas Bureau of Economic Geology)
G. Oelsner (PhD Arizona, hydrology; now US EPA Corvallis, OR)