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Engineering & Scientific Consulting

Kate Murdock, Ph.D., P.G.

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Professional Profile

Dr. Murdock is a geologist with experience in geophysics, mineralogy, environmental geology, and geological and geomorphic site characterization by means of field mapping, aerial photo analysis, and subsurface investigations. She has technical experience in optical and petrographical methods of rock and mineral identification, cross section and geologic map preparation and analysis, and surveying sites using aerial photographs, aeromagnetic maps, and gravitational anomaly maps.

Dr. Murdock has used ground penetrating radar and electrical resistivity for near-surface investigations, as well as interpreted geochemical data for rock, sediment, and soil analysis. She also has expertise in rock magnetism as a nondestructive tool for mineral identification, including its application to geologic reconstructions of past environments, variations in sediment transport, climatic changes, and tectonic events. Additional areas of interest for Dr. Murdock include rock mechanics, ore and mineral quality assessment, oil and gas recovery and transport, and the evaluation of landslides.

Prior to joining Exponent, Dr. Murdock was a Visiting Lecturer teaching geology, geophysics, planetary, and environmental science courses. Her doctoral work focused on using rock magnetic measurements to determine changes in mineralogy of Arctic lakes that could be used to determine environmental and climatic shifts in the region over the past million years. Dr. Murdock has extensive experience in magnetic investigations using MPMS, VSM, cryogenic magnetometers, and high- and room-temperature MS systems.

Academic Credentials & Professional Honors

Ph.D., Geosciences, University of Massachusetts, Amherst, 2013

M.S., Geosciences, University of Massachusetts, Amherst, 2009

B.S., Geological Sciences, Salem State University, 2006

Winner of Gloria Radke Memorial Award for Research at Univ. of Massachusetts, Amherst 2012

Recipient of first US Visiting Student Fellowship; Institute of Rock Magnetism, Univ. of Minnesota, Minneapolis 2009

Massachusetts Space Grant Consortium research grant award 2007, 2008, and 2009

Licenses and Certifications

Licensed Professional Geologist (GA)

Licensed Professional Geologist (NH)

Licensed Professional Geologist (PA)

Licensed Professional Geologist (TX)

Academic Appointments

Visiting Lecturer, Department of Geological Sciences, Salem State University (2013-2018)

Visiting Lecturer, Environmental Sciences Program, Stonehill College (2014-2018)

Visiting Lecturer, Environmental Science Program, Endicott College (2017)

Professional Affiliations

American Geophysical Union (AGU)

Geological Society of America (GSA)

Association of Environmental and Engineering Geologists (AEG)

American Association of Petroleum Geologists (AAPG)

Association of Women Geoscientists (AWG)

American Institute of Professional Geologists (AIPG)

Publications

Murdock, K.J. Iron Sulfides and Concrete Degradation. AIPG Annual Meeting, Marquette, MI. August 6-9, 2022.

Murdock, K.J. Magnetic Methods as a Hazard Assessment Tool: Detecting, delineating, and monitoring underground and surface fires. AEG Annual Meeting, Las Vegas, NV. September 12-17, 2022.

Murdock, K.J. Pyrite and Construction: Evaluating Pre- and Post-Failure. AEG Annual Meeting, San Antonio, TX. September 18-26, 2021.

Murdock, K.J. Pyrite, Marcasite, and Pyrrhotite: Potential Construction Hazards in New England and Beyond. GSA Connects, Portland, OR. October 10-13, 2021

Murdock, K. J. Arctic Lake Sediments as Records of Climate Change Using Rock Magnetic Properties and Paleomagnetic Data. Ph.D. dissertation, University of Massachusetts Amherst, Amherst, MA, 2013. https://scholarworks.umass.edu/dissertations_1/475/

Murdock, K. J., L. L. Brown, K. M. Wilkie. Rock magnetic properties, magnetic susceptibility, and organic geochemistry comparison in core LZ1029-7 Lake El'gygytgyn, Northeast Siberia, Russia, Climate of the Past 2013; 9: 467-479. https://doi.org/10.5194/cp-9-467-2013

Minyuk, P.S., T.V. Subbotnikova, L. L. Brown, and K. J. Murdock. Thermomagnetic properties of vivianite

nodules, Lake El'gygytgyn, Northeast Russia, Climate of the Past 2013; 9: 433-446. https://doi.org/10.5194/cp-9-433-2013

Murdock, K. J. Possible Terrestrial Basaltic Analogs for Highly Magnetized Martian Crustal Rocks. M.S. thesis, University of Massachusetts Amherst, Amherst, MA, 2009. https://scholarworks.umass.edu/theses/342/

Presentations

Murdock, K. J. and L. L. Brown. Saddleback Basalt as a Terrestrial Analog to Highly Magnetized Martian Crustal Rocks. AGU Joint Assembly, Montreal. May 3-7, 2015.

Murdock, K. J. and L. L. Brown. Magnetic investigation of the mid-Holocene aged coastal lake Heimerdalsvatnet in the Lofoten Islands, northern Norway. AGU Fall Meeting, San Francisco. December 3-7, 2012.

Murdock, K. J and L. L. Brown. Rock Magnetic Properties of Lake El'gygytgyn: Implications for Paleoclimatic Reconstruction. AGU Fall Meeting Invited Talk, San Francisco. December 5-9, 2011.

Murdock, K. J. and L. L. Brown. Initial Results of a Rock Magnetic Study from Core LZ-1029, Lake El'gygytgyn, Northeast Siberia; AGU Fall Meeting, San Francisco. December 13-17, 2010.

Murdock, K. J. and L. L. Brown. Possible Terrestrial Basaltic Analogs for Highly Magnetized Martian Crustal Rocks. AGU Joint Assembly, Ft. Lauderdale. May 27-30, 2008.

Peer Reviews

Geochemistry, Geophysics, Geosystems (G-Cubed)