



**Professor Heidi Mader**  
**B.Sc.(York), Ph.D.(Bristol)**

Professor

**Area of research**

Geophysical Fluid Dynamics

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**Summary**

My research interests cover a broad range of multiphase phenomena in the environmental sciences, specifically problems in volcanology and glaciology. Research on both topics is generally a mixture of laboratory experiments and analytical and numerical modelling.

Volcanological research has focused on multiphase flow and fragmentation processes during explosive volcanic eruptions, multiphase rheology, and the propagation of pyroclastic flows and turbidites.

Glaciological research centres on the microscopic water content in glacial ice and where impurities (soluble, insoluble, and microbial) are located with respect to that water. These problems affect the viability of microbial life in the ice, the record of past climates, and the flow response of large bodies of ice to changes in their thermal regimes.

**Biography**

Academic Qualifications:

1982-1985 BSc Physics, University of York.

1987-1991 PhD Physics, University of Bristol. (Supervisor: Professor J F Nye FRS)

Appointments:

1992-1996 Lecturer, Institute of Environmental and Biological Sciences, Lancaster University

1996-2003 Lecturer, Department of Earth Sciences, University of Bristol.

2003-2006 Senior Lecturer, Department of Earth Sciences, University of Bristol.

2006-2012 Reader, Department of Earth Sciences, University of Bristol.

2012-present Professor, School of Earth Sciences, University of Bristol.

## Keywords

- environmental sciences
- volcanology
- glaciology
- multiphase rheology
- geophysical fluid dynamics

## Memberships

### Organisations

[School of Earth Sciences](#)

### Earth Sciences staff

- [Earth Sciences academic staff including research fellows](#)

### Research groups

- [Petrology](#)
- [Geophysics](#)
- [Volcanology](#)

### Research themes

- [Dynamics and Architecture of the Solid Earth](#)
- [Crustal Magmatism, Volcanism and Geological Risk](#)
- [Earth Surface Processes](#)

### Interdisciplinary groups

- [The Cabot Institute](#)
- [Centre for Environmental Flows](#)

## Links

-  [My Personal Webpage](#)

## Recent publications

- Hughes, E, Buse, B, Kearns, S, Blundy, J, Kilgour, G & Mader, H, 2019, '[Low analytical totals in EPMA of hydrous silicate glass due to sub-surface charging: Obtaining accurate volatiles by difference](#)'. *Chemical Geology*, vol 505., pp. 48-56
- Arzilli, F, La Spina, G, Burton, M, Polacci, M, Le Gall, N, Hartley, M, Di Genova, D, Cai, B, Vo, N, Bamber, E, Nonni, S, Atwood, R, Llewellyn, E, Brooker, R, Mader, H & Lee, P, 2019, '[Magma fragmentation in highly explosive basaltic eruptions induced by rapid crystallisation](#)'. *Nature Geoscience*.
- Jarvis, PA, Mader, HM, Huppert, HE, Cashman, KV & Blundy, JD, 2019, '[Experiments on the low-Reynolds-number settling of a sphere through a fluid interface](#)'. *Physical Review Fluids*, vol 4.
- Hughes, EC, Buse, B, Kearns, SL, Blundy, JD, Kilgour, G, Mader, HM, Brooker, RA, Balzer, R, Botcharnikov, RE, Di Genova, D, Almeev, RR & Riker, JM, 2018, '[High spatial resolution analysis of the iron oxidation state in silicate glasses using the electron probe](#)'. *American Mineralogist*, vol 103., pp. 1473-1486
- Polacci, M, Vitturi, MdM, Arzilli, F, Caricchi, L, Carr, B, Cerminara, M, Cimarelli, C, Clarke, AB, Colucci, S, Costa, A, Degruyter, W, Druitt, T, Engwell, S, Ongaro, TE, Giordano, D, Gurioli, L, Haddadi, B, Kendrick, JE, Kueppers, U, Lamur, A, Lavallée, Y, Llewellyn, E, Mader, HM, Metrich, N, Montagna, C, Neri, A, Rivalta, E, Saccorotti, G, Sigmundsson, F, Spina, L & Taddeucci, J, 2017, '[From magma ascent to ash generation: Investigating volcanic conduit processes by integrating experiments, numerical modeling, and observations](#)'. *Annals of Geophysics*, vol 60.
- Shields, JK, Mader, HM, Caricchi, L, Tuffen, H, Mueller, SP, Pistone, M & Baumgartner, L, 2016, '[Unravelling textural heterogeneity in obsidian: Shear-induced outgassing in the Rocche Rosse flow](#)'. *Journal of Volcanology and Geothermal Research*, vol 310., pp. 137-158
- Palacios, P, Diez, M, Kendall, JM & Mader, H, 2016, '[Seismic-acoustic energy partitioning during a paroxysmal eruptive phase of Tungurahua volcano, Ecuador](#)'. *Geophysical Journal International*, vol 205., pp. 1900-1915
- Kilgour, GN, Mader, HM, Blundy, JD & Brooker, RA, 2016, '[Rheological controls on the eruption potential and style of an andesite volcano: A case study from Mt. Ruapehu, New Zealand](#)'. *Journal of Volcanology and Geothermal Research*, vol 327., pp. 273-287
- Truby, JM, Mueller, SP, Llewellyn, EW & Mader, HM, 2015, '[The rheology of three-phase suspensions at low bubble capillary number](#)'. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol 471.
- Palacios, PB, Kendall, JM & Mader, HM, 2015, '[Site effect determination using seismic noise from Tungurahua volcano \(Ecuador\): implications for seismo-acoustic analysis](#)'. *Geophysical Journal International*, vol 201., pp. 1084-1100

[View complete publications list](#) in the University of Bristol publications system

## Courses

Professor Mader currently teaches 3 courses: