



THE UNIVERSITY OF THE WEST INDIES

ST. AUGUSTINE, TRINIDAD AND TOBAGO, WEST INDIES

THE SEISMIC RESEARCH CENTRE

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THE UWI SEISMIC RESEARCH CENTRE

ANNUAL REPORT JULY 1, 2017 – AUGUST 31, 2018

1. DIRECTOR'S SUMMARY

The UWI Seismic Research Centre (SRC) continues to serve the region by providing governments of 9 contributing territories¹ with accurate and up-to-date information about earthquake, volcanic and other geologic activity. We provide a national seismological service for all of our contributing territories and a national volcanological service for five of them. Our mission spans the wide areas of monitoring, research, warnings and outreach and postgraduate teaching. Our research focuses on developing a better understanding of the geologic processes at work in the region so as to reduce risk and promote sustainable development. We play an active role in promoting geologic hazard awareness collaborating with local, regional and international agencies on research and outreach projects.

Geologically the high level of seismicity being experienced in recent years persisted over the past year. The seismograph network recorded more than 5,000 earthquakes occurring in our area of responsibility, with locations determined for 2,310 of those recorded. The largest event for the period of magnitude 5.7 was located south-east of Grenada. The second largest event, at magnitude 5.6, was located north-east of Anguilla.

¹ The following nine (9) English-speaking territories of the Eastern Caribbean (listed from south to north): Trinidad and Tobago, Grenada, St. Vincent & the Grenadines, Barbados, Saint Lucia, Dominica, Montserrat, Antigua & Barbuda, St. Kitts & Nevis

The elevated state of earthquake activity noted in the region in recent reports appears to be intensifying. At least 37 of the recorded events were felt. In addition, there were seven events of magnitude 5.0 and larger during the period. While high level activity continued in the Antigua/Barbuda and the Paria Peninsula areas, the densest concentration of seismicity was seen in the middle of the arc.

During the period 20th February to 20th March 2018, there was non-eruptive unrest at the Kick'em-Jenny volcano, with more than 500 volcanic earthquakes associated with the episode. Activity at the Soufrière Hills Volcano in Montserrat, which is now at a low level, continues to be closely monitored by the Montserrat Volcano Observatory, a facility managed by the SRC under contract with the Government of Montserrat. Other volcanoes in the region exhibited background levels of activity.

Research being conducted at the SRC continues to suggest that the global seismogenic system is poised to deliver its largest earthquakes and the mega-earthquakes occurring since 2004 support this conclusion. Our region has not seen its largest earthquake for well over 150 years and background seismicity in the region appears to be intensifying. It is for this reason that we seek to foster collaborations that allow us to enhance our monitoring and seismic hazard and risk capability, take an active role in promoting the development and legislation of Building Codes and our Education and Outreach thrust is maintained at a high level. To this end several workshops were held at secondary and tertiary level institutions that focus on earthquake science and safety. There were weeklong outreach campaigns in Barbados and St. Vincent and the Grenadines.

2. THE REPORT

A. STAFF

Overview of recruitment and retention

Funding of the Centre's recurrent budget through annual contributions from island territories continue to negatively impact our ability to secure its core staff with it being possible to fund **21** of the budgeted **25** staff position. Fortunately our efforts at raising additional resources has continued to be successful such that an additional 19 persons are employed on short-term contracts specifically to assist with various grants and consultancies. Retention rates at SRC are generally high with >90% of all staff recruited opting to remain employed at the Centre.

List of appointed and promoted academic staff

Dr Victoria Miller joined the scientific staff at UWI-SRC/MVO in October 2017 as a Research Fellow in Volcanology (Risk Assessment and Postgraduate Course Development). The role will focus on quantitative hazard and risk assessment methodologies, including modelling and expert elicitation.

Significant training initiatives

The Centre was able to support the participation of several staff member in various training courses including a Leadership and Media Training Workshops.

B. STUDENTS

Mr. Viveka B. Jackson (MPhil student in Volcanology) graduated in September 2017 after successfully completing his research into the development, testing, and application of a low-cost technology sulphur dioxide monitor as a tool for use in a volcanic emissions monitoring network.

C. STRATEGY APPRAISAL

Strategic goal: Access

Develop and improve existing facilities for post-graduate students including: Moderate improvements were made to facilities for graduate students as they were all accommodated in the new SRC building. Support and encouragement was provided for graduate students to attend one overseas conference per year. Opportunities given for training in monitoring techniques, attachment to the Montserrat Volcano Observatory and accessing of funds for attachments to collaborating Universities for specialized training.

Strategic goal: Alignment

Completed Research Projects

InSAR Volcano Monitoring at Rabaul volcano, Papua New Guinea: This project was a collaborative research project with Geoscience Australia, Rabaul Volcano Observatory, Icelandic Meteorological Office and Curtin University to develop the methodology and code to incorporate InSAR monitoring of volcano deformation into operational capability at volcano observatories, with

a particular emphasis on applicability in a resource-constrained context.. It resulted in a peer-reviewed publication of the method (published after the reporting period) and in the implementation of the code for analysis of ground deformation for volcanoes located in Papua New Guinea. The project is the first step towards volcano monitoring of 40+ active volcanoes in Papua New Guinea that currently have no ground-based monitoring systems in place.

Principal staff involved: Dr. Victoria Miller

Harnessing ‘citizen science’ to reinforce resilience to environmental disasters: creating an evidence base and community of practice’: The broad aim of this project was to understand how citizen science is currently applied to disaster risk reduction (DRR) objectives in the face of natural hazards, and how it might be more effectively applied in the future. It consisted mainly of a workshop which sought to design of a project to be employed in the Eastern Caribbean that utilises the concept of Citizen Science to help improve resilience to disasters.

Principal staff involved: Dr. Erouscilla Joseph, Prof. Richard Robertson

Analysis of VT string earthquakes at Soufriere Hills volcano, Montserrat: This project is a collaborative research project with The Pennsylvania State University and University of Liverpool as well as scientists at UWI-SRC on the analysis and characterisation of volcano-tectonic earthquake “strings” recorded at the Soufriere Hills Volcano, Montserrat in 2007. These earthquakes provide an insight into the volcanic system and its evolution resulting from a long-lived eruption and their interpretation can guide scientists when considering any patterns of seismicity that may be recorded at the volcano in the future. This project was completed during the reporting period with the results submitted for publication (in review, anticipated publication after the reporting period).

Principal staff involved: Dr. Victoria Miller, Dr. Leo Peters, Dr. Patrick Smith, Mr. Roderick Stewart

Ongoing Research Projects²

EVANeSCE: Estimating Volcanic Activity with Networked Sensing of CO₂ Emissions: This project involved a collaboration with a team of researchers from the Departments of Computer Science and of Earth Sciences at the University College of London (UCL), UK to test low-cost,

² Only five projects listed as requested in the guidelines.

robust, carbon dioxide gas monitoring sensors at Sulphur Springs, St. Lucia. Two field campaigns were conducted during the period in review install the sensor network at Sulphur Springs. The performance of the sensors will be monitored over time to assess their suitability in the naturally acidic conditions at Sulphur Springs and help inform the development of more robust sensors in the near future.

Principal staff involved: Dr. Erouscilla Joseph

Seismic Microzonation Studies in Trinidad and Tobago: This is a project funded by the Ministry of Planning and Sustainable Development, Government of Trinidad and Tobago to pursue the microzonation of ten cities and major population centres in Trinidad and Tobago over the next 10 years. The data collected will be used by planners and engineers to guide future building construction in Trinidad and Tobago.

Principal staff involved: Dr. Ilias Papadopoulos, Dr. Joan Latchman, Mr. Kafele Reddock, Mr. Lloyd Lynch, Ms. Stacey Edwards, Prof. Richard Robertson, Mr. Clevon Ash

Disaster risk management in the Caribbean, support for the Seismic Research Centre, University of the West Indies: This project is funded by the Government of New Zealand through its Ministry of Foreign Affairs and Trade that involves GNS Science of New Zealand providing assistance to the SRC in building capacity in continuous monitoring of volcano-hydrothermal systems using remote techniques, ground deformation monitoring using remotes sensing and improved alerting systems for volcanic emergencies.

Principal staff involved: Dr. Graham Ryan, Dr. Erouscilla Joseph, Ms. Stacey Edwards, Mr. Roderick Stewart, Prof. Richard Robertson

Montserrat Risk Assessment –Refinement of Zone V hazard and risk using modelling: This is a collaborative research project with The Pennsylvania State that involves employment of quantitative methods for hazard assessment at the Soufriere Hills Volcano, Montserrat. A new hazard map will be developed in collaboration with researchers at The University of Edinburgh, scientists at UWI-SRC and the Government of Montserrat, with a focus on pyroclastic flows and lahars, to differentiate hazard levels within the existing Zone V (exclusion zone). The microzonation of Zone V will provide input to risk assessment for the volcano and an evidence base for decision-making regarding access management and long-term development planning on the island of Montserrat.

Principal staff involved: Dr. Victoria Miller

Monitoring volcano-deformation in the Eastern Caribbean combining the existing GPS network with ALOS/ALOS-2 data [2016-2018]: This is research project funded by the Japan Aerospace Exploration Agency that seeks to develop an effective means of monitoring volcanic ground deformation in the Lesser Antilles using satellite data.

Principal staff involved: Dr. Graham Ryan, Dr. Karen Pascal

Modelling Montserrat Geothermal Systems: This research project utilizes data obtained from three geophysical surveys conducted on Montserrat using high resolution seismic tomography, magnetotellurics and gravity surveys geophysical and petrological data to model Montserrat geotherm system.

Principal staff involved: Ms Racine Basant (student), Dr. Graham Ryan (supervisor)

VIOLA (Volatile recycling at the Lesser Antilles): This is a collaborative project with several UK institutions (including Bristol, Durham & Imperial College). It involves deployment of Ocean Bottom Seismometers and the conduct of active source experiments to collect a series of seismic profiles across the plate boundary.

Principal staff involved: Dr. Joan Latchman, Mr. Lloyd Lynch, Dr. Frederic Dondin

Volcano-Ready Communities in St. Vincent: This is a project funded by a grant of US\$618,700 from the Community Disaster Risk Reduction Fund administered by the Caribbean Development Bank that is being done in St. Vincent in collaboration with the National Emergency Management Organisation of St. Vincent and the Grenadines. It involves the provision of scientific information and its downscaling to support community level volcano contingency planning, community-led multi-hazard mapping and capacity building for disaster risk reduction.

Principal staff involved: Prof. Richard Robertson, Ms. Monique Johnson

Strategic goal: Agility

Workshop of the IAVCEI Developing Nations Network: An IUGG Centennial grant (USD 5,000) was secured to host a workshop at UWI, St. Augustine in June 2019 on the theme of “Fostering developed-developing country partnerships for the advancement of global volcano science”. Additional funding was also sought and secured during the reporting period to support the implementation of this workshop. The workshop will bring together senior volcano scientists to discuss the formation and activities of the new network under IAVCEI (the international association for volcanologists).

Principal staff involved: Dr. Victoria Miller, Prof. Richard Robertson

3. OUTREACH

The Education and Outreach section of the Centre aims to bridge the gap between the science of the geological hazards monitored by the UWI-SRC and public understanding and knowledge of these phenomena in the region. The section focuses on student outreach, stakeholder sessions, special projects and collaborations throughout the islands with the aim of raising awareness to the geological hazards and helping to reduce the risk via preparedness and mitigation messages.

In Trinidad & Tobago, the section conducted eight student outreach workshops, nine science and safety sessions with the public and private sector, collaborations with the Department of Geography for awareness week, a lecture series and exhibitions and a public education and outreach campaign. Regionally, the section supported the annual tsunami outreach week in Barbados, the 'Volcano Awareness Week' in St Vincent and a 'Tsunami Smart' campaign in the Grenadine Island, Union. The annual commemoration of 'Earth Science Week' was postponed due to the severe hurricane season. In house, the section oversaw two art exhibitions, a 1 week internship won by secondary school students as part of the Seismology in Schools project and the Centre's annual 8 week internship programme, C.O.R.E (Creating Opportunity from Research Experience). The section continued to monitor and populate the Centre's social media pages by creating engaging posts, producing scientific and safety videos and conducting live videos sessions during periods of elevated seismicity or volcanic unrest that allowed real time engagement between the scientists and the public within the region and the Caribbean diaspora.

4. DISTINGUISHED VISITORS

Dr. Salman Ashraff

Remote Sensing Scientist

GNS Science, New Zealand

Dr Eliza Calder

Reader in Volcanology

The University of Edinburgh, Scotland

5. CONFERENCE PRESENTATIONS & PUBLICATIONS

Refereed Publications

JOURNAL MANUSCRIPTS

Alexandros P. Poulidis, Jeremy C. Phillips, Ian A. Renfrew, Jenni Barclay, Andrew Hogg, Susanna F. Jenkins, **Richard Robertson** & David M. Pyle (2018): Meteorological controls on local and regional ash dispersal revealed using high-resolution dispersion modelling: The eruptions of Soufriere St Vincent. *Scientific Reports*, 8:6873, DOI:10.1038/s41598-018-24651-1.

Lindsay J.M and **Robertson R.E.A** (2018): Integrating Volcanic Hazard Data in a Systematic Approach to Develop Volcanic Hazard Maps in the Lesser Antilles. *Front. Earth Sci.* 6:42. <https://doi.org/10.3389/feart.2018.00042>

Allen, R. W., Berry, C., Henstock, T. J., Collier, J. S., **Dondin, F. J.-Y.**, Rietbrock, A., **Latchman, J. L.** and **Robertson, R. E. A.** (2018): 30 Years in the Life of an Active Submarine Volcano: A Time-Lapse Bathymetry Study of the Kick-'em-Jenny Volcano, Lesser Antilles. *Geochem. Geophys. Geosyst.*, doi:10.1002/2017GC007270.

Mayer, K., Scheu, B., Yilmaz, T., Montanaro, C., Gilg, H.A., Rott, S., **Joseph, E.P.**, and Dingwell, D.B. (2017): Phreatic activity and hydrothermal alteration in the Valley of Desolation, Dominica, Lesser Antilles. *Bulletin of Volcanology*, 79: 82. <https://doi.org/10.1007/s00445-017-1166-0>.

NON – REFEREED PUBLICATIONS AND RELATED WORKS

CONFERENCE PRESENTATIONS

Bettina Scheu, Stefanie Rott, Klaus Mayer, **Erouscilla P. Joseph**, Tim I. Yilmaz, H. Albert Gilg, and Donald B. Dingwell

Hydrothermal activity and related hazards at Dominica: the role of alteration on the propensity of hydrothermal eruptions.

Geophysical Research Abstracts Vol. 20, EGU2018-19224; EGU General Assembly 8-13 April 2018. Poster Presentation.

Chatzopoulos G, Kouli M., **Papadopoulos I.** and Vallianatos F.

The Chania (CRETE) Strong Ground Motion Network First Results

16th European Conference on Earthquake Engineering, Thessaloniki, Greece, 18-21 June 2018.

Erouscilla Joseph, Danielle Charlton, Lara Smale, Stephen Hailes, Christopher Kilburn, Reni Magbagbeola and Carlisle Williams

The use of affordable technology to mitigate community concerns of volcanic emissions.

Cities on Volcanoes 10, 2-7 September 2018, Naples, Italy. Poster Presentation.

Eyles, J.H.W., **Smith, P.J.**, Johnson, J.H., and Barclay, J.

The Role of Accurate Earthquake Locations in the Mapping of a Volcanic Plumbing System.

In V. Manville, editor, Programme and Abstracts, page 39. VMSG 54th Annual Conference, Leeds, UK, January 2018.

Lara Smale, Reni Magbagbeola, Stephen Hailes, Christopher Kilburn, **Erouscilla Joseph**, and Carlisle Williams

Affordable technology to monitor degassing at remote volcanoes.

The EGU General Assembly 8-13 April 2018, Vienna, Austria. Geophysical Research Abstracts Vol. 20, EGU2018-7098. Poster Presentation.

Miller, V.L., Peters, L.E., Ammon, C.J., **Smith, P.**, **Stewart, R.**, Voight, B.,

Optimising the focal mechanism solution uncertainties from volcano-tectonic earthquakes recorded on small-aperture seismic networks: A case study from the Soufrière Hills volcano, Montserrat.

Cities on Volcanoes 10, 2-7 September 2018, Naples, Italy.

Papadopoulos I., and TTMP participants

The Port of Spain Microzonation Project

1st joint conference SSA-LACSC, Miami, 13-17 May 2018.

Papadopoulos I., Higgins M. and Smith, D.

Integrated Geophysical Study of Kingston Metropolitan Area Using Ambient Noise

1st joint conference SSA-LACSC, Miami, 13-17 May 2018.

Sindija, D., Neuberg, J.W., and **Smith, P.J.**

Resolution test for moment tensor inversions of very-long-period seismo-volcanic signals.

In Geophysical Research Abstracts, volume 20, pages EGU2018–10765. (European Geosciences Union, General Assembly).

Sindija, D., Neuberg, J.W., and **Smith, P.J.**

The analysis and interpretation of very long-period seismic signals on volcanoes.

In V. Manville, editor, Programme and Abstracts, page 77. VMSG 54th Annual Conference, Leeds, UK, January 2018.

Clarissa Smith, Holli Frey, **Erouscilla P. Joseph** and Matt Manon

Investigation of Mineral Alteration from Three Different Volcano Hydrothermal Systems on Dominica, Lesser Antilles

AGU Fall Meeting, 11-15 December 2017, New Orleans, Louisiana.

Collinson A., Neuberg J.W., **Pascal K.**

Using cGPS to estimate the magma budget for Soufrière Hills volcano, Montserrat, West Indies

European Geophysical Union (EGU) General assembly, Vienna, Austria.

Dexter Kopas, Holli Frey, and **Erouscilla P. Joseph**.

An investigation of the geochemistry of major streams in Dominica, Lesser Antilles: 2014 – 2017

AGU Fall Meeting, 11-15 December 2017, New Orleans, Louisiana.

Erouscilla P. Joseph and Timothy Barrett

Hydrothermal alteration in an acidic geothermal field: Sulphur Springs, St. Lucia.

AGU Fall Meeting, 11-15 December 2017, New Orleans, Louisiana.

Halldór Geirsson, John Weber, Peter La Femina, **Joan L Latchman**, **Richard Robertson**,
Machel Higgins, Keith Miller, Chris Churches, Kenton Shaw

Fault creep and strain partitioning in Trinidad-Tobago: Geodetic measurements, models, and origin of creep.

EGU General Assembly Conference Abstracts.

Anna Hicks, Teresa Armijos, Jenni Barclay, Jonathan Stone, **Richard Robertson**, Gloria Patricia Cortes

Risk Communication Films: Process, product and potential for improving preparedness & adaptation.

IAVCEI 2017 Scientific Assembly, Fostering Integrative Studies of Volcanism, Portland, U.S.A., August 2017.

Jacqueline Buskop, **Erouscilla P. Joseph**, Salvatore Inguaggiato, Johan Varekamp, and Timothy Ku

Insights on the origin of volatiles from the geochemical investigation of hydrothermal gas discharges from Dominica, Lesser Antilles.

AGU Fall Meeting, 11-15 December 2017, New Orleans, Louisiana.

Mazi Onyeali, **Erouscilla P. Joseph**, Holli M. Frey.

Investigating Volcanic-Hydrothermal Systems in Dominica, Lesser Antilles: Temporal Changes in the Chemical Composition of Hydrothermal Fluids for Volcanic Monitoring Using Geothermometers

AGU Fall Meeting, 11-15 December 2017, New Orleans, Louisiana.

Chatzopoulos G., Vallianatos F., and **Papadopoulos I.**

An Urban strong ground motion network in the city of Chania, Crete. Preliminary results

EGU General Assembly 2016, Trieste, Italy, 4 – 11 September 2016.

Melanie Duncan, Katy Mee, Samantha Engwell, Anna Hicks, Sue Loughlin, **Richard Robertson**, Michelle Forbes, Idelia Ferdinand

Increasing resilience to multiple natural hazards through citizen science: piloting the myVolcano app in St Vincent and the Grenadines.

IAVCEI 2017 Scientific Assembly, Fostering Integrative Studies of Volcanism, Portland, U.S.A., August 2017.

Pascal K., MVO Staff and Colleagues

22 years of volcano-deformation monitoring at Soufrière Hills Volcano, Montserrat.

IAVCEI 2017 Scientific Assembly - August 14 - 18, Portland, Oregon, USA.

Rodgers, M., **Smith, P.J.**, Mather, T.A., and Pyle, D.M.

The July 2008 Vulcanian Explosion of Soufrière Hills Volcano, Montserrat: Using seismicity to investigate pre-eruption processes during quiescent-explosive transitions.

IAVCEI 2017 Scientific Assembly - August 14 - 18, Portland, Oregon, USA.

Rodgers, M., **Smith, P.J.**, Mather, T.A., and Pyle, D.M.

Seismicity associated with quiescent-explosive transitions at dome forming eruptions: The July 2008 Vulcanian Explosion of Soufrière Hills Volcano, Montserrat.

In Geophysical Research Abstracts, volume 19, pages EGU2017–10705. (European Geosciences Union, General Assembly).

Sarah Brown, Steve Sparks, Anna Stewart, Jenni Barclay, Carolyn Driedger, John Pallister, Elizabeth Westby, Gill Jolly, Julian Thomson, Katcho Karume, Mony Murongani, Jean-Christophe Komorowski, Iain Stewart, Patricia Mothes, **Richie Robertson**, **Stacey Selman-Edwards**, Gokhan Atici, Bilge Karaman, Micol Todesco, Daniele Andronico, Augusto Neri, Esline Garaebiti
VolFilm: educational films to increase resilience to risks from volcanic hazards.

IAVCEI 2017 Scientific Assembly, Fostering Integrative Studies of Volcanism, Portland, U.S.A., August 2017.

Stefanie Rott, Bettina Scheu, Klaus Mayer, Tim I. Yilmaz, H. Albert Gilg, **Erouscilla P. Joseph**, Donald B. Dingwell.

Phreatic activity, hydrothermal alteration and related hazards at Boiling Lake and the Valley of Desolation, Dominica

IAVCEI General Assembly, 14 – 18 August 2017: Portland, Oregon, USA. Poster Presentation.

Susan Loughlin, Anna Hicks, Jenni Barclay, Roger Few, Emily Wilkinson, **Richard Robertson**
Integrating diverse datasets and applying new knowledge: the use of scenario exercises in the STREVA project.

IAVCEI 2017 Scientific Assembly, Fostering Integrative Studies of Volcanism, Portland, U.S.A., August 2017.

D. INVITED REVIEWS

Erouscilla Joseph: Journal of Volcanology and Geothermal Research, “Asphalt volcanism as a model to understand the geochemical nature of Pitch Lake” by Afshin Khan, Justin Parker, Dirk Schulze Makuch, Peter Larson. (August 2017).

Dr. Victoria Miller edited the peer-reviewed manuscript: Solari L, Del Soldato M, Bianchini S, Ciampalini A, Ezquerro P, Montalti R, Raspini F and Moretti S (2018) From ERS 1/2 to Sentinel-1: Subsidence Monitoring in Italy in the Last Two Decades. *Front. Earth Sci.* 6:149. doi: 10.3389/feart.2018.00149

Dr. Victoria Miller edited the peer-reviewed manuscript: Wolpert RL, Spiller ET and Calder ES (2018) Dynamic Statistical Models for Pyroclastic Density Current Generation at Soufrière Hills Volcano. *Front. Earth Sci.* 6:55. doi: 10.3389/feart.2018.00055

E. JOURNALISM/PUBLIC COMMENTARY

Ryan, G.A. (2017): Two-minute science interview for SRC youtube

https://www.youtube.com/watch?v=50GGZbXk4_E

F. TECHNICAL REPORTS

Smith, P., Bass, V., **Christopher, T.**, Edgecombe, N., Hatter, S., **Miller, V.**, **Pascal, K.**, **Stewart, R.** and Syers, R (2018): MVO Scientific Report for Volcanic Activity between 1 October 2016 and 31 March 2018. Open-file Report 18/01, Montserrat Volcano Observatory, 2018.

PHOTO CAPTIONS:

Volcano-Ready Communities in St. Vincent Project: This project funded through the Community Disaster Risk Reduction Fund, seeks to establish safe, resilient Volcano-Ready communities in northern St. Vincent and the Grenadines. In the Professor Richard Robertson of the SRC is shown with Mr. Benoit Laramée, Canada's CDB Board Director on a tour of the northern communities (here they are overlooking Chateaubelair) targeted by the project

Modelling Montserrat Geothermal Systems Research: This research looks at models created using data obtained from three geophysical surveys conducted in Montserrat. Shown in the photograph is MPhil Research student, Racine Basant, measuring core samples obtained from wells dug in Montserrat at the British Geological Survey facilities in the UK.

CORE Internship Project: The UWI-SRC offers an eight-week internship programme for highly motivated university level students interested in pursuing geoscience careers. C.O.R.E. interns have the opportunity to work closely with staff on current research projects. The internship is designed to give students a full understanding of the operations of the SRC through hands-on involvement. Shown in the photograph (left to right) are Arvid Ramdeane, Thalia Thomas, Kadem McGillivray and Zakiya Akwell CORE interns in 2017.



Figure 1: Volcano-Ready Communities in St. Vincent Project



Figure 2: Modelling Montserrat Geothermal Systems Research.



Figure 3: CORE Internship Project