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EDUCATION

Ph. D., Earth Sciences, Johns Hopkins University, 1987
Doctorat d'Université, Géologie Structurale, Université de Nantes, France, 1979
Bachelor of Science, Earth Sciences, University of California at Santa Cruz, 1976
Bachelor of Arts, Psychology, University of California at Santa Cruz,1976

PROFESSIONAL EXPERIENCE

Research Associate Professor, Department of Geology and Geophysics, University of Utah
April 2016 to present
Investigations of the cementitious fabrics of basaltic tephra and leadership of the 2017 SUSTAIN drilling project at Surtsey volcano, Iceland. Production of extremely durable concretes with reactive glass aggregates through leadership of a DOE ARPA-E concrete infrastructure project, in collaboration with civil and mechanical engineers and industry partners. Ongoing investigations of these materials and ancient Roman mortars and concretes using synchrotron radiation applications and advanced microscopy and spectroscopy techniques.

Project Scientist IV, Department of Civil and Environmental Engineering, UC Berkeley
November 2013 to December 2015

Visiting Research Engineer, Department of Civil and Environmental Engineering, UC Berkeley
August 2011 to October 2013
Investigations of ancient Roman seawater concretes and the concretes of the monuments of ancient Rome and the diverse microstructures, compositions, and material characteristics of their cementitious phases, with applications to volcanic ash pozzolans in modern concretes, in collaboration with Professor P. Monteiro and Professor H.-R. Wenk and their graduate students. Analytical methods include petrographic microscopy, Scanning Electron Microscopy, Raman Spectroscopy, and Scanning X-ray Transmission Microscopy, High Pressure X-ray Diffraction, and X-ray Microdiffraction studies with Synchrotron Radiation at beamlines 5.3.1, 5.3.2, 12.2.2., and 12.3.2 of the Advanced Light Source, Lawrence Berkeley Laboratories.

Adjunct Faculty Member, History Department, Northern Arizona University
2005 to 2015
Investigations of the volcanic building stone and concrete masonry of ancient Roman monuments and maritime harbor concretes. Research includes petrographic and geochemical studies of Roman volcanic tuffs, concrete aggregates, and pozzolanic cements; experimental tests of strength and durability of these materials; the chronology of use of building stone and concrete in Roman construction; and analyses of ancient texts (e.g. *De Architectura*) to describe scientifically the expertise of Roman builders and assess the durability of ancient masonry in Rome.

Visiting Scientist, School of Civil and Environmental Engineering, Cornell University
July to August 2010

Research Geoscientist, U. S. Geological Survey, Earthquake Hazards Reduction Program
1987 to 1995; GS 12 and 13 (1992)

Investigation of late Quaternary earthquake-ground ruptures along the Hat Creek fault near Lassen Volcano, California, 1991-1995. Developed innovative methods to make detailed, 1:1,000 scale geologic maps of segments of ground breakage along the 11-km long, Hat Creek fault scarp. Investigated processes of earthquake rupture on this young, well-developed normal fault and evaluated its earthquake potential.
Structural study of the seismically active Kaoiki fault zone and its recent earthquake ground ruptures, Mauna Loa volcano, Hawaii, 1988-1990. Published results include innovative geologic mapping, analysis of geodetic and seismic data, and mechanical analysis of faulting to clarify the ground-rupture process for one of the most seismically active areas in Hawaii.

Visiting Scholar, Stanford University, Stanford, CA 1984 to 1986
Collaborated with professors and students of the Geomechanics Group at Stanford on geological, geophysical, and geomechanical research towards Ph. D. dissertation.

Graduate Assistant, Johns Hopkins University, Baltimore, MD 1980 to 1986
Investigation of the deformation of host rocks over three igneous domes in the Southern Henry Mountains, Utah using geological mapping, geophysical methods and mechanical analysis. Published results are considered classic field studies in understanding how host rocks deform to accomodate near-surface accumulations of magmas.
Ph. D. Dissertation: *Deformation of host rocks during growth of igneous domes, southern Henry Mountains, Utah.*

Graduate Student, Université de Nantes, Nantes, France 1977 to 1979
Investigation of the mechanism of intrusion of mafic dikes into three upper mantle peridotite bodies in Corsica, and the Italian Alps, using geologic mapping, geochemical analysis, and microscopic methods of structural petrology.
Thèse de Doctorat d'Université: *Structures des filons dans les massifs de péridotite: mécanismes d'injection et relations avec la déformation plastique.*

SCIENTIFIC PUBLICATIONS

***** denotes ten publications of greatest importance

Jackson, M. D., H. Chen, J. G. Peterson, B. Richards, in press, Synchrotron X-Ray micro-diffraction studies of the mortars of ancient Roman concretes, *In* **Cultural Heritage Science,** edited by P. Martinetto, C. Dejoie, N. Tamura, ISTE Science, London.

Pizzo, A., Vitti, M., 2021, Ritrovamenti archeologici presso la Escuela Española de Historia y Arquelogia en Roma e il contesto topografico delle pendici meridionali del Quirinale, M. Vitti and A. Pizzo, Appendice, Jackson, M. D. et al.,, Petrographic and X-ray Diffraction Analyses, Wall Mortars, Via di S. Eufemia 13, Rome: **Bullettino della Commissione Archeologica Comunale di Roma**, 122, 107-130.

Seymour, L. M., N. Tamura, M. D. Jackson, A. Masic, 2021, Reactive binder and aggregate interfacial zones in the mortar of Tomb of Caecilia Metella concrete, 1C BCE, Rome: **Journal of the American Ceramic Society**, 18133, doi.org/10.1111/jace.18133.

Bergsten, P., P. Vannier, P., A. M. Klonowski, S. Knobloch, M. T. Gudmundsson, M. D. Jackson, V. T. Marteinsson, 2021, Basalt-hosted microbial communities in the subsurface of the young volcanic island of Surtsey, Iceland: **Frontiers of Microbiology**, 12, 728977 doi: 10.3389/fmicb.2021.728977

Kleine, B. I., A. Stefánsson, R. Kjartansdóttir, S. Prause, T. B. Weisenberger, H. I. Reynolds, Á. E. Sveinbjörnsdóttir, M. D. Jackson, M. T. Gudmundsson, 2020, The Surtsey volcano geothermal system: an analogue for seawater-oceanic crust interaction with implications for the elemental budget of the oceanic crust: **Chemical Geology**, 550, 119702. https://doi.org/10.1016/j.chemgeo.2020.119702

McPhie, J., J. D. L. White, C. Gorny, M. Jackson, M. Gudmundsson, S. Couper, 2020, Lithofacies

from the 1963-1967 Surtsey eruption in SUSTAIN drill cores SE-2a, SE-2b and SE-03: **Surtsey Research**, 14, 19-32.

Moore, J.G., M. D. Jackson, 2020, Observations on the structure of Surtsey: **Surtsey Research**, 14, 33-45.

Jackson, M. D., 2020, Petrographic and material observations of basaltic lapilli tuff, 1979 and 2017 Surtsey drill cores, Iceland: **Surtsey Research**, 14, 47-62.

Prause, S., T. B. Weisenberger, P. Cappelletti, C. Grimaldi, C. Rispoli, K. Jónasson, M. D. Jackson, M. T. Gudmundsson, 2020, Alteration progress within the Surtsey hydrothermal system, SW Iceland – A time-lapse petrographic study of cores drilled in 1979 and 2017: **Journal of Volcanological and Geothermal Research**, 106754 https://doi.org/10.1016/j.jvolgeores.2019.106754

Jackson, M. D., S. Couper, C. V. Stan, M. Ivarsson, M. W. Czabaj, N. Tamura, D. Parkinson, L. M. Miyagi, J. G. Moore, 2019, Authigenic mineral texture in submarine 1979 basalt drill core, Surtsey volcano, Iceland: **Geochemistry, Geophysics, Geosystems**, 20 [7], https://doi.org/10.1029/2019GC008304

Jackson, M. D., M. T. Gudmundsson, T. B. Weisenberger, J. M. Rhodes, A. Stefánsson, B. I. Kleine, P. C. Lippert, J. M. Marquardt, H. I. Reynolds, J. Kück, V. Þ., Marteinsson, P. Vannier, W. Bach, A. Barich, P. Bergsten, J. G. Bryce, P. Cappelletti, S. Couper, M. F. Fahnestock, C. F. Gorny, C. Grimaldi, M. Groh, Á. Gudmundsson, Á. Þ. Gunnlaugsson, C. Hamlin, Th. Högnadóttir, K. Jónasson, S. S. Jónsson, S. L. Jørgensen, A. M. Klonowski, B. Marshall, E. Massey, J. McPhie, J. G. Moore, E. S. Ólafsson, S. L. Onstag, V. Perez, S. Prause, S. P. Snorrason, A. Türke, J. D. L. White, and B. Zimanowski, 2019, SUSTAIN drilling at Surtsey volcano, Iceland, tracks hydrothermal and microbiological interactions in basalt 50 years after eruption: **Scientific Drilling**, 25, 35-46, https://doi.org/10.5194/sd-25-35- 2019.

Türke, A., M. D. Jackson, W. Bach, W.-A. Kahl, B. Grzybowski, B. Marshall, M. T. Gudmundsson, S. L. Jørgensen, 2019, Design of the Subsurface Observatory at Surtsey Volcano, Iceland: **Scientific Drilling**, 25, 57-62, https://doi.org/10.5194/sd-25-57-2.

***Jackson, M. D., S. R. Mulcahy, H. Chen, Y. Li, Q. Li, P. Cappelletti, H.-R. Wenk, 2017, Phillipsite and Al-tobermorite produced by cementitious water-rock reactions in Roman marine concrete: **American Mineralogist**, 102, 1435-1450.

Jackson, M. D., Y. Zhang, H. Chen, J. Moon, 2017, Autogenous mineral textures in micropores and microcracks Roman architectural concrete, Markets of Trajan, Rome: **RILEM Proceedings 14th International Conference on Durability of Building Materials and Component**s, Universiteit Gent, Gent, Belgium, 29-31 May 2017.

Jackson, M. D., M. Vitti, 2017, Mortars of the concrete wall between Augustus' and Trajan's Forum, Appendice I, Il restauro del muro tra il Foro di Traiano e il Foro di Augusto come spunto per alcune osservazioni archeologiche, M. Vitti: **Bullettino della Commissione Archeologica Comunale di Roma. Vol. 116 (2015), pp. 174-176.**

Schmölder-Veit, A., F. Henke, L. Thiemann, F. Schlütter, M. D. Jackson, 2017, Hydraulische Mörtel. Interdisziplinäres Projekt zu Wasseranlagen auf dem Palatin: **Bulletino dell'Istituto Archeologico Germanico Sezione Roma**, 122, 331-366.

Jackson, M. D., 2017, Technological confidence in Roman architectural and maritime concrete production: Proceedings 5th International Workshop on the Archaeology of Roman Construction, University of Oxford, Ioannou Centre for Classical and Byzantine Studies, Oxford, 11-12 April, 2015, **Arquelogía de la Construcción V**, **Archivo Español de Arqueología,** 15-28.

Jackson, M. D., M. T. Gudmundsson, W. Bach, P. Cappelletti, N. J. Coleman, M. Ivarsson, K. Jónasson, S. L. Jørgensen, V. Marteinsson, J. McPhie, J. G. Moore, D. Nielson, J. M.

Rhodes, C. Rispoli, P. Schiffman, A. Stefánsson, A. Türke, T. Vanorio, T. B. Weisenberger, J. D. L. White, R. Zierenberg, B. Zimanowski, 2015, Time-lapse characterization of hydrothermal seawater and microbial interactions with basaltic tephra at Surtsey volcano: **Scientific Drilling,** 20, 51-58. http://www.sci-dril.net/20/51/2015/

Zhao, P., M. D. Jackson, Y. Zhang, G. Li, P. J. M. Monteiro, L. Yang, 2015, Material characteristics of ancient Chinese lime binder and experimental reproductions with organic admixtures: **Construction and Building Materials**, 84, 477-488.

*****Jackson, M. D., E. N. Landis, P. F. Brune, M. Vitti, H. Chen, Q. Li, M. Kunz, H.-R. Wenk, P. J. M. Monteiro, A. R. Ingraffea, 2014, Mechanical resilience and cementitious processes in imperial Roman architectural mortar: **Proceedings of the National Academy of Sciences,** 111[52], 18484-18489. doi:www.pnas.org/cgi/doi/10.1073/pnas.1417456111

Jackson, M. D., 2014, Seawater Concretes and their Material Characteristics: *In* **Building for Eternity the History and Technology of Roman Concrete Engineering in the Sea**, edited by J. P. Oleson, Oxbow Books, Oxford, 141-187.

Celik, K., M. D. Jackson, M. Mancio, C. Meral, A. M. Emwas, P. K. Mehta, P. J. M. Monteiro, 2014, High-volume natural volcanic pozzolan and limestone powder as partial replacements for portland cement in self-compacting and sustainable concrete: **Cement and Concrete Composites**, 45, 136-147.

*****Jackson, M. D., S. R. Chae, S. R. Mulcahy, C. Meral, R. Taylor, P. Li, J. Moon, S. Yoon, A.-H. Emwas, G. Vola, H.-R. Wenk, P. J. M. Monteiro, 2013, Unlocking the secrets of Al-tobermorite in Roman seawater concrete: **American Mineralogist**, 98, 1669-1687.
Highlights and Breakthroughs Article 2013.
Elsen, J., O. Cozer, R. Snellings, 2013, Lessons from a lost technology: The secrets of Roman concrete, **American Mineralogist**, 98, 1917-1918.

*****Jackson, M. D., J. Moon, E. Gotti, R. Taylor, S. R. Chae, M. Kunz, A.-H. Emwas, C. Meral, P. Guttmann, P. Levitz, H.-R. Wenk, P. J. M. Monteiro, 2013, Material and elastic properties of Al-tobermorite in ancient Roman seawater concrete: **Journal of the American Ceramic Society**, 96[8], 2598-2606. **Featured article 2013.**

Brune, P., Ingraffea, A. R., Jackson, M. D., Perucchio, R., 2013, The fracture toughness of an Imperial Roman mortar: **Engineering Fracture Mechanics**, 102, 65-76.

Jackson, M. D., C. K. Kosso, 2013, *Scientia* in republican era stone and concrete masonry: *In* **A Companion to the Archaeology of the Roman Republic**, First Edition, edited by J.R. Evans. Blackwell Publishing Ltd. p. 268-284.
2013 PROSE Award, Honorable Mention, Single Volume Reference/Humanities & Social Sciences, American Publishers for Professional and Scholarly Excellence.

Jackson, M., G. Vola, J. P. Oleson, B. Scheetz, C. Brandon, R. Hohlfelder, 2012, Cement microstructures and durability in ancient Roman seawater concretes: **Historic Mortars, Characteristics and Tests,** edited by J. Valek, C. Groot, and J. Hughes. Springer – RILEM, p. 49-76.

Marra, F., D. Deocampo, M. Jackson, G. Ventura, 2011, The Alban Hills and Monti Sabatini volcanic products used in ancient Roman masonry (Italy): An integrated stratigraphic, archaeological, environmental and geochemical approach: **Earth Science Reviews**, 108[3-4]:115-136.

Bianchi, E, R. Meneghini, M. Jackson, P. Brune, F. Marra, 2011, Archaeological, structural, and compositional observations of the concrete architecture of the Basilica Ulpia and Trajan's Forum: **Comm. Hum. Litt**. 128, 72-93.

Jackson, M. D., P. Ciancio Rossetto, C. K. Kosso, M. Buonfiglio, F. Marra, 2011, Building materials of the Theater of Marcellus, Rome: **Archaeometry**, 4[4], 728-742.

*****Jackson, M. D., D. Deocampo, F. Marra, and B. E. Scheetz, 2010, Mid-Pleistocene volcanic ash in ancient Roman concretes, **Geoarchaeology**, 25, 36-74.
Award, 25 best articles in 25 years, 2010.

Jackson, M., F. Marra, 2010, Calcestruzzi delle volte del Foro di Traiano, Appendice I: Nuovi dati sulle volte in calcestruzzo della Basilica Ulpia e del Foro di Traiano, E. Bianchi and R. Meneghini: **Bullettino della Commissione Archeologica Comunale di Roma**, 111- 140.

Jackson, M., F. Marra, D. Deocampo, B. Scheetz, and A. Vella, 2010, Analisi delle componenti geologiche nelle murature del Foro di Cesare: *In* Atti del convegno "Il Foro di Cesare", **Scienze dell'Antichità,** 16, 403-417.

Howe, C., M. Jackson, C. Woolfit, 2010, Tuff Stone Masonry near Tower Hill in Victoria: Fragmentary Remains of Pioneer Settlement in Australia: **Journal of Architectural Conservation**, 16[3], 91-109.

Jackson, M., J. Logan, F. Marra, B. Scheetz, D. Deocampo, C. Cawood, 2010, Composizione e caratteristiche meccaniche dei calcestruzzi della Grande Aula, a cura di L. Ungaro, M.P. Paola, M. Vitti, **Mercati di Traiano restituiti. Studi e restauri 2005-2007**, 145-153, Rome, Palombri Editore.

Jackson, M., 2010, La malta del conglomerato cementizio nella volta della Sala Zuccari, in M. Vitti, 'Le coperture degli ambiente del corpo centrale dei Mercati di Traiano alla luce delle evidenze archeologiche', a cura di L. Ungaro, M.P. Paola, M. Vitti, **I Mercati di Traiano restituiti. Studi e restauri 2005-2007**, 83-84, Rome, Palombri Editore.

*****Jackson, M. D., J. M. Logan, B. E. Scheetz, D. M. Deocampo, C. G. Cawood, F. Marra, M. Vitti, L. Ungaro, 2009, Assessment of material characteristics of ancient concretes, Grande Aula, Markets of Trajan, Rome: **Journal of Archaeological Science**, 36, 2481-2492.

Jackson, M., F. Marra, D. Deocampo, A. Vella, C. Kosso, R. Hay, 2007, Geological observations of excavated sand (*harenae fossiciae*) used as fine aggregate in ancient Roman pozzolanic mortars: **Journal of Roman Archaeology**, 20, 25-51.

*****Jackson, M. D., F. Marra, 2006, Roman stone masonry: Volcanic foundations of the ancient city: **American Journal of Archaeology**, 110, 403-436.

Jackson, M. D., F. Marra, R. L. Hay, C. Cawood, E. Winkler, 2005, The judicious selection and preservation of tuff and travertine building stone in ancient Rome: **Archaeometry**, 47[3], 485-510.

Jackson, M. D., 1998, Processes of laccolith emplacement in the southern Henry Mountains, Southeastern Utah: Laccolithic complexes of southeastern Utah: Time of Emplacement and Tectonic Setting: *In* Workshop Proceedings: edited by J. D. Friedman and A. C. Huffman, Jr., **U. S. Geological Survey Bulletin**, 2158, 51-59.

*****Jackson, M. D., E. T. Endo, P. T. Delaney, T. Arnadottir, A. M. Rubin, 1992, Ground ruptures of the 1974 and 1983 Kaoiki earthquakes, Mauna Loa volcano, Hawaii: **Journal of Geophysical Research**, 97, 8775-8796.

Jackson, M. D., J. S. Noller, 1991, Geologic map of the Copper Creek Benches quadrangle, Garfield County, Utah (1:24,000 scale): **Utah Geological and Mineral Survey Open File Report** 209.

*****Jackson, M. D., D. D. Pollard, 1990, Flexure and faulting of sedimentary host rocks during growth of igneous domes, southern Henry Mountains, Utah: **Journal of Structural Geology**, 12, 185-206.

Jackson, M. D., 1989, Book review of: Geology of the Henry Mountains, Utah, as recorded in the notebooks of G. K. Gilbert, C. B. Hunt, editor, 1988, Geological Society of America Memoir 167: **Economic Geology**, 84, 206.

Jackson, M. D., D. D. Pollard, 1988, The laccolith-stock controversy: New results from the southern Henry Mountains, Utah: Reply: **Geological Society of America Bulletin**, 100,

1657-1659.

*****Jackson, M. D., D. D. Pollard, 1988, The laccolith-stock controversy: New results from the southern Henry Mountains, Utah: **Geological Society of America Bulletin**, 100[1], 117-139.

Delaney, P. T., M. D. Jackson, 1985, Computer and hand-calculator programs to determine extension or contraction of faulted marker planes**: U.S. Geological Survey Open File Report** 85-107, 21 pp.

Jackson, M. D., and P. T. Delaney, 1985, Extension and contraction of faulted marker planes: **Geology**, 13, 569-572.

Boudier, F., A. Nicolas, M. Jackson, 1983, Structural study of the Balmuccia peridotite (Western Alps): a transition from mantle to lower crust: **Geologie en Mijnbouw**, 63, 179-188.

Nicolas, A., M. Jackson, 1982, High temperature dikes in peridotites: origin by hydraulic fracturing: **Journal of Petrology**, 23, 568-582.

Jackson, M. D., M. Ohnenstetter, 1981, Peridotite and gabbroic structures in the Monte Maggiore Massif, Alpine Corsica: **Journal of Geology**, 89, 703-719.

INVITED PRESENTATIONS

Jackson, M. D., 2022 (upcoming), Self-sustaining cementitious systems in archaeological, geological and laboratory analogs of ancient Roman concretes: **Gordon Research Conference, Scientific Methods in Cultural Heritage Research**, Les Diablerets, Switzerland, 10-15 July, 2022.

Jackson, M. D., 2022 (upcoming), Reactive Volcanic Tephra and Cementing Processes: From Young Surtsey Tuff to Ancient Roman Concrete: **Advanced Light Source Colloquium**, LBNL National Laboratory, April 27, 2022.

Jackson, M. D., 2021, New Insights into the Reactive Aggregate and Binding Phase of Ancient Roman Architectural Concretes: **Henry L. Pierce Laboratory Seminar Series**, Department of Civil and Environmental Engineering,, Massachusetts Institute of Technology, 27 October, 2021.

Jackson, M. D. and H.-R. Wenk, 2018, Characterization of Cementitious Phases in Mortars of Roman Concretes and Analogies with Volcanic Tuffs. ISA 2018 Symposium, Commission on Crystallography in Art and Cultural Heritage, **Recent advances in ancient mortar characterization**, Merida, Mexico, 20-24 May, 2018. http://isa2018.mx/news/3

Jackson, M. D., 2018, Durability of Ancient Roman Concretes and their Geologic Analogs: **ARPA-E Extremely Durable Cementitious Materials Workshop**, Dallas, TX, 10-11 April, 2018.https://arpae.energy.gov/sites/default/files/11.%20Jackson_2018_DOE_ARPAe_Synop sis_17April.pdf

Jackson, M. D., 2018, Glass Alteration in Volcanic and Archaeological Materials: Guideposts for Predicting Nuclear Waste Glass Durability. Glass Corrosion Short Course. **American Ceramics Society Glass and Optical Materials, Annual Meeting**, San Antonio, TX, 20-24 May, 2018. http://ceramics.org/glass-corrosion-short-course

Jackson, M. D., 2018, Comparison of volcanic glass dissolution microstructures in ancient Roman marine concrete and young Surtsey, Iceland, basalt. **American Ceramics Society Glass and Optical Materials, Annual Meeting**, San Antonio, TX, 20-24 May, 2018.

Jackson, M. D., 2017, ALS Beamline investigations of Roman concrete and its young geologic analog at Surtsey Volcano, Iceland: **Advanced Light Source, Cross-Cutting Review, Earth and Environmental Sciences**, Lawrence Berkeley Laboratories, Berkeley, CA, 2-3 November, 2017.

Jackson, M. D., 2017, Applications of ancient Roman cementitious systems to long term nuclear waste performance: **Materials Science and Technology 2017**, Materials Issues in Nuclear

Waste Management Symposium, Pittsburgh, PA, 8-12 October, 2017.

Jackson, M. D., 2017, X-ray Microdiffraction of Mineral Cements in Ancient Roman Concrete; **Advanced Light Source User Meeting**, Lawrence Berkeley Laboratories, Berkeley, CA, 2-4 October, 2017.

Jackson, M. D., 2017, Drilling into the secrets of Roman concrete. **Science Friday**, 07/07/2017, https://www.sciencefriday.com/segments/drilling-into-the-secrets-of-roman-concrete/

Jackson, M. D., 2017, Applications of ancient Roman cementitious systems to long term nuclear waste performance: **Materials Science and Technology 2017**, Materials Issues in Nuclear Waste Management Symposium, Pittsburgh, PA, 5-10 October, 2017.

Jackson, M. D., 2016, Cementitious mineral cycling associated with volcanic ash reactions in ancient Roman marine concrete: **Materials Science and Technology 2016**, Art and Cultural Heritage Symposium, Salt Lake City, UT, 16 October, 2016.

Jackson, M. D., 2015, Sea-Water Concrete Fabrics: Volcanic Ash, Cementitious Binder, and Material Characteristics. Monuments in the Contemporary World: Roman Concrete Engineering in the Sea: A 21st Century Perspective, **American Academy in Rome**, Rome, Italy, 9 April, 2015.

Jackson, M. D., 2015, Ancient Roman Concretes: Cementitious Hydrates in Volcanic Ash-Hydrated Lime Seawater Mortars, **Southeast University**, Nanjing, China, 2 February, 2015.

Jackson, M. D., 2014, Rediscovering Concrete of the Romans: Keynote Lecture, **Nevada Infrastructure Concrete Conference**, Reno, Las Vegas, 18-20November, 2014.

Jackson, M. D., 2014, Pyroclastic Rock in Imperial Roman Architectural Concrete: Fracture toughness, cementitious processes, and environmental sustainability at the millennial scale: Invited Seminar, **Department of Earth and Planetary Sciences**, **UC Davis**, 15 October, 2014.

Jackson, M. D., 2014, Ancient Roman Concretes: How interdisciplinary collaborative studies of 2000-year-old concretes can help resolve modern issues in concrete construction: **HOK Open House**, San Francisco, CA, 3 April, 2014.

Jackson, M. D., 2013, Breakthroughs in Environmentally Sustainable, High Performance Concretes from Nano-Scale Studies of Ancient Roman Seawater Concretes, Panel Discussion: R&D in Nanotechnology, Future Applications, and Cross-Industry Collaboration: **CTO Forum: Rethink Disruption: Emerging Technologies Transforming Business and Society,** San Francisco, 11 November, 2013.

Jackson, M. D., 2013, Exposing the Trade Secrets of Ancient Roman Engineers: Nanostructure and Material Properties of Al-tobermorite in 2000-year-old Seawater Harbor Concrete: **Science Café, Advanced Light Source, Lawrence Berkeley Laboratories**, 1 November, 2013.

Jackson, M. D., 2011, The role of pyroclastic rock in the durability of ancient Roman concretes: Why Imperial Age monuments have remained intact for 2000 years: Invited Seminar, **Department of Geological and Environmental Sciences**, **Stanford University**, 9 May, 2011.

ABSTRACTS, MEETINGS AND CONFERENCES

Surtsey volcano, Iceland (alphabetical by year)

Sayyadi, S., Gudmundsson, M. T., White, J. D. L., Jónsson, Th., Jackson, M. D., 2022, An aeromagnetic survey over the volcanic island of Surtsey off the south coast of Iceland (abs.): NH2.1–Living with volcanoes, EGU22-11029, **EGU General Assembly 2022** 23–27 May 2022.

Peterson, J. G., M. D. Jackson, J. M. Marquardt, P. C. Lippert, N. Tamura, P. Bergsten, P.

Vannier, A. M. Klonowski, S. Knobloch, M.T. Gudmundsson, V. T. Marteinsson, 2021, Material, Magnetic, and Microbial Features of a Submarine Inflow Zone Traversed by SUSTAIN Drill Cores, Surtsey Volcano, Iceland (abs.): SSP1.3 Achievements and perspectives in scientific ocean and continental drilling, EGU21-6496, **EGU General Assembly 2021** "EGU 21: Gather Online", 19-30 April, 2021, virtual.

Sayyadi,, S., M.T. Gudmundsson, J. D. L. White, M. D. Jackson, 2021, 3D Gravity modeling of the volcanic island of Surtsey, Iceland: GMPV9.5 – Volcanic processes: tectonics, deformation, geodesy, unrest (abs.): **EGU General Assembly 2021** "EGU 21: Gather Online", 19-30 April, 2021, virtual.

Kleine, B. I., A. Stefánsson, R. Kjartansdóttir, S. Prause, T. B. Weisenberger, Á. E. Sveinbjörnsdóttir, M. D. Jackson, M. T. Gudmundsson, 2020, The Surtsey volcano geothermal system: An analogue to constrain elemental cycling in seamounts? (abs.): **Goldschmidt Conference**, Virtual 2020, 21-26 June, 2020.

Kleine, B. I., A. Stefánsson, M. J. Whitehouse, T. B. Weisenberger, M. D. Jackson, M. T. Gudmundsson, 2020, Stable Isotope Constraints on the Origin of Sulfur-Bearing Minerals in the Seawater Hydrothermal System of Surtsey Volcano, Iceland: **Proceedings World Geothermal Congress 2020**, 26 April-2 May, 2020, Reykjavik, Iceland.

Moore, J. G., M. D. Jackson, 2020, Observations on the Structure of Surtsey, Iceland, and its Basaltic Lapilli Tuff (abs.): **Geophysical Research Abstracts**, Vol. 22, EGU2020-21018, General Assembly 2020, 3-7 May, 2020. https://doi.org/10.5194/egusphere-egu2020-21018

Sayyadi, S., M. T. Gudmundsson, J. D. L. White, M. D. Jackson, 2020, Gravity modeling of the volcanic island of Surtsey, Iceland (abs.): **Geophysical Research Abstracts**, Vol. 22, EGU2020-13580, General Assembly 2020, 3-7 May, 2020. https://doi.org/10.5194/egusphere-egu2020-13580

Weisenberger, T. B., S. Prause, C. F. Gorny, B. I. Kleine, P. Bergsten, A. M. Klonowski, V. Perez, A. Barich, M. T. Gudmundsson, K. Jónasson, V. Marteinsson, A. Stefánsson, M. D. Jackson, Surtsey OnSite Team, 2020, The SUSTAIN ICDP Drilling Project on Surtsey: **Proceedings World Geothermal Congress 2020**, Reykjavik, Iceland. 26 April-2 May, 2020.

Gorny, C., J. D. L. White, M. T. Gudmundsson, M. T., J. McPhie., B. I. Kleine, T. B. Weisenberger, M. D. Jackson, 2019, The lithology of the 2017 Surtsey volcano drill cores (abs.): **Geophysical Research Abstracts**, Vol. 21, EGU2019-19140, General Assembly 2019, 7- 15 April, 2019.

Jackson, M. D., M. J. Heap, S. C. Couper, and M. T. Gudmundsson, 2019, Rapid evolution of material characteristics in subaerial and submarine basaltic tuff 50 years after eruption, Surtsey volcano, Iceland (abs.): **Geophysical Research Abstracts**, Vol. 21, EGU2019-11482, General Assembly 2019, 7-15 April, 2019.

Reynolds, H. I., M. T. Gudmundsson, M. J. Heap, M. D. Jackson, T. B. Weisenberger, 2019, The thermal history of Surtsey, explored using HYDROTHERM numerical simulations (abs.): **Geophysical Research Abstracts**, Vol. 21, EGU2019-14945, General Assembly 2019, 7- 15 April, 2019.

Tu̇rke, A., M. D. Jackson, W. Bach, W.-A. Kahl, S. L. Jørgensen, M. T. Gudmundsson, 2019, Design and implementation of a submarine borehole observatory at Surtsey volcano, Iceland (abs.): **Geophysical Research Abstracts**, Vol. 21, EGU2019-18812, General Assembly 2019, 7- 15 April, 2019.

White, J. D. L., M.T. Gudmundsson, M. D. Jackson, C.F. Gorny, J. McPhie, 2019, Surtsey's eruption excavated a diatreme more than 150 metres into the seafloor: **International Union of**

Geodesy and Geophysics, poster V02, p. 402, Montreal, Canada, 8-18 July, 2019.

Bergsten, P., V. P. Marteinsson, A. M. Klonowski, P. Vannier, B. Kleine, A. Stefánsson, T. Weisenberger, M. D., Jackson, M. T. Gudmundsson, and the SUSTAIN OnSite Team, 2018, Preliminary results from 1979 and 2017 ICDP SUSTAIN drilling: the sub-terrestrial biosphere of the neo-island Surtsey (abs.): **Geophysical Research Abstracts**, Vol. 20, EGU2018-17706. EGU General Assembly 2018, 13-18 April, 2018.

Gudmundsson, M. T., M. D., Jackson, J. D. L. White, C. Gorny, J. McPhie, T. B. Weisenberger, B. Zimanowski, J. M. Rhodes, K. Jónasson, A. Stefánsson, and the SUSTAIN OnSite Team, 2018, The SUSTAIN ICDP 2017 drilling of Surtsey: First results on physical volcanology and island formation (abs.): **Geophysical Research Abstracts**, Vol. 20, EGU2018-12156, EGU General Assembly 2018, 13-18 April, 2018.

Jackson, M. D., P. C. Lippert, J. M. Marquardt, M. J. Heap, J. G. Moore, J. M Rhodes, T. B. Weisenberger, M. T. Gudmundsson, 2018, Evolving magnetic and material properties of 50-year-old basaltic tuff, SUSTAIN drilling project, Surtsey volcano, Iceland. Abstract V23J-0181, presented at the Fall Meeting, **American Geophysical Union**, Washington D.C. 10-14 December, 2018.

Jackson, M. D., M. T. Gudmundsson, W. Bach, A. Türke, S. Jørgensen, T. Weisenberger, S. Couper, P. Lippert, V. P. Marteinsson, B. Zimanowski, P. Cappelletti, and the SUSTAIN OnSite Team, 2018, ICDP SUSTAIN drilling at Surtsey Volcano: A time-lapse drill core record and hydrothermal borehole observatory in basalt 50 years after eruption (abs.): **Geophysical Research Abstracts**, Vol. 20, EGU2018-11324. EGU General Assembly 2018, 13-18 April, 2018.

Jackson, M. D., S. Couper, M. Ivarsson, C.V. Stan, N. Tamura, L.M. Miyagi, J. G. Moore, 2017, Hydrovolcanic and Hydrothermal influences on Biomediated Mineral Growth in Basaltic Tuff, Surtsey Volcano, Iceland: Abstract V11A-0338, presented at the Fall Meeting, **American Geophysical Union**, New Orleans, LA, 11-15 December 2017.Jackson, M. D., S. Couper, N. Tamura, C. V. Stan, and L. M. Miyagi, 2017, Authigenic Mineral Textures in Basaltic Tuff, Surtsey Volcano, Iceland (abs.): **Proceedings of the 18th International Conference on Textures of Materials (ICOTOM)**, St George, Utah, USA, 5-10 November, 2017.

Rhodes, J. M., J. G. Bryce, M. J. Jercinovic, M. F. Fahnestock, M. D. Jackson, 2017, Hydrothermal Alteration and Seawater Exchange at Surtsey Volcano, Iceland: New results from 1979 Surtsey Drill Core, Abstract V11A-0338, presented at the Fall Meeting, **American Geophysical Union**, New Orleans, LA, 11-15 December 2017.

Jackson, M. D., S. Couper, Y, Li, C. V. Stan, N. Tamura, A, Stefánsson, J. G. Moore, H.-R Wenk, 2016, Hydrothermal Rock-Fluid Interactions in 15-year-old Submarine Basaltic Tuff at Surtsey Volcano, Iceland (abs.): **EOS, Transactions of the American Geophysical Union**: OS31D-2054.

Ancient Roman concrete and related topics

Hambleton, J. A., J. G. Peterson, N. Tamura, A. G. Sinner, M. D. Jackson, 2021, Volcanic and authigenic fabrics in tephra from the 'Ses Llumetes' shipwreck and Roman marine concretes: **Geological Society of America, Abstracts with Programs #366843**, T105. Reading the Record of Volcanic Tephra and Tuff in Geoarchaeological Site Studies and Drill Core Records, 12 October 2021.
https://gsa.confex.com/gsa/2021AM/meetingapp.cgi/Paper/366843

Ntoutsi, I., N. Meimaroglou, P. Koustalos, C. Paptrechas, M. D. Jackson, 2021, The use of 'Theran Tephra' in Aegean traditional building techniques (abs.): A case-study from Therasia

Island, Greece: **Geological Society of America, Abstracts with Programs #368518**, T105. Reading the Record of Volcanic Tephra and Tuff in Geoarchaeological Site Studies and Drill Core Records, 12 October 2021. https://gsa.confex.com/gsa/2021AM/meetingapp.cgi/Paper/368518

Jackson, M. D., C. L. Trivelpiece, N. Cheng, B. Nash, N. Tamura, 2020, Cementitious systems in Roman reactive glass marine concretes: **Materials Science & Technology 2020**, Art and Cultural Heritage: Discoveries and Education, Pittsburgh, PA, 4-8 October, 2020.

Jackson, M. D., 2020, Cementitious systems in Roman reactive glass concretes: **Gordon Research Conference, Advanced Materials for Sustainable Infrastructure Development**, Ventura, CA, 23-28 February, 2020.

Jackson, M. D., 2019, Natural volcanic pozzolans in the enduring concretes of Imperial age Roman construction: **Natural Pozzolan Association**, Wickenburg, AZ, 16-17 May, 2019**.**

Jackson, M. D., J. Moon, H. Chen, Y. Zhang, 2018, Principles of Roman cementitious systems in architectural and marine concretes: **Materials Science & Technology 2018**, Art and Cultural Heritage: Reverse Engineering, Columbus, OH, 14-18 October, 2018.

Stan, C. V., H.-R Wenk, N. Tamura, M. D. Jackson, 2016, Beamline 12.3.2 at the Advanced Light Source: direct strain measurements and micronscale phase maps (abs.): **EOS, Transactions of the American Geophysical Union**: MR11B-04, https://agu.confex.com/agu/fm16/meetingapp.cgi/Paper/126797.

Jackson, M. D., S. R. Mulcahy, H. Chen, Y. Li, Q. Li, P. Cappelletti, C. Carraro, H.-R Wenk, 2015, Authigenic mineral cycling in Roman seawater concrete with Campi Flegrei volcanic ash pozzolan (abs.): **EOS, Transactions of the American Geophysical Union**: V13C:3150, https://agu.confex.com/agu/fm15/meetingapp.cgi/Paper/75218.

Alfonso, C., C. M. Amici, R. Auriemma, L. Calcagnile, G. Ceraudo, A. Cossa, L. M. Foresi, M. Jackson, S. Margiotta, A. Quarta, G. Quarta, M. Sammarco, 2015, Multidisciplinary investigation at the ancient harbour of St. Cataldo (Lecce, South Italy): new data for understanding a long maritime history, The Portus Lupiae Project. **Harbours from the Roman Period to the Middle Ages,** Kiel, Germany, 30 September-3 October, 2015.

Jackson, M. D., G. Vola, 2015, Lime preparation in ancient Roman architectural and marine mortars: Invited Presentation, **Society of American Archaeology**, San Francisco, CA, 15- 19April, 2015.

Jackson, M. D., J. G. Moore, S. R. Mulcahy, M. Kunz, 2014, Authigenic crystalline cementitious fabrics in Surtsey tephra and Roman seawater concrete: **International Continental Drilling Program "Surtsey at 50 Years" Workshop,** Heimaey, Iceland, 1-4October, 2014.

Jackson, M. D., S. R. Mulcahy, M. Kunz, H. Chen, Q. Li, H.-R. Wenk, P. J. M. Monteiro, 2014, Al-tobermorite and phillipsite in Roman seawater concrete with zeolitized pumiceous pozzolan (abs.), **Goldschmidt Conference**, Sacramento, CA, June 8-13, 2014.

Jackson, M. D., J. P. Oleson, 2014, Validation of Roman descriptions of construction technologies and material provenance of harbor concretes through fine-scale studies of the *Baianus Sinus* breakwater (abs.). International Symposium on Archaeometry, Los Angeles, CA, May 19-13, 2014.

Jackson, M. D., 2013, Mineralogical analysis of altered tephras. **DOSECC Workshop to Promote Collaborative Initiative to Develop Higher Enthalpy Geothermal Systems in the USA**, Lake Arrowhead, CA, October 13-15, 2013.

Jackson, M. D., H. Chen, Q. Li, G. Geng, C. Meral, M. Kunz, N. Tamura, H.-R. Wenk, P. J. M. Monteiro, 2013, X-ray microdiffraction analyses (Beamline 12.3.2) of Al-tobermorite as a cementitious phase in ancient Roman seawater concrete (abs.): **Advanced Light Source**

User Meeting, Lawrence Berkeley National Laboratories, October 7, 2013.

Wehby, J., M. D. Jackson, 2013, Evaluation of mortar microstructures in ancient Roman concrete from Ostia, Italy, with Petrog software (abs.): **Proceedings of the 35th ICMA conference,** Chicago, IL, 29 April-1 May, 2013.

Jackson, M. D., J. G. Moore, H.-R. Wenk, P. J. M Monteiro, 2012, Al-tobermorite in pyroclastic rock-seawater environments: 1963-1967 Surtsey tephra and 2000-year-old Roman *Baianus Sinus* harbor concrete (abs.): **EOS, Transactions of the American Geophysical Union**, V51A-2753: http://fallmeeting.agu.org/2012/eposters/eposter/v51a-2753/

Meral, C., M. D. Jackson, P. J. M Monteiro, H.-R. Wenk, 2012, Characterization of mineral assemblages in ancient Roman maritime concrete with synchrotron X-ray techniques(abs.): **EOS, Transactions of the American Geophysical Union,** V23C-2834: http://fallmeeting.agu.org/2012/eposters/eposter/v23c-2834/

Jackson, M. D., 2012, Unlocking the cement secrets of ancient Roman seawater concretes (abs.): **3rd Annual BAIR Conference,** UC Berkeley Classics Department, 27 October, 2012.

Jackson, M. D., C. Meral, S. R. Chae, J. Moon, R. Taylor, S. Yoon, P. Li, A. M. Emwas, G. Vola, H.-R. Wenk, P. J. M. Monteiro, Unlocking the secrets of Al-tobermorite in ancient Roman seawater concrete (abs.): Advanced Light Source User Meeting, Lawrence Berkeley Laboratories, 9 October, 2012.

Jackson, M. D., Rapid and innovative developments in concrete technologies by late Republican builders in Rome (abs.): **1st Annual BAIR Conference**, UC Berkeley Classics Department, 9 October, 2010.

Dickie, J., M. D. Jackson, F. Marra, and D. Deocampo, 2010, Mineralogical and geochemical indicators of sub-aerial weathering in the Pozzolane Rosse ignimbrite (Alban Hills volcanic district, Italy) (abs.): **Geological Society of America, Abstracts with programs**, v. 42, n. 5, p. 243.

Jackson, M. D., G. Vola, J. Oleson, and B. Scheetz, 2010, Petrographic and chemical maps of pozzolanic cement microstructures in ancient Roman seawater concretes (abs.): **Geological Society of America, Abstracts with programs,** v. 42, n. 5, p. 30.

Jackson, M., G. Vola, B. Scheetz, J. Oleson, C. Brandon, R. Hohlfelder, 2010, Cement compositions and durability in ancient Roman seawater concretes: *In* **Proceedings of the Second Historic Mortars Conference (HMC 2010) and RILEM TC 203-RHM Final Workshop:** 22-24 September, 2010, Prague, edited by J. Válek, C. Groot, and J. Hughes, 207-217. http://www.rilem.net/fiche.php?cat=conference&reference=pro078-021

Jackson, M., B. Scheetz, F. Marra, 2010, Micromorphological textures and pozzolanic cements in Imperial age Roman concretes: *In* **Proceedings of the Second Historic Mortars Conference (HMC 2010) and RILEM TC 203-RHM Final Workshop**, Prague, edited by J. Válek, C. Groot, and J. Hughes, 22-24 September, 2010,

Oleson, J., M. Jackson, 2010, How did expertise in maritime hydraulic concrete spread through the Roman empire? *In* **Proceedings of the Second Historic Mortars Conference (HMC 2010) and RILEM TC 203-RHM Final Workshop**, Prague, edited by J. Válek, C. Groot, and J. Hughes, 22-24 September, 2010,

Vola, G., M. Jackson, J. Oleson, C. Brandon, R. Hohlfelder, 2010, Mineralogical and petrographic characterisation of ancient Roman maritime concretes: *In* **Proceedings of the Second Historic Mortars Conference (HMC 2010) and RILEM TC 203-RHM Final Workshop**, Prague, edited by J. Válek, C. Groot, and J. Hughes, 22-24 September, 2010.

Brune, P., M. D. Jackson, A. R., Ingraffea, R. Perucchio, 2010, Innovative experimentation on ancient material: Exploring the fracture of Imperial Roman concrete: **Proceedings of Structures Congress 2010,** Concrete and Masonry Structures, p. 1938-1948, American Society of Civil Engineers.

Brune, P., R. Perucchio, A. R., Ingraffea, M. Jackson, 2010, The toughness of Imperial Roman concrete: IA-FraMCoS 7, *In* **Proceedings of the 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures**, Jeju, Korea, 23-28 May, 2010.

Deocampo, D., M. D. Jackson, B. Hausback, and F. Marra, 2008, Alumina complexation and differential alteration of volcaniclastic materials: Examples from the Alban Hills, Italy, and the Sutter Buttes, California (abs.): **Geological Society of America, Abstracts with programs**, 40, n. 6, p. 134.

Bianchi, E., R. Meneghini, M. D. Jackson, and F. Marra, 2008, Variations in the compositions of fine and coarse aggregate (*harenae fossiciae* and *caementa*) within *opus caementicium* in the Basilica Ulpia and Trajan's Forum: implications for highly efficient worksite management and a skilled workforce (abs.). **Roma Aeterna Conference**, Rome, Italy, March 2008.

Jackson, M. D., F. Marra, D. Deocampo, and R. Hay, 2007, Altered volcanic ash as fine aggregate (*harenae fossiciae*) in the pozzolanic mortars of ancient concretes (abs.): **Geological Society of America, Abstracts with programs,** v. 39, n. 6., p. 174.

Deocampo, D., M. Jackson, F. Marra and R. Hay, 2007. Chemostratigraphy, diagenesis, and a paleo-ultisol in Pleistocene ash (*pozzolana*) near Rome, Italy: Implications for the formulation of ancient Roman concrete (abs.): **Geological Society of America, Abstracts with programs**, v. 39, n. 6, p. 174.

Marra, F., M. Jackson, and D. Deocampo, 2007, The volcanic rocks of Rome: Eruptive history, emplacement mechanisms, and environmental conditions (abs.): **Geological Society of America, Abstracts with programs**, v. 39, n. 6, p. 173.

Jackson, M. D, C. Kosso, F. Marra, R. L. Hay, 2006, Geological basis of Vitruvius' empirical observations of material characteristics of rock utilized in Roman masonry: *In* **Proceedings of the Second International Congress of Construction History**. Queen's College, University of Cambridge, 29 March – 2 April 2006, edited by M. Dunkeld J. Campbell, H. Louw, M. Tutton, B. Addis, and R. Thorne, p. 1685–1702. London: The Construction History Society.

Jackson, M. D., 2006, The Tiber River: Its Flows, Floods, and Ancient History in Rome: International Conference on Water in Antiquity (abs.), Northern Arizona University, October 2006.

Jackson, M. D., R. Hay, F. Marra, and R. Hughes, 2004, Reactive components of Roman pozzolane in the pozzolanic cements of ancient Rome (abs.), **Geological Society of America, Abstracts with Programs**, v. 36, n. 5, p. A-308.

Jackson, M. D., C. Cawood, R. Hay, and F. Marra, 2004, Volcanic building stones of ancient Rome: natural analogs for Roman concrete? (abs.), **Archeological Institute of America, Annual Meeting**, vol. 27, p. 30, 5-7 January, 2004.

Jackson, M. D., R. Hay, C. Cawood, and F. Marra, 2002, Petrographic and physical properties of the tuffaceous building stones of ancient Rome (abs.), **Geological Society of America, Abstracts with Programs**, v. 34, n. 6, p. A-89.

Jackson, M. D., E. Winkler, and F. Marra, 2000, Durability of tuffs used as building stones in ancient Rome (abs.**), Geological Society of America, Abstracts with Programs**, v. 32, n. 7, p. A-424.

Laccoliths and earthquake ground cracks

Duffield, W. A., M. D. Jackson, J. G. Smith, J. B. Lowernstern, and M. A. Clynne, 1996, Structural doming over an upper crustal magma body at Alid, Eritrea (abs.): **Transactions of the American Geophysical Union**, v. 77, p. F792.

Jackson, M. D., and E. T. Endo, 1989, Genesis of a strike-slip fault zone: The 1974 and 1983 Kaoiki ground ruptures, Mauna Loa volcano, Hawaii (abs.): **Transactions of the American**

Geophysical Union, v. 70, p. 1409.

Jackson, M. D., P. T. Delaney, and E. T. Endo, 1988, The 1983 Kaoiki earthquake ground rupture, Mauna Loa volcano, Hawaii (abs.): **Seismological Research Letters**, v. 59, p. 35.

Jackson, M. D., and D. Champion, 1987, Paleomagnetism of rotated sills at Mount Hillers, Henry Mountains, Utah (abs.): **Geological Society of America, Abstracts with Programs**, v. 19, n. 6, p. 391.

Jackson, M. D., 1986, Faulting and flexure of sedimentary host rock during growth of igneous domes (abs.): **Geological Society of America, Abstracts with Programs**, v. 18, p. 363.

Jackson, M. D., and D. D. Pollard, 1985, Form and mechanism of growth of large diorite intrusions, Henry Mountains, Utah (abs.): **EOS, Transactions of the American Geophysical Union,** v. 66, n. 46, p. 1104.

Jackson, M. D., 1980, The deformational history of alpine peridotite massifs as recorded by their internal mafic and ultramafic dikes (abs.): **Geological Society of America, Abstracts with Programs**, v. 12, n. 7, p. 454.

BOOKS AND POPULAR PUBLICATIONS

Jackson, M. D., J. P. Oleson, J. Moon, Y. Zhang, H. Chen, M. T. Gudmundsson, 2018, Extreme durability in ancient Roman concretes: **American Ceramic Society Bulletin**, 97[5], 22-28.

Delaney, I., and M. Jackson, 2015, Geologic Setting of Picture Canyon, Flagstaff, Arizona: **Plateau Magazine**, Museum of Northern Arizona, Flagstaff, Arizona, p. 6-11.

Jackson, M. D., 2014, New proposed drilling at Surtsey Volcano, Iceland: **Eos Transactions American Geophysical Union***,* 95[51], p. 488, doi:10.1002/2014EO510006.

Scruggs, B., A. Lee, M. D. Jackson, 2014, Using the Orbis Micro-XRF spectrometer to study the microstructure of ancient Roman seawater concrete: **Spectroscopy**, Application Notebook, September, 6-7, http://www.spectroscopyonline.com/using-orbis-micro-xrf-spectrometer-study-microstructure-ancient-roman-seawater-concrete

Brandon, C., R. L. Hohlfelder, M. D. Jackson, J. P. Oleson, 2014, **Building for Eternity: the History and Technology of Roman Concrete Engineering in the Sea**. Oxbow Books, Oxford, pp. 327.

Jackson, M. D., 2007, Vulcan's Masonry: **Natural History Magazine**, v. 116, n. 3, p. 40-45.

Jackson, M. D., 2000, A Geologist's Life in Flagstaff: **The View from Here**: edited by J. Doggett and P. Friederici, Red Lake Books, Flagstaff, Arizona, p. 115-120.

Jackson, M. D., 1999, **Stone Landmarks, Flagstaff's Geology and Historic Building Stones**: Piedra Azul Press, Flagstaff, Arizona, 128 pp.

PROFESSIONAL MEMBERSHIPS

Fellow (2020), American Ceramic Society
Chair, Art Archaeology and Conservation Science Division (2022)
Geological Society of America
Vice Chair, Continental Scientific Drilling Division
American Geophysical Union
Mineralogical Society of America
American Concrete Institute
Committee 204 Associate Member, Natural Pozzolans
Natural Pozzolan Association, *Scholar Member*
Archaeological Institute of America

RESEARCH INTERESTS, AWARDS, SYNGERGISTIC ACTIVIES

My collaborative investigations in pyroclastic volcanism, mineralogy, materials science and archaeological science are breaking new ground in understanding how pyroclastic rock pozzolans produce durability, specialty properties, and long service life in ancient Roman mortars and concretes. I am especially interested in deciphering Roman methods and materials – and their geologic analogs in young volcanic systems – to produce innovative, environmentally- friendly cementitious masonry products with volcanic rock that benefit the modern world. The studies of Surtsey volcano resulting from the ICDP SUSTAIN drilling program in Iceland, for which I am Principal Investigator, (https://surtsey50years.utah.edu/; http://surtsey.icdp-online.org) provide extraordinarily precise insights into basaltic glass alteration through chemical and microbiological processes and the rapid evolution of rock material properties in oceanic basaltic tephra and tuff deposits. The Department of Energy ARPA-E "Roman Reactive Glass Concrete" project, for which I am Principal Investigator, is an interdisciplinary collaboration of glass scientists, civil and mechanical engineers, and geoscientists that is producing an environmentally-friendly seawater concrete prototype using engineered cellular magmatic aggregates fabricated with recycled glass and cementitious principles from Roman conglomeratic concretes.

Research Funding

2019 – 2022 Principal Investigator and Project Director, with Savannah River National Laboratories and three Industry Partners, Roman reactive glass concretes in energetically self-sustaining cementitious systems, U. S. Department of Energy, Advanced Research Projects Agency – Energy, DE-AR0001953 **Extreme Durability of Cementitious Materials**, $1,430,556.

2015 – 2018 Principal Investigator and Project Director, with six Co-PIs and a 25-member science team: **SUSTAIN: A New Drill Core at Surtsey Volcano: A Natural Laboratory for Time-Lapse Characterization of Hydrothermal Seawater and Microbial Interactions with Basaltic Tephra,** International Continental Drilling Program, $920,000.

2017 Principal Investigator: **Rapid Integrative Analyses of Mineral, Magnetic, and Microbial Processes in Reactive Basalt Drill Core, Surtsey Volcano, Iceland**: University of Utah, Vice-President for Research, Seed Money Grant, $35,985.

2019– 2021 Principal Investigator: **Evolution of Glass, Magnetic and Cementing Mineral Systems in Surtsey Basalt, Iceland, College of Mines and Earth Sciences,** University of Utah, Fellowship, $41,000.

2016 – 2018 Principal Investigator, Advanced Light Source, Lawrence Berkeley National Laboratories, **Evolving Mineral Systems of Surtsey Basalt Tephra, Iceland**.

2015 – 2017 Principal Investigator, Advanced Light Source, Lawrence Berkeley National Laboratories, **Crystalline Cementitious Systems of Ancient Roman Volcanic Ash Mortars**.

2014 Principal Investigator and Project Director: **A New Drill Core at Surtsey Volcano: A Natural Laboratory for Characterizing 50 Years of Hydrothermal Seawater Interactions with Basaltic Tephra**, International Continental Drilling Program, Surtsey at 50 Years workshop on Heimaey Island, Iceland, $46,000.

2010 Co-Principal Investigator, with J. P. Oleson, University of Victoria: **Roman Maritime Concrete Study: Analysis of Cores**, Loeb Classical Library Foundation, $22,350.

Research Mentoring

2016 – 2022 Serves as an advisor to 4 graduate students and 5 undergraduate students in the Department of Geology and Geophysics, the Department of Civil and Environmental Engineering and the Department of Materials Science at University of Utah.
Claire Cruz, Undergraduate Research
Jenny Hambleton, Senior Thesis
Jacob Peterson, Senior Thesis
Jeremy Fisher, Undergraduate Research
Bradley Cottle, MSc
Jeremiah Bernau, PhD
Samantha Couper, PhD
Joshua Marquardt, MSc

2011 – 2015 Served as a mentor to numerous graduate student co-authors in the Department of Civil and Environmental Engineering at UC Berkeley.

Symposia and Field Trips

Materials Science & Technology 2022, **Art and Cultural Heritage: Discoveries during the Pandemic Year**, Pittsburgh, PA, 9-13 October, 2022. Co-Convenors: Marie D. Jackson and Jamie L. Weaver.

GSA Annual Meeting, 2021, **A Volcanic Tour of Central Oregon: Newberry Volcano Geothermal Scientific Drilling and Fort Rock Geoarchaeological Sites**, Portland, OR, 7-9 October, 2021, Adam Schultz, Alain Bonneville, Johann C. Verkamp, Andrew Meigs, Thomas Connolly, Jayde Hirniak, Marie D. Jackson (convenor). (*cancelled due to COVID-19*)

GSA Annual Meeting, 2021, **Reading the record of volcanic tephra and tuff in geoarchaeological site studies and drill core records,** Portland, OR, 10-13 October, 2021. Co-convenors: Jayde Hirniak and Marie D. Jackson

Materials Science & Technology 2020, **Art and Cultural Heritage: Discoveries and Education Symposium**, Pittsburgh, PA, 4-8 October, 2020. Co-Convenors: Glenn Gates and Marie D. Jackson

Materials Science &Technology 2018, **Art and Cultural Heritage: Reverse Engineering**, Columbus, OH, 14-18 October, 2018. Co-Convenors: Glenn Gates and Marie D. Jackson

Honors & Awards

Science Highlight, Advanced Light Source: Unexpected Transformations Reinforce Roman Architectural Concrete: ALS, Lawrence Berkeley National Laboratories, 7/12/2021
https://als.lbl.gov/unexpected-transformations-reinforce-roman-architectural-concrete/

Also recognized as a **Lawrence Berkeley National Laboratory Science Highlight**, 06/01/2022

Science Brief, Advanced Light Source: Phillipsite and Al-tobermorite mineral cements produced through low-temperature water-rock reactions in Roman marine concrete: ALS, Lawrence Berkeley National Laboratories, 07/24/2017
https://als.lbl.gov/ancient-roman-secret-self-healing-concrete/.

Science Highlight, Advanced Light Source: Unlocking the Secrets of Al-tobermorite in Ancient Roman Marine Concrete. ALS, Lawrence Berkeley National Laboratories, 9/25/2013
https://als.lbl.gov/learning-from-roman-concrete/

Highlights and Breakthroughs Article: Jackson, M. D., S. R. Chae, S. R. Mulcahy, C. Meral, R.

Taylor, P. Li, J. Moon, S. Yoon, A.-H. Emwas, G. Vola, H.-R. Wenk, P. J. M. Monteiro, 2013, Unlocking the secrets of Al-tobermorite in Roman seawater concrete: American Mineralogist, 98, 1669-1687. American Mineralogist, 05/2013

Featured article: Jackson, M. D., J. Moon, E. Gotti, R. Taylor, S. R. Chae, M. Kunz, A.-H. Emwas, C. Meral, P. Guttmann, P. Levitz, H.-R. Wenk, P. J. M. Monteiro, 2013, Material and elastic properties of Al-tobermorite in ancient Roman seawater concrete: Journal of the American Ceramic Society, 96[8], 2598-2606.

Award, 25 best articles in 25 years: Jackson, M. D., D. Deocampo, F. Marra, and B. E. Scheetz, 2010, Mid-Pleistocene volcanic ash in ancient Roman concretes, Geoarchaeology, 25, 36-74. 09/2010

Acknowledgement, Open Spaces Commission: Commissioner 2003-2009, Chair 2003 Contributions towards acquisition of $8 million of lands at Picture Canyon, Observatory Mesa, and the Flagstaff Urban Trail System. City of Flagstaff, 03/2009

ARCS, Washington D. C. Chapter, Graduate Fellowship, Johns Hopkins University, 06/1980

Mention Très Honorable, Thèse d'Université, Université de Nantes, France, 12/1979

NAGT Field Camp Award, University of Wyoming, 09/1975

Referree

Reviews 8–10 manuscripts per year for **Science Advances, Frontiers of Earth Science, Geophysics, Geochemistry, Geosystems, Volcanica, Journal of the American Ceramic Society, Nature Materials Degradation, PlosOne, Concrete and Building Materials, American Concrete Institute Journal, Cement and Concrete Research, Cement and Concrete Composites, Geoarchaeology, Archaeometry**, **Journal of Archaeological Science, Journal of Cultural Heritage, Conservation and Management of Archaeological Sites**, etc.

Communications with the Global Public

Ars Technica, Noblewoman's tomb reveals new secrets of ancient Rome's highly durable concrete: 1/2/2022
https://arstechnica.com/science/2022/01/noblewomans-tomb-reveals-new-secrets-of-ancient-romes-highly-durable-concrete/

BBC News, 2021, How are Rome's monuments still standing? Ancient Engineering Marvels: 19/12/2021 https://www.bbc.com/travel/article/20211213-how-are-romes-monuments-still-standing.

Materialism Podcast, 2019, Episode 11. The Ultimate Construction Material: How we are reinventing concrete with inspiration from ancient Rome
https://materialism.pinecast.co/episode/1f4cfad710c74a5a/episode-11-the-ultimate-construction-material

Life of Earth from Space, 2019, Smithsonian Channel, This Icelandic Volcano Recreates Early Conditions on Earth.

Le Monde: Paléo-inspiration, Le passé invente le futur. 11/22/2017.
http://www.lemonde.fr/sciences/article/2017/11/20/...

American Ceramic Society: High-tech methods confirm Pliny the Elder's observations and reveal new insights into strength of Roman concrete: 07/31/2017 https://ceramics.org/ceramic-tech-today/today/high-tech-methods-confirm-pliny-the-elders-observations-and-reveal-new-insights-into- strength-of-roman-concrete.

Nature: News article, Iceland drilling project aims to unearth how islands form. 07/24/2017. http://www.naturenature.com/news/iceland-drilling-...

Blueprint for Living: The secret behind the world's most durable concrete. 07/21/2017. https://radio.abc.net.au/programitem/pglGmR3Ko6?pl...

Science Friday: Drilling into the Secrets of Roman Concrete. 07/07/2017. https://www.sciencefriday.com/segments/drilling-into-the-secrets-of-roman-concrete/

Popular Mechanics: The ancient Romans' concrete could help up beat back rising seas: 07/05/2017 www.popularmechanics.com/technology/.../ancient-roman-concrete-mixture-seawall/.

Nature: News article, Seawater is the secret to long-lasting Roman concrete. 07/03/2017. http://www.natnature.com/news/seawater-is-the-secr...

BBC News: Swansea lagoon should use 'Roman-style' concrete: Expert. 01/13/2017. http://www.bbc.com/news/business-38609512

American Ceramic Society: Unique crystals prevent crack propagation and bestow strength to ancient Roman concrete. 01/06/2015. http://ceramics.org/ceramic-tech-today/unique-crys...

Berkeley Lab: Back to the Future with Roman Architectural Concrete, Research at Berkeley Lab's Advanced Light Source Reveals Key to Longevity of Imperial Roman Monuments. 12/15/2014.http://newscenter.lbl.gov/2014/12/15/romanarchite...

Berkeley Engineer: Concrete Knowledge. 11/01/2013. http://engineering.berkeley.edu/magazine/fall-2013...

NBC News: What Ancient Roman Concrete Could Teach Modern Builders. 06/05/2013. http://www.nbcnews.com/id/52112847/ns/technology_a...

Berkeley News: To improve today's concrete, do as the Romans did. 04/06/2013. http://news.berkeley.edu/2013/06/04/roman-concrete...

Smithsonian Magazine: The Secrets of Ancient Rome's Buildings. 11/16/2011. http://www.smithsonianmag.com/history/the-secrets-...

Community Service

2021 "**The mystery of a tomb that lasts forever…**" A scary Halloween tale of the Tomb of Caecilia Metella for Oakland, California, Elementary Schools Grades 1-5, 23 October , with Nobumichi Tamura, for Lawrence Berkeley National Laboratory.

2000 – 2010 **Flagstaff Educational Outreach**; Developed a 9th grade geosciences program in Flagstaff high schools; Led accreditation workshops for teachers in Flagstaff elementary schools; Created community programs relating geosciences, civil engineering, and history in Flagstaff.

2003 – 2009 **Commissioner, City of Flagstaff Open Spaces Commission**, Chair 2003, Acquisition of $8 million of lands at Picture Canyon, Observatory Mesa, and the Flagstaff Urban Trail System.

1999 Publication of **Stone Landmarks, Flagstaff's Geology and Historic Building Stones,** Piedra Azul Press.

REFERENCES AVAILABLE UPON REQUEST