

PROJECT TITLE: The enduring impacts of Volcanic Ash: a case study from the Eastern Caribbean

University of Bristol Theme: Climate and Environment Research Challenge Area

Research Group(s): Volcanology

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Project keywords: Volcanic Ash, St Vincent, Cascading Impacts, Community-based Risk Reduction, Dispersal Modelling

Funder: University of Bristol Scholarship



School chairs and tephra, April 2021, Sandy Bay St Vincent (Jenni Barclay)



Explosive eruption of Soufriere, St Vincent. Still captured from film by Steve Sparks

Project Background

Over the course of an eruption, volcanic ash has the potential to destroy infrastructure and crops and harm vegetation, animals and humans. Prolonged eruptions can also generate profound psychosocial and potential health impacts on exposed populations. Many studies of volcanic ash focus particularly on the immediate deleterious impacts to physical infrastructure and human assets when ash is settling out from the atmosphere, yet populations at risk often report more prolonged and cascading impacts but also important benefits from this material (Armijos and Few, 2016; Phillips et al, 2019).

The supervisory team have been working together since 2014 on the island of St. Vincent gathering information and data and generating models for the dispersal and movement of volcanic ash in this setting. This has created a unique library of socially-reported and physically measured distributions and impacts of volcanic ash at a variety of scales. Most recently they have been collaborating with the community researchers of the St Vincent Red Zone in the *Changing Landscapes* project, as this team recovers from the impacts of the 2020-2021 eruption of La Soufriere.

The idea behind this project is to use these observations which both pre- and post-date the most recent eruption and capture socially reported impacts from the 1902 and 1979 eruptions, as well as the legacy detailed scientific measurements of the same events.

Project Aims and Methods

The **aim** of this project will be to capture, quantify and compare the physical, social and economically-reported impacts of the 2020-2021 eruptions both at the height of the eruption and through the process of recovery. Initially this will be tackled through a mixture of field-based measurements, ash transport modelling, interviews, and the synthesis of existing datasets from a variety of sources.

In response to this the PhD candidate can then use this as a jumping off point to take the project in a variety of directions, they could focus on approaches from the further modelling of volcanic ash dispersal and mobilisation to the consideration and conducting of further field-based experiments with the community researchers particularly on modifications for ash dispersal or mitigative actions for agriculture. It is anticipated that the outputs from this project will be of immediate value in the Eastern Caribbean in improving future preparedness but also contribute a unique new set of insights into volcanic ash.

Candidate

This may particularly suit a candidate who has completed a degree that provides them with a firm background in understanding volcanic behaviour, tephra creation and composition but it could also be suited to those with a background in human geography (broadly defined) who are particularly interested in its intersection with geology and volcanology in particular.

Project partners

This project will involve collaboration with the University of the West Indies Seismic Research Centre, and community groups across St Vincent, who will provide field observations and data in a range of forms, as well as support for fieldwork in St Vincent.

Training

The student will receive broad training in field volcanology, ash dispersal modelling and community participatory methods, physical and social vulnerability. Depending on the direction of the research, there will be opportunities to develop high-level expertise in one or more of these areas. Volcanological and Community Risk Reduction fieldwork will be undertaken on St Vincent funded by the AXA Chair.

Background reading and references

Pyle, D.M., Barclay J. and Armijos, M.T. 2018 The 1902-03 eruptions of the Soufriere, St Vincent: impacts relief and response. *J. Volcanol and Geothermal Res.* 356: <https://doi.org/10.1016/j.jvolgeores.2018.03.005>
Phillips, J., Barclay, J., Pyle, D., Armijos, T., Hicks, A. and Few, R., 2019. Dynamic and extensive risk arising from volcanic ash impacts on agriculture. *Global Assessment Report on Disaster Risk Reduction (GAR 2019)* (https://www.preventionweb.net/files/66547_f419finaljeremyphillipsdynamicandex.pdf)
Poulidis, A.P. Phillips, J.C. Renfrew, I.A., Barclay, J., Hogg, A. Jenkins, S.F. Robertson, R. and Pyle D. Meteorological controls on local and regional volcanic ash dispersal. *Sci Reports.* <https://doi.org/10.1038/s41598-018-24651-1>

Useful links

<http://www.bristol.ac.uk/earthsciences/courses/postgraduate/>

Eligibility

UK and International students are eligible for a University of Bristol Scholarship. UoB Scholarships are fully funded for 4 years and cover university fees, living expenses at the UKRI standard rate, and an allowance of £2100 per year towards research expenses.