

Curriculum Vitae

Michael Anthony Kruge

Professor Emeritus
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Education

1985 Ph.D. University of California, Berkeley (Geochemistry)
(Thesis advisors: H.R. Wenk, A.L. Burlingame, Melvin Calvin, R.L. Hay)
1982 M.A. University of California, Berkeley (Geology)
1980 B.A. San Francisco State Univ. (Geology)

Professional Experience

2019-present Professor Emeritus, Dept. of Earth & Environmental Studies, Montclair State University (MSU).
2019-present Colaborador, Instituto de Recursos Naturales y Ordenación del Territorio (INDUROT), University of Oviedo, Spain
2002-2019 Professor, Dept. of Earth & Environmental Studies, Montclair State University (MSU).
2008 (May-June) Visiting Professor, Dept. of Environmental Geosciences, University of Vienna, Austria (also May-June, 2010)
2002-2008 Associate Dean, College of Science & Mathematics, MSU.
1999-2002 Chair, Dept. of Geology, Southern Illinois Univ. Carbondale (SIUC)
1998-2002 Professor, Dept. of Geology, SIUC
1994 (Jan.-Jun.) Chargé de Recherche, CNRS-CREGU, Vandœuvre-lès-Nancy, France
1992-1998 Associate Professor, Dept. of Geology, SIUC
1987-1992 Assistant Professor, Dept. of Geology, SIUC
1985-1987 Geochemist, Standard Oil (Ohio), Cleveland, Ohio and Dallas, Texas
1981-1982 Research Assistant, Stanford University
1980-1985 Geologist, Sohio Petroleum Company, San Francisco, Calif.

University and Professional Service

- Chair, Graduate Council, MSU (2010-2012)
- Elected representative of the College to Graduate Council, MSU (2008-2014)
- Member, President's Commission on Affirmative Action and Diversity, MSU (2007-2009)
- Co-Director, Doctor of Environmental Management Program, MSU (2003-2008)
- Co-Director, Environmental Resources & Policy Program, SIUC (2000-2002)
- Member, College of Science Executive Committee, SIU (1999-2002)
- Elected representative of the College of Science to Graduate Council, SIUC (1997-2000)
- Elected by Geology faculty to Departmental Representative Council, SIUC (1998-1999)
- Coordinator, Graduate Studies in Geology, SIUC (1997-1999)

- Associate Editor of *Organic Geochemistry* (1998-1999)

- Member, Editorial board of *International Journal of Coal Geology* (1989-2002)
- Member, Science Advisory Committee, Connecticut Audubon Coastal Center (2000-2004)
- Member, European Association of Organic Geochemists, Geochemical Society, American Chemical Society, American Geophysical Union, Geological Society of America.

Research Interests

Geochemistry of organic contaminants in sediments. Environmental forensics. Marine, estuarine and lacustrine biogeochemistry. Geochemistry of peat. Fossil organic matter as indicator of environmental change. Applications of analytical pyrolysis-gas chromatography/mass spectrometry. Biological marker compounds and polycyclic aromatic hydrocarbons in petroleum, petroleum source rocks, oil shales, coal and sediments. Nature of organic sulfur in fossil fuels, a precursor of acid rain.

Teaching Experience

Organic Geochemistry, Low Temperature Inorganic Geochemistry, Advanced Organic Geochemistry, Environmental Forensics, Petroleum Geology, Energy and the Environment, Physical Geology, Historical Geology, Environmental Geoscience, Physical and Biological Environmental Systems. Chaired or served on numerous M.S. and Ph.D. committees in Geology, Chemistry & Engineering. Technical short courses.

Grants and Contracts

Crelling, J.C., Hippo, E.J. and Kruege, M.A., Characterization of Organic Sulfur in Coal and Pure Macerals. Granted by the Center for Research on Sulfur in Coal. (1 Sep. 1988 - 31 Aug. 1990, \$300,000.)

Kruege, M.A., Hippo, E.J. and Crelling, J.C., Characterization of Organic Nitrogen in Coals. Granted by the Center for Research on Sulfur in Coal. (1 Sep. 1990 - 31 Aug. 1991, \$71,192)

Hippo, E.J., Crelling, J.C. and Kruege, M.A., Molecular Structure of Coal and Coal Macerals. Funded by the Electric Power Research Institute. (1 Apr. 1991- 31 Mar. 1992, \$121,292)

Kruege, M.A. and Palmer, S.R., Analysis of Organic Sulfur and Nitrogen in Coal via Tandem Degradation Methods. Granted by the Center for Research on Sulfur in Coal. (1 Sep. 1991 - 31 Aug. 1992, \$119,125)

Kruege, M.A. and Palmer, S.R., Analysis of Organic Sulfur and Nitrogen in Coal via Tandem Degradation Methods. Granted by the Illinois Clean Coal Institute. (1 Sep. 1992 - 31 Aug. 1993, \$107,051)

Kruege, M. A. and Landais, P., Chemical Characterization of Kerogen Macerals. Granted by the French Centre National de Recherches Scientifiques and the French Centre de Recherches sur la Geologie des Matieres Premieres Minerales et Energetiques. (6 months full support for research during sabbatical leave Jan-Jun 1994.)

Crelling, J.C. and Kruge, M.A., Separation and Characterization of Separated Coal Macerals and Kerogen. Granted by the PG Research Foundation. (1 June 2000-31 May 2002, \$170,635)

Goodey, N. (PI), Krumins, J.A. (CoPI), Kruge, M.A., Forgoston, E., Krumins, V., Li, X., Gallagher, F., RUI: SusChEM: Increasing Soil Enzymatic Function with Targeted Microbial Inocula. National Science Foundation (CBET - Environmental Engineering) June 2016-May 2019, \$320,180.

Kruge M.A. "Professional Learning Community Faculty" member for Vanderklein D.W. (PI), Dalley J., Galster J., Goodey N. (co-PIs). STEM Pioneers: A 3-year pilot study to increase science literacy and STEM enrollment among first-year first-generation students. National Science Foundation (DUE-IUSE - Exploration & Design: Engaged Student Learning) Jan. 2017 - Dec. 2019, \$300,000.

Organic geochemical service contracts from government, university and private concerns, totaling \$45,000 since 1991.

Publications

Thesis

Kruge, M.A., 1985, Organic geochemistry and comparative diagenesis: Miocene Monterey Formation, Lost Hills Oil Field and Vicinity, West San Joaquin Basin, California. Ph.D. dissertation, Dept. of Geology & Geophysics, University of California, Berkeley. 266 p.
https://www.researchgate.net/publication/35326262_Organic_geochemistry_and_comparative_diagenesis_Miocene_Monterey_Formation_Lost_Hills_Oil_Field_and_vicinity_West_San_Joaquin_Basin_California

Published Papers

Kruge, M.A. and Williams, L.A., 1982, Silica diagenesis in the Monterey Formation (Miocene) in the Lost Hills oil field, San Joaquin Valley, California. In, Williams, L.A. and Graham, S.A., eds., *Monterey Formation and Associated Coarse Clastic Rocks, Central San Joaquin Basin, California*, Soc. Econ. Paleon. Mineral. Pacific Section, Los Angeles, p. 37-42. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/71/>

Kruge, M.A., 1983, Diagenesis of Miocene biogenic sediments in Lost Hills oil field, San Joaquin Basin, California. In, Isaacs, C.M. and Garrison, R.E., eds., *Petroleum Generation and Occurrence in the Miocene Monterey Formation, California*, Soc. Econ. Paleon. Mineral. Pacific Sect., Los Angeles, p. 39-51.
<https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/72/>

Kruge, M.A., 1986, Biomarker geochemistry of the Miocene Monterey Formation, West San Joaquin Basin, California: Implications for petroleum generation. In Leythaeuser, D. and Rullkötter, J., eds., *Advances in Organic Geochemistry 1985*, Pergamon Press, Oxford, p. 517-530. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/59/>

- Kruger, M.A., Rimmer, S.M. and Crelling, J.C., 1989, Organic geochemical and petrographic analysis of pure macerals from the Ohio Shale. In, Lazar, D.J., ed., *Proceedings, 1988 Eastern Oil Shale Symposium*, Institute for Mining and Minerals Research, Lexington, Kentucky, p. 411-417.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/93/>
- Hippo, E.J., Crelling, J.C., Palmer, S.R. and Kruger, M.A., 1989, Macromolecular structure of coal. *Proceedings; Symposium on Biological Processing of Coal and Coal-derived Substances*. EPRI ER-6572, Electric Power Research Institute, Palo Alto, California, p. 1-15 to 1-35.
- Kruger, M.A., Hubert, J.F., Akes, R.J. and Meriney, P. E., 1990, Biological markers in Lower Jurassic synrift lacustrine black shales, Hartford basin, Connecticut, USA. *Organic Geochemistry*, vol. 15, p. 281-289.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/94/>
- Palmer, S.E., Hippo, E.J., Kruger, M.A. and Crelling, J.C., 1990, Characterization of organic sulfur compounds in coals and coal macerals. In, Orr, W.L. and White, C.M., eds., *Geochemistry of Sulfur in Fossil Fuels*, American Chemical Society Symposium Series 429, p. 296-315. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/623>
- Kruger, M.A., Hubert, J.F., Bensley, D.F., Crelling, J.C., Akes, R.J. and Meriney P.E., 1990, Organic Geochemistry of a Lower Jurassic synrift lacustrine sequence, Hartford Basin, Connecticut, USA. In, B. Durand and F. Behar, eds., *Advances in Organic Geochemistry 1989*, Pergamon Press, Oxford, p. 689-701.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/95/>
- Hippo, E.J., Crelling, J.C., Palmer, S.E. and Kruger, M.A., 1990, Organic sulfur compounds in coals. *Proceedings; 14th Annual Conference on Fuel*, Electric Power Research Institute, Palo Alto, California, p. 6/1-6/28.
- Hippo, E.J., Palmer, S.E., Kruger, M.A. and Crelling, J.C., 1990, Organic sulfur characterization of low rank coals. *Proceedings of the First International Symposium on the Bioprocessing of Coals*, Electric Power Research Institute, Palo Alto, California, p. 1-15.
- Kruger, M.A., Crelling, J.C., Hippo, E.J. and Palmer S.R., 1991, Aspects of sporinite chemistry. *Organic Geochemistry*, vol. 17, p. 193-204.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/96/>
- Kruger, M.A. and Suarez-Ruiz, I., 1991, Organic geochemistry and petrography of Spanish oil shales. *Fuel*, vol. 70, p. 1298-1302. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/97/>
- Palmer, S.R., Hippo, E.J., Kruger, M.A., and Crelling, J.C., 1992, Characterization and selective removal of organic sulfur from Illinois Basin coals. *Coal Prep.*, vol. 10, p. 93-106.
https://www.researchgate.net/publication/232822949_Characterization_and_Selective_Removal_of_Organic_Sulfur_from_Illinois_Basin_Coals
- Yawanarajah, S.R., Kruger, M.A., Mastalerz, M. and Sliwinski, W., 1993, Organic geochemistry of Permian organic-rich sediments from the Sudetes area, SW Poland. *Organic Geochemistry* **20**:267-281. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/60/>
- Yawanarajah, S.R. and Kruger, M.A., 1994, Lacustrine shales and oil shales from Stellarton Basin, Nova Scotia, Canada: Organofacies variations and use of polyaromatic hydrocarbons as maturity indicators. *Organic Geochemistry* **21**:153-170.
https://www.researchgate.net/publication/256404233_Lacustrine_shales_and_oil_shal

- es_from_Stellarton_Basin_Nova_Scotia_Canada_organofacies_variations_and_use_of_polyaromatic_hydrocarbons_as_maturity_indicators
- Kruege, M.A., Stankiewicz, B. A., Crelling, J. C., Montanari, A. and Bensley, D. F., 1994, Fossil charcoal in Cretaceous-Tertiary boundary strata: Evidence for catastrophic firestorm and megawave. *Geochimica et Cosmochimica Acta* **58**:1393-1397. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/73/>
- Palmer, S.R., Kruege, M.A., Hippo, E.J., and Crelling, J.C., 1994, Speciation of heteroatoms in coal by sulfur-selective and nitrogen-selective techniques. *Fuel* **73**:1167-1172. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/638>
- Stankiewicz, B. A., Kruege M. A., and Crelling, J. C., 1994, Geochemical characterization of maceral concentrates from Herrin No. 6 coal (Illinois Basin) and Lower Toarcian shale kerogen (Paris Basin). In, Curnelle, R. and Sévérac, J.-P., eds., *Pétrologie Organique*, Recueil des Communications, Colloque International des Pétrographes Organiciens Francophones, Publ. Spéc., *Bull. Centres Rech. Explor.-Prod. Elf Aquitaine*, Vol. 18, p. 237-251. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/74/>
- Kruege, M.A. and Bensley, D.F., 1994, Flash pyrolysis-gas chromatography/mass spectrometry of Lower Kittanning vitrinites: Changes in the distributions of polyaromatic hydrocarbons as a function of coal rank. In, Mukhopadhyay, P. K. and Dow, W.G., eds., *Vitrinite Reflectance as a Maturity Parameter: Applications and Limitations*. American Chemical Society Symposium Series 570, p. 136-148. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/77/>
- Stankiewicz, B. A., Kruege M. A., Crelling, J. C., and Salmon, G.L., 1994, Density gradient centrifugation: Application to the separation of macerals of Type I, II and III sedimentary organic matter. *Energy & Fuels*.**8**:1513-1521. https://www.researchgate.net/publication/231270483_Density_Gradient_Centrifugation_Application_to_the_Separation_of_Macerals_of_Type_I_II_and_III_Sedimentary_Organic_Matter
- Kruege, M. A., Stankiewicz, B. A. and Montanari, A., 1994, Serravallian shales in the Monte dei Corvi pelagic sequence (Ancona, Italy): An organic geochemical perspective. *Giornale di Geologia*. **56**:173-182. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/98/>
- Han, Z., Kruege, M.A., Crelling, J.C. and Stankiewicz, B.A., 1995, Organic geochemical characterization of the density fractions of a Permian torbanite. *Organic Geochemistry* **22**:39-50. https://www.researchgate.net/publication/223399245_Organic_geochemical_characterization_of_the_density_fractions_of_a_Permian_torbanite
- Mukhopadhyay, P.K., Wade, J. A. and Kruege, M.A., 1995, Organic facies and maturation of Jurassic/Cretaceous rocks, and possible oil-source rock correlation based on pyrolysis of asphaltenes, Scotian Basin, Canada. *Organic Geochemistry* **22**:85-104. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/622>
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- Middle to Upper Miocene pelagic sequence of the Conero Riviera Marche Region, Italy
- Kruege, M.A., Stankiewicz, B. A., Crelling, J. C., Montanari, A. and Bensley, D. F., 1996, Reply to the comment by T. P. Jones on "Fossil charcoal in Cretaceous-Tertiary boundary strata: Evidence for catastrophic firestorm and megawave". *Geochimica et Cosmochimica Acta*. **60**:721-722. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/73/>
- Kruege M. A., Landais P. and Bensley D. F. (1996) Artificial maturation of alginite and organic groundmass separated from torbanites. *Organic Geochemistry* **24**:737-750. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/100/>
- Kruege M. A., Mastalerz M., Solecki A. and Stankiewicz B. A. (1996) Organic geochemistry and petrology of oil source rocks, Carpathian Overthrust region, southeastern Poland. Implications for petroleum generation. *Organic Geochemistry* **24**:897-912. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/101/>
- Stankiewicz, B. A., Kruege, M. A. and Mastalerz, M. (1996) A geochemical study of macerals from a Miocene lignite and an Eocene bituminous coal, Indonesia. *Organic Geochemistry* **24**:531-545. https://www.researchgate.net/publication/223453398_A_geochemical_study_of_macerals_from_a_Miocene_lignite_and_an_Eocene_bituminous_coal_Indonesia
- Stankiewicz, B. A., Kruege, M. A., Mastalerz, M. and Salmon G. L. (1996) Geochemistry of the alginite and amorphous organic matter from Type II-S kerogens. *Organic Geochemistry* **24**:495-509. https://www.researchgate.net/publication/223287017_Geochemistry_of_the_alginite_and_amorphous_organic_matter_from_Type_II-S_kerogens
- Stankiewicz, B. A., Mastalerz, M., Kruege, M. A., van Bergen P. F. and Sadowska, A. (1997) A comparative study of modern and fossil cone scales and seed of conifers: a geochemical approach. *New Phytologist*. 135:375-393. https://www.researchgate.net/publication/240456388_A_comparative_study_of_modern_and_fossil_cone_scales_and_seeds_of_conifers_A_geochemical_approach
- Kruege M. A., Landais P., Bensley D. F., Stankiewicz B. A., Elie M., Ruau O. (1997) Separation and artificial maturation of macerals from Type II kerogen. *Energy & Fuels* **11**:503-514. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/102/>
- Mukhopadhyay P.K., Kruege M.A. and Lewis C.F.M (1997). Application of Environmental Organic Petrology and Geochemistry to Fingerprint Organic Pollutants in the Recent Sediments of Lake Ontario. *Environmental Geosciences* **4**:137-148. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/625>
- Mukhopadhyay, P.K., Goodarzi, F., Kruege, M. A. and Alimi, M. H. (1997). Comparison of source rock geochemistry of selected rocks from the Schei Point group and Ringnes formation, Sverdrup basin, arctic Canada. *Int. J. Coal Geol.* **34**:225-260. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/636>
- Kuder T.K., Kruege M.A., Shearer J.C. and Miller S.L. (1998) Environmental and botanical controls on peatification - a comparative study of two New Zealand restiad bogs using Py-GC/MS, petrography and fungal analysis. *Int. J. Coal. Geol.* **37**:3-27. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/631>
- Crelling J. C. and Kruege M. A., (1998) Petrographic and chemical properties of Carboniferous resinite from the Herrin No. 6 coal seam. *Int. J. Coal Geol.* **37**:55-71. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/629>
- Kruege M. A., Mukhopadhyay P. K. and Lewis C. F. M. (1998) A molecular evaluation of contaminants and natural organic matter in surface sediments from western Lake

- Ontario. *Organic Geochemistry* **29**:1797-1812.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/632>
- Kuder T.K. and Kruege M.A. (1998) Preservation of lignin in sub-fossil plant tissues from raised peat bogs — a potential paleoenvironmental proxy. *Organic Geochemistry* **29**:1355-1368. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/630>
- Han Z., Kruege M. A., Crelling J. C., and Bensley D. F. (1999) Classification of torbanite and cannel coal. I. Insights from petrographic analysis of density fractions. *Int. J. Coal Geol.* **38**:181-202. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/633>
- Han Z. and Kruege M. A. (1999) Classification of torbanite and cannel coal. II. Insights from organic geochemical and multivariate statistical analysis. *Int. J. Coal Geol.* **38**:203-218. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/634>
- Kruege M. A. (1999) Molecular organic geochemistry of New York Bight sediments. Sources of biogenic organic matter and polycyclic aromatic hydrocarbons. *Northeastern Geology and Environmental Sciences*.**21**:121-128.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/103/>
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- Han Z. and Kruege M. A. (1999) Chemistry of maceral and groundmass density fractions of torbanite and cannel coal. *Organic Geochemistry* **30**:1381-1401.
<https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/635>
- Kruege M.A. (2000) Determination of thermal maturity and organic matter type by principal components analysis of the distributions of polycyclic aromatic compounds. *Int. J. Coal Geol.* **43**:27-51. <https://digitalcommons.montclair.edu/earth-environ-studies-facpubs/70/>
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- Burkhart C.N., Kruege M.A., Burkhart C.G., and Black C. (2001) Cerumen composition by flash pyrolysis-gas chromatography/mass spectrometry. *Otology & Neurotology* **22**:715-722.
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- Kruege M.A., Permanyer A., Serra J., Yu D. (2010) Geochemical investigation of an offshore sewage sludge deposit, Barcelona, Catalonia, Spain. *Journal of Analytical and Applied Pyrolysis* **89**:204-217. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/82/>
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- Kruege M.A. (2015) Analytical pyrolysis principles and applications to environmental science. In, M. Barbooti, ed., *Environmental Applications of Instrumental Chemical Analysis*. CRC Press, Boca Raton (FL), p. 533-569. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/66/>
- Lara-Gonzalo A., Kruege M.A., Lores I., Gutiérrez B., Gallego J.L.R. (2015) Pyrolysis-GC-MS for the rapid environmental forensic screening of contaminated brownfield soil. *Organic Geochemistry* **87**:9-20. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/69/>
- Micić V., Köster J., Kruege M.A., Engelen B. and Hofmann T. (2015) Bacterial wax esters in recent fluvial sediments. *Organic Geochemistry* **89-90**:44-55. https://www.researchgate.net/publication/283665693_Bacterial_wax_esters_in_recent_fluvial_sediments
- Kruege M.A. (2015) Geology in environmental management. In, D. Sarkar et al., eds., *An Integrated Approach to Environmental Management*. Wiley, pp. 3-45. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/65/>
- Kruege M.A. (2017) Dam removal in the USA: Effects on river water quality. In, M. Salgot, ed., *Stagnant Water Bodies Pollution II*, Atelier, Barcelona, pp. 37-64. <https://digitalcommons.montclair.edu/earth-environmental-studies-facpubs/67/>
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- Hagmann D.F., Kruege M.A., Cheung M., Mastalerz M., Gallego J.L.R., Singh J.P., Krumins J.A., Li X., Goodey N. (2019) Environmental forensic characterization of

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