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Surtsey@50Years website: <https://surtsey50years.utah.edu/>

2019 – 2021 ACTIVITY REPORT

SCIENTIFIC PUBLICATIONS

- Pizzo, A., Vitti, M., 2021, Ritrovamenti archeologici presso la Escuela Española de Historia y Arqueología 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. Marteinson, 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 **Surtsey Research**, 14, 47-62.
- Prause, S., T. B. Weisenberger, P. Cappelletti, C. Grimaldi, C. Rispoli, K. Jónasson, M. D. Jackson, M. T. Gudmundsson, 2019, 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 textures 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. P., Marteinson, 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. Onsteg, 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-25-57-2019>.

INVITED PRESENTATIONS

- 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.

ABSTRACTS, MEETINGS AND CONFERENCES

Surtsey volcano, Iceland (alphabetical by year)

- 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, **EGU General Assembly 2021** "EGU 21: Gather Online", April 19-30, 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", April 19-30, 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** , , 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.
- Türke, 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. Gudmundsson², M. D Jackson, C.F. Gorny⁴, J. McPhie⁵, 2019, Surtsey's eruption excavated a diatreme more than 150 metres into the seafloor: **International Union of Geodesy and Geophysics**, poster V02p-402, July 8-18, Montreal, Canada,
- 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.
- Türke, 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.

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>
- Ntoutsis, I., N. Meimaroglou, P. Koustalos, C. Papatrechas, 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.

RESEARCH FUNDING

- 2019 – 2022 Principal Investigator and Project Director, with Savannah River National Laboratories and 3 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.
- 2020 Ses Llumetes Project, Roman shipwrecked pumice at Porto Cristo, Spain, Social Sciences and Humanities Research Council (SSHRC) of Canada and University of Victoria. \$3785
- 2018 – 2020 Principal Investigator, Advanced Light Source, Lawrence Berkeley National Laboratories, **Evolving Mineral Systems of Surtsey Basalt Tephra, Iceland.**
- 2018 – 2020 Principal Investigator, Advanced Light Source, Lawrence Berkeley National Laboratories, **Crystalline Cementitious Systems of Ancient Roman Volcanic Ash Mortars.**
- 2017– 2020 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, \$30,000

STUDENT ADVISING

Ph. D. and M. Sc. Thesis Research Committees

- Jeremiah Bernau, Ph. D. candidate, 2022, Spatial and temporal processes of evaporite deposition & alteration at the Bonneville Salt Flats (with B. Bowen).
- Bradley Cottle, M. Sc., 2022, Fabrication of Roman reactive glass mortars (with Pedro Romero, Civil and Environmental Engineering).
- Samantha Couper, Ph. D., 2021, Application of novel methods investigating high temperature and high pressure deformation behavior of Earth materials (with L. Miyagi).
- Joshua Marquardt, M. Sc. candidate, 2020, Magnetic properties and mineral systems in 1979 and 2017 Surtsey Basalt drill cores, Iceland (with P. Lippert).
- Gabriele Vola, Ph. D., 2019, High grade burnt lime products: impact of calcination kinetics on slaking reactivity, sticking tendency and blocks formation at HT (1300 °C), Ph.D. Course in Earth and Marine Sciences - EMAS, University of Ferrara, Italy.

Undergraduate Research

- Jenny Hambleton, B. Sc., 2021, Volcanic and authigenic fabrics in tephra from the ‘Ses Llumetes’ shipwreck and Roman marine concretes, Senior Thesis.
- Jacob Peterson, B. Sc., 2020, X-ray microdiffraction and microfluorescence studies of altered glass in submarine basaltic tephra, Surtsey volcano, Iceland, Senior Thesis.

Jeremy Fisher, B. Sc., 2019, Precise determinations of fresh volcanic glass proportions in high-resolution thin section images of 1979 and 2017 Surtsey basaltic tuff, Iceland, Independent Study.

COMMITTEES

American Ceramic Society, Fellow 2020
Vice-Chair, Art Archaeology and Conservation Science Division
Geological Society of America
Vice Chair, Continental Scientific Drilling Division
American Concrete Institute
Committee 204 Associate Member, Natural Pozzolans

MEDIA COMMUNICATIONS

Tomb of Caecilia Metella Roman noblewoman's tomb reveals secrets of ancient concrete resilience, 2021
<https://attheu.utah.edu/facultystaff/caecilia-metella/>

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

Life of Earth from Space Smithsonian Channel, This Icelandic Volcano Recreates Early Conditions on Earth, 2019
Filming on Surtsey during the 2017 SUSTAIN drilling project and in the Heimaeý laboratory with my microscopy images from University of Utah
<https://www.smithsonianchannel.com/shows/the-life-of-earth/from-space/1006151/3476654>

OTHER

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

European Geophysical Union, 2019, **Submarine Volcanic Activity and Associated Hazards: Recent and ancient perspectives**, Vienna, Austria, 7-12 April, 2019. Co-Convener, Oral and Poster Sessions with Paraskevi Nomikou, Magnus Tumi Gudmundsson, Steffen Leth Jørgensen <https://meetingorganizer.copernicus.org/EGU2019/session/32569>. 04/10/2019 - 04/10/2019

Manuscripts reviewed (22), Nature Materials Degradation, Science Advances, Frontiers of Earth Science, Concrete and Building Materials, American Concrete Institute Journal, Journal of Cultural Heritage, Conservation and Management of Archaeological Sites, Geological Society of America Bulletin, Cement and Concrete Research, Material Design, Cement and

Concrete Composites, Construction Building Materials, Journal of the American Ceramic Society.

Proposals reviewed, National Science Foundation, Nuclear Energy University Program

HONORS

Science Highlight, Advanced Light Source: Unexpected Transformations Reinforce Roman Architectural Concrete: ALS, Lawrence Berkeley National Laboratories, 2021

<https://als.lbl.gov/unexpected-transformations-reinforce-roman-architectural-concrete/>

American Ceramic Society, Fellow 2020