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Volcanologist

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About me

I'm an experimental and computational geoscientist with a focus on volcanology. Broadly speaking, I investigate volcanic processes across a wide range of spatiotemporal scales in order to understand the complex eruption mechanisms observed in nature. I have a background in experimental rock deformation and computational volcanology, coupled with hands-on machine engineering and programming experience. In recent work, I have studied the consequences of extreme rainfall in volcanic environments, including the potential for external triggering of volcanic eruptions and the impacts of climate change. As well as running experiments and models, I'm interested in using alternative sources of information, for example through quantitative network analysis of social media data.

Technical Skills

LaTeX • LabVIEW • Inkscape

Python • Jupyter Lab • MS Office

MATLAB • R • CSS • Adobe

Large font version available on request.

Experience

Apr 2018–Apr 2021 — **Post-doctoral research associate** — University of Miami, USA

- Exploring the influence of external forces on the frequency and magnitude of volcanic eruptions;
- Studying the propensity for rainfall-induced volcanic activity;
- Applying experimental data to field-scale problems.

Nov 2017–Apr 2018 — **Teaching assistant** — Université de Strasbourg, France

- Practical class *mesures géophysiques en laboratoire* [Geophysics laboratory classes];
- Lectures in petrophysics, brittle microstructure, and applied rock physics.

Nov 2016–Apr 2018 — **Post-doctoral research assistant** — Université de Strasbourg, France

- Experimental stimulation of geothermal reservoir rocks, under the DESTRESS Horizon-2020 framework;
- Investigating the evolution of the strength and fluid-flow properties of reservoir material during acid stimulation.

Nov 2011–Mar 2012 — **Research assistant** — Universidad de Colima, Mexico

- Volunteer at Centro de Intercambio e Investigación en Vulcanología (Center for Exchange and Research in Volcanology);
- Collection and analysis of volcanic thermal data, digitisation of seismic events, and taking field gas measurements;
- Deployment and field testing of infrasound arrays, field-testing a range of geochemical, geothermal and geodesic equipment.

Awards and prizes

- 2021 – Volcanic and Magmatic Studies Group Zeiss Post-doctoral Keynote Award
- 2017 – Societé des Amis des Universités de l'Académie de Strasbourg *prix de thèse*
- 2013 – Lancaster Environment Center "best dissertation" prize
- 2011 – Royal Scottish Geographical Society University medal

Service to the community

I am a keen proponent of the idea that science and data should be openly accessible to everyone. I founded Volcanica, a diamond open-access volcanology journal, with this in mind. I serve as Editor-in-Chief and Head Technical Editor. I also serve as a Senior Advisory Council member for EarthArXiv, and am an elective member of the IAVCEI ECR-Net working group. I have reviewed for >20 scholarly journals. I am engaged in outreach initiatives aimed at introducing under-privileged students to STEM subjects, such as the Scientist in Every Florida School program.

Select publications

Farquharson, J. I., & F. Amelung, 2020. Extreme rainfall triggered the 2018 rift eruption at Kīlauea Volcano. Nature. DOI: 10.1038/s41586-020-2172-5. [Cover feature]

Farquharson, J. I., B. Wild, A. R. L. Kushnir, M. J. Heap, P. Baud, & B. Kennedy, 2019. Acid-induced dissolution of andesite: evolution of permeability and strength. JGR: Solid Earth. DOI: 10.1029/2018JB016130.

Farquharson, J. I., M. J. Heap, N. Varley, P. Baud, & T. Reuschlé, 2015. Permeability and porosity relationships of edifice-forming andesites: A combined field and laboratory study. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2015.03.016.

• Full list of publications on following pages.

Education

PhD., Geophysics
(Experimental Volcanology)
Exceptional
Université de Strasbourg
2013–2016 | Strasbourg, France

MSc., Volcanology
and Geological Hazards
Distinction
Lancaster University
2012–2013 | Lancaster, UK

BSc., Environmental Geography
First class with honours
University of Stirling
2007–2011 | Stirling, UK

Editing

Since founding Volcanica in 2017 I have served continuously as Editor-in-Chief and journal manager, alongside other voluntary roles. As well as coordinating article ingestion and carrying out editorial duties on a manuscript-by-manuscript basis, I directly manage a team of more than 40 researchers across all career stages. Additional roles include typesetting, article production, and managing the technical editing team; facilitating publication and indexing of accepted articles; communicating with authors, editors, and reviewers; website maintenance and development; and graphic design.

Metrics

26 publications since 2014

• External metrics

h-index: 17

i10-index: 21

citations: 819

RG score: 29.68

• Alternative measures of impact
My research featured in 90+ news articles in 2020, including *NPR*, *New York Times*, and *VICE*. See more via Impactstory:

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Society memberships

• American Geophysical Union (AGU)
• European Geosciences Union (EGU)
• The American Ceramic Society (ACerS)
• Association of Earth Science Editors (AESE)
• Asia Ocean Geosciences Society (AOGS)
• International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).

Keynotes and invited talks

May 2021 – University of East Anglia Atmospheres, Oceans and Climate seminar series: "*Rainfall-induced volcanic hazard in a changing climate*";

Apr 2021 – European Geosciences Union meeting: "*Pore fluid pressure evolution in volcanic environments: the role of rainfall*";

Feb 2021 – Montana State University's ESCI Spring Department Seminar: "*Volcanica: A success story for diamond open access publishing in geoscience*";

Jan 2021 – Volcanic and Magmatic Studies Group Zeiss Keynote: "*Assessing rainfall-induced volcanic hazard*";

Oct 2020 – Leicester Literary and Philosophical Society Winter Seminar Series: "*Fire and rain: exploring the links between weather, climate, and volcanism*";

Feb 2020 – University of Miami Geotopics Seminar Series: "*(how) can rainfall trigger volcanic eruptions?*";

Apr 2018 – University of Miami Geotopics Seminar Series: "*Permeability and anisotropy in volcanic systems: upscaling data from the micro- to macro-scale*";

Equipment construction

With a background in experimental volcanology and rock mechanics, I have often designed, built and/or modified, and operated scientific equipment—such as reactive permeameters—tailored towards a specific research question. This often demands a series of innovative engineering solutions, ranging from the design and construction of apparatus using leading-edge materials (e.g. high-temperature silicone thermofluids; acid-resistant copolymers) to the precision electronics and custom-written software required for data acquisition. As such, I have a detailed understanding of the practicalities of every stage of designing and developing complex research apparatus.

Full list of publications

Wadsworth, F. B., Vossen, C. E. J., Heap, M. J., Kushnir, A. R. L., **Farquharson, J. I.**, Schmid, D., Dingwell, D. B., Belohlavek, L., Huebsch, M., Carbillet, L., and Kendrick, J. E., 2021. The force required to operate the plunger on a French press. American Journal of Physics.

Farquharson, J. I., A. R. L. Kushnir, B. Wild, and P. Baud, 2020. Physical property evolution of granite during experimental chemical stimulation. Geothermal Energy. DOI: 10.1186/s40517-020-00168-7.

Farquharson, J. I. and F. Amelung, 2020. Extreme rainfall triggered the 2018 rift eruption at Kīlauea Volcano. Nature. DOI: 10.1038/s41s586-020-2172-5.
</> https://doi.org/10.5281/zenodo.3635944

Heap, M. J., M. Villeneuve, F. Albino, **J.I. Farquharson**, E. Brothelande, F. Amelung, J.-L. Got, and P. Baud, 2019. Towards more realistic values of elastic moduli for volcano modelling. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2019.106684.

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Open access

All publications can be accessed via my website: https://jifarquharson.github.io#publications, either as a downloadable PDF (green open-access) or a link to an open-access version via the publisher (gold open-access). Code associated with various publications are openly available via Zenodo, GitHub, or Figshare.

Full list of publications [cont.]

Mordensky, S. P., M. J. Heap, B. M. Kennedy, H. A. Gilg, M. C. Villeneuve, **J. I. Farquharson**, and D. M. Gravley, 2019. Influence of alteration on the mechanical behaviour and failure mode of andesite: implications for shallow seismicity and volcano monitoring. Bull. Volcanol. DOI: 10.1007/s00445-019-1306-9.

Narock, T., E. Goldstein, C. A.-L. Jackson, A. Bubeck, A. Enright, **J. I. Farquharson**, A. Fernandez, D. Fernández-Blanco, S. Girardclos, D. E. Ibarra, and S. Lengger, 2019. Earth Science is Ready for Preprints. Eos. DOI: 10.1029/2019EO121347.

Farquharson, J. I., B. Wild, A. R. L. Kushnir, M. J. Heap, P. Baud, and B. Kennedy, 2019. Acid-induced dissolution of andesite: evolution of permeability and strength. J. Geophys. Res. DOI: 10.1029/2018JB016130.

Heap, M. J., M. C. Villeneuve, A. R. L. Kushnir, **J. I. Farquharson**, P. Baud, and T. Reuschlé, 2018. Rock mass strength and elastic modulus of the Buntsandstein: An important lithostratigraphic unit for geothermal exploitation in the Upper Rhine Graben. Geothermics.DOI: 10.1016/j.geothermics.2018.10.003.

Mordensky, S. P., M. C. Villeneuve, **J. I. Farquharson**, B. M. Kennedy, M. J. Heap, and D. M. Gravely, 2018. Rock mass properties and edifice strength data from Pinnacle Ridge, Mt. Ruapehu, New Zealand. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2018.09.012.

Farquharson, J. I., and F.B. Wadsworth, 2018. Upscaling permeability anisotropy in volcanic systems. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2018.09.002.

Farquharson, J. I., and F.B. Wadsworth, 2018. Introducing Volcanica: The first diamond open-access journal for volcanology. Volcanica. DOI: 10.30909/vol.01.01.i-ix.

Heap, M. J., **J. I. Farquharson**, A. R. L. Kushnir, Y. Lavallée, P. Baud, H. A. Gilg, and T. Reuschlé, 2018. The influence of water on the strength of Neapolitan Yellow Tuff, the most widely used building stone in Naples (Italy). Bull. Volcanol. DOI: 10.1007/s00445-018-1225-1.

Heap, M. J., T. Reuschlé, **J. I. Farquharson**, and P. Baud, 2018. Permeability of volcanic rocks to gas and water. Journal of Volcanology and Geothermal Research. DOI: 10.1016/j.jvolgeores.2018.02.00.

Mordensky, S. P., M.C.Villeneuve, B. M. Kennedy, M. J. Heap, D. M. Gravley, **J. I. Farquharson**, and T. Reuschlé, 2018. Physical and mechanical property relationships of a shallow intrusion and volcanic host rock, Pinnacle Ridge, Mt. Ruapehu, New Zealand. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2018.05.020.

Farquharson, J. I., F.B. Wadsworth, M. J. Heap, and P. Baud, 2017. Time-dependent permeability evolution in compacting volcanic fracture systems and implications for gas overpressure. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2017.04.025 </> https://github.com/jifarquharson/FRACkR.

Farquharson, J. I., P. Baud, and M. J. Heap, 2017. Inelastic compaction and permeability evolution in volcanic rock. Solid Earth. DOI: 10.5194/se-8-561-2017.

Heap, M.J., B.M. Kennedy, **J. I. Farquharson**, J. Ashworth, K. Mayer, M. Letham-Brake, T. Reuschlé, H.A. Gilg, B. Scheu, Y. Lavallée, P. Siratovich, J. Cole, A.D. Jolly, P. Baud, and D.B. Dingwell, 2016. A multidisciplinary approach to quantify the permeability of the Whakaari/White Island volcanic hydrothermal system (Taupo Volcanic Zone, New Zealand). J. Volcanol. Geoth. Res.

Farquharson, J. I., M. J. Heap, P. Baud, 2016. Strain-induced permeability increase in volcanic rock. Geophys. Res. Lett. DOI: 10.1002/2016GL071540.

Farquharson, J. I., M. J. Heap, Y. Lavallée, N. R. Varley, P. Baud, 2016. Evidence for the development of permeability anisotropy in lava domes and volcanic conduits. J. Volcanol. Geoth. Res. OI: 10.1016/j.jvolgeores.2016.05.007.

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Full list of publications [cont.]

Farquharson, J. I., M. J. Heap, P. Baud, T. Reuschlé, N. R. Varley, 2016. Pore pressure embrittlement in a volcanic edifice. Bull. Volcanol. DOI: 10.1007/s00445-015-0997-9.

Farquharson, J. I., M. James, H. Tuffen, 2015. Examining rhyolite lava flow dynamics through photo-based 3D reconstructions of the 2011–2012 lava flowfield at Cordon-Caulle, Chile. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2015.09.004.

Heap, M. J., **J. I. Farquharson**, F. B. Wadsworth, S. Kolzenburg, and J. K. Russell, 2015. Timescales for permeability reduction and strength recovery in densifying magma. Earth Plan. Sci. Lett. DOI: 10.1016/j.epsl.2015.07.053.

Heap, M. J., **J. I. Farquharson**, P. Baud, Y. Lavallée, and T. Reuschlé, 2015. Fracture and compaction of andesite in a volcanic edifice. Bull. Volcanol. DOI: 10.1007/s00445-015-0938-7.

Farquharson, J. I., M. J. Heap, N. Varley, P. Baud, and T. Reuschlé, 2015. Permeability and porosity relationships of edifice-forming andesites: A combined field and laboratory study. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2015.03.016.

Heap, M. J., B. Kennedy, N. Perrin, L. Jacquemard, P. Baud, **J. I. Farquharson**, B. Scheu, Y. Lavallée, H. A. Gilg, M. Letham-Brake, K. Mayer, A. D. Jolly, T. Reuschlé, and D. B. Dingwell, 2015. Mechanical behaviour and failure modes in the Whakaari (White Island volcano) hydrothermal system, New Zealand. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2015.02.012.

Heap, M. J., S. Kolzenburg, J. K. Russell, M. E. Campbell, J. Welles, **J. I. Farquharson**, A. Ryan, 2014. Conditions and timescales for welding block-and-ash flow deposits. J. Volcanol. Geoth. Res. DOI: 10.1016/j.jvolgeores.2014.11.010.