REPORTING PERIOD: 1 AUGUST 2020 - 31 JULY 2021

1. Director's Summary

The UWI Seismic Research Centre (SRC) is the regional institution responsible for surveillance of and fundamental research into volcanoes and earthquakes for the English-speaking islands of the Eastern Caribbean. The UWI-SRC has a much broader mission than most research agencies, with responsibilities that include monitoring of geophysical activity, research, warnings and outreach and postgraduate teaching. The SRC provides the governments of its 9 contributing territories[1] with accurate and up-to-date information about earthquake, volcanic and other geologic activity, including 19 live volcanoes, in the Eastern Caribbean. The Centre has been providing these services for over 65 years. Its work has and will continue to have direct impact on vulnerable island communities throughout the Eastern Caribbean. All aspects of the work undertaken by the SRC are of direct and immediate relevance and importance to public safety and sustainable development in the region.

The income received from our contributing territories continue to be inconsistent and provide only sufficient funds for routine monitoring (i.e. operation of a minimal seismic network). We continued to lobby vigorously during the year for payment of outstanding debts. All other work, including most research, major developments in the network and outreach, were undertaken through grant funding mainly from external sources or from applications to the SRC Departmental Consultancy Fund (DCF).

Seismicity in the Eastern Caribbean linked to volcanic and subduction processes persisted with more than 23,000 events recorded during the reporting period. Almost 75% of this seismicity was related to the La Soufrière volcano, St. Vincent eruption during the period January and April 2021. Around 6,000 events were related to the subduction process, which is in close agreement with the events recorded in previous years. There were 201 earthquakes recorded above magnitude 3.8, with the largest magnitude 6.0 off the coast of Antigua/Barbuda on 26 March 2021.

[1] St. Kitts & Nevis, Antigua & Barbuda, Montserrat, Dominica, Saint Lucia, St. Vincent & the Grenadines, Barbados, Grenada, Trinidad & Tobago

High level seismic activity is observed near UK/US Virgin Islands, off the SE coast of Antigua/Barbuda, off the NE coast of Barbados and West of Trinidad, in the Gulf of Paria. Besides the magnitude 6.0 event registered, we recorded six events in the range 5.0 – 5.9 and 96 events in the range 4.0-4.9. Whilst it is not possible to say definitively when the next great earthquake would occur in the region, the time since the last one is now more than 170 years ago. It should be noted that regional seismic and volcanic activity has been elevated for several years. For this reason, monitoring programmes continue to be enhanced, promoting the legislation of building codes continues and maintaining critical education and outreach to ensure adequate detection and seismic hazard and risk capability, and better-informed population.

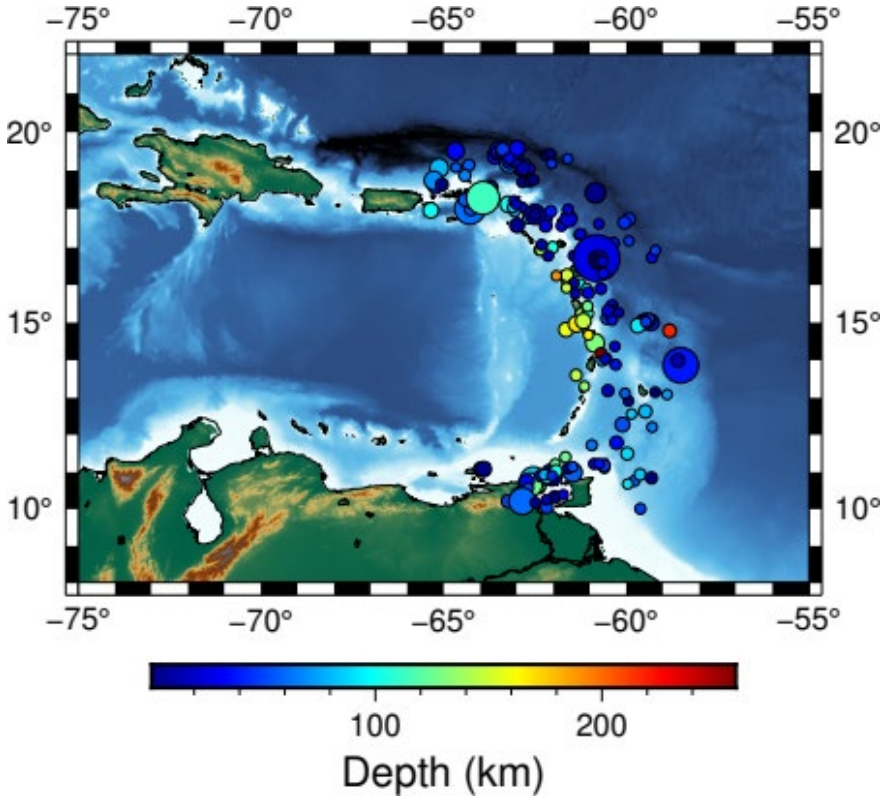

Figure 1:
Seismicity recorded during August 2020 - July 2021. Size of the circles represent magnitude and the colour depth.

On 27 December 2020, the La Soufrière volcano, St. Vincent began a dome building eruption. This required the rapid deployment of staff to St. Vincent to augment the volcano monitoring network and establish on-island monitoring at the Belmont Observatory. Staff rotations to support on island monitoring were carried out during the period January to November 2021. After

10,165 volcanic events, the volcano moved to explosive activity over the period 9 - 22 April 2021, there were 32 explosions recorded. At least 16,150 volcanic events were recorded during the explosive period. The volcano is currently at Alert Level Yellow and monitoring is ongoing.

The Dominica and Saint Lucia volcanic complexes recorded above background seismicity. Other volcanic systems in the Lesser Antilles arc remained at background levels, including Soufriere Hills volcano, which is constantly monitored by the Montserrat Volcano Observatory (MVO). All systems are continuously monitored to identify any escalation of activity that may arise.

2. Report

A. STAFF

Appointments

- Dr. Rodrigo Contreras-Arratia – Research Fellow (Seismologist) assumed duty on April 1, 2021.
- Dr. Joan Latchman – Honorary Senior Research Fellow appointed on June 1, 2021.

B. STUDENTS

Postgraduate Programme

During the reporting period the SRC's Postgraduate programme included a total of six (6) postgraduate students employed as Research Assistants working on projects that contribute to our key areas of research and monitoring. Of these, three (3) were registered for postgraduate degrees in Seismology and two (2) for postgraduate degrees in Volcanology. One (1) other postgraduate student was part of a joint project in collaboration with the Department of Geography.

C. RESEARCH & INNOVATION

Volcanology

i) **Development of the myHAZ citizen science system**. This project was supported by the British Geological Survey NC-ODA grant NE/R000069/1: Geoscience for Sustainable Futures, with input from the following BGS Challenge Areas: Multihazards and Resilience, Digital and Global. It involves stakeholder awareness and participation in the development of the prototype citizen science 'myHAZ' platform, which consists of three components: (1) a citizen science smartphone

app for gathering multihazard observations and providing users with a 'quick glance' of ongoing hazards, environmental change and impacts; (2) a management dashboard to manage and respond to incoming observations in-country, and; (3) a web portal for exploring, visualising and downloading data collected by the app.

ii) **Volcano-Ready Communities in St. Vincent.** (Project leader Prof. R. Robertson) 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 Organization 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. This project played a significant role in our response to the La Soufrière eruption in providing financial and monitoring equipment resources to SRC.

iii) **UK Global Challenges Research Fund (GCRF). Caribbean Resilience and Recovery Knowledge Network**. Funding: £144,963.00 (Project partner: Dr. Erouscilla Joseph) The SRC will contribute to the GCRF Caribbean Resilience and Recovery Knowledge Network in collaboration with Dr. Emily Wilkinson (Overseas Development Institute) and Dr. Donovan Campbell (UWI, Mona). The overall aim of the Caribbean Knowledge Network is to create a new culture for responding to and preparing for hazardous events; one that promotes sustainable and equitable recovery and resilient development pathways in Caribbean islands. Three key activities will all happen in the region: a forensic workshop, scenario roadshows and an interdisciplinary webinar series. New knowledge will be co-produced between the research, practitioner and policymaker communities. This will take the form of policy briefs, scenario exercises, new (bespoke) principles and strategies for disaster recovery and new research manifestos and proposals.

iv) **Quantitative methods for hazard assessment at the Soufriere Hills Volcano, Montserrat.** Dr. Victoria Miller (Principal Investigator) is leading a research project to employ 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 micro-zonation 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.

Geophysics

i) The UWI SRC Geophysics team continues this year to work on the **Trinidad & Tobago Microzonation project (TTMP)**, funded by the Ministry of Planning & Development. The TTMP has reached the 10th year, with field work commencing in the areas of Barataria and San Juan. The technical report for this area is to be submitted to Ministry of Planning and Development in the next year. This year the TTMP Steering committee accepted as final the Amended First Technical Report: Port of Spain, while the Second Technical Report: San Fernando has also been submitted and awaiting final approval. (Project leader Dr. I. Papadopoulos).

ii) The **PREPARE TT** project has ended in 30th of November 2021. The geophysics team assisted in collecting building stock information that was reviewed by civil engineers, to calculate the exposure in Port of Spain. The results of the TTMP: PoS were also used from Miyamoto International to calculate the seismic hazard in the same area. Dr. Ilias Papadopoulos leaded the presentation of the results to various stakeholders. (Project leader Dr. I. Papadopoulos).

iii) **Dominica Geothermal Project in Roseau Valley**: In April 2021 Dr. Ilias Papadopoulos and Mr. Arvid Ramdeane installed a small seismic network comprising of 4 broadband sensors in Trafalgar, Dominica. The purpose of the network is to monitor any induced seismicity that can be caused by the drilling operations during Phase II of the geothermal project.

D. 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 along with social media posts with the aim of raising awareness to the geological hazards and helping to reduce the risk via preparedness

and mitigation messages. The start of 2020 saw the COVID-19 pandemic impact the work of the Centre and the section had to take steps to move to online platforms to conduct sessions. Our robust social media platforms were fully implemented and we engaged the online and general community through various activities.

Student Outreach

Tours continued at the Centre during the reporting period. Students of Tableland Government and North Gate Secondary school visited the Centre. The tour is modeled on following the 'Data Trail' of seismic data throughout the building and ends with an interactive session. The Tour can be adapted for the varying age groups and or subject(s) being studied by the visiting students.

Presentations were given to various schools and institutes in Trinidad and Tobago. The E&O team also participated with booths at certain school events. These activities covered a multitude of topics (see below).

School/Institution	**EVENT**	**TOPIC**
Lakshmi Girls High	Assembly Talk	Earthquake Science and Safety
Marabella North Secondary	Student Workshops	Geologic Hazards and Earth Science Careers
Trinity East	Booth at Technical Event	Booth showcasing technical aspects of the Centre
Smart Start Academy	Outreach at School	Sessions with all students
University of the Southern Caribbean	Booth at Conference	All topics

Table 1. List of student outreach activities for the period July 31st 2019- August 1st 2020.

Science and Safety Sessions

Science and safety presentations on either earthquakes, volcanoes, tsunamis or all three hazards are given to private firms, government offices and other entities in Trinidad and Tobago upon request. Sessions with Telecommunications Service of Trinidad and Tobago (TSTT) and The Power Generation Company (PowerGen) were carded but ultimately postponed. The sessions after March 2020 had to be conducted online due to the pandemic and requests also dwindled during the reporting period due to various lockdowns and changes to work policies. The section used the Zoom account and will switch to the Microsoft 365 Suite later in the year. Table 2 lists the sessions conducted for the reporting period.

Company/Agency	Topics presented at Session
Digicel	Earthquake Science and Safety & Microzonation Studies
Caribbean Union Conference for Seventh Day Adventists	Earthquake Science and Safety

Table 2. List of Agencies that requested Science & Safety Sessions for the period July 31st 2019 to August 1st 2020.

Collaborations/Special Events

Proposed Events

Proposed collaborations were a tsunami campaign (DEM – Barbados), Volcano Awareness Week – St. Vincent and the Grenadines, a geological hazards campaign for Saint Kitts and Nevis, the annual Trinidad and Tobago public awareness campaign, and the Seismology in Schools (SIS) and Creating Opportunity from Research Experience (C.O.R.E) internships. All these events were postponed due to the COVID-19 pandemic.

Caribbean Development Bank Volcano Ready Communities Project (VRCP)

The section began assisting the Project team with the production of new information material for all three geological hazards for both print and social media.

Online Activities during COVID-19 Lockdown

The following activities were trialled during the global lockdown:

- Tobago Anniversary Earthquake and Earthquake Safety Online Campaign

  To commemorate the 1997 Tobago earthquake and conduct an online earthquake science and safety campaign, the Open house videos from the 2019 and infographics were shared in April 2020.

- SRC Chats 'Quarantine Edition'

  The section used the SRC Chat format from previous events to launch a 'Quarantine Edition' and seven episodes were filmed with the Centre's staff. The videos aimed to provide the general public with a behind the scenes look at the work undertaken by the various sections at the Centre and the challenges faced with doing this work during a lockdown.

- SRC 'Snapchats'

  To commemorate the 25th anniversary of the eruption of the Soufrière Hills Volcano (SHV), Montserrat, the section did two videos with senior scientists that recalled poignant memories during that eruption period. A slideshow video was also done and shared on the anniversary of the eruption.

- Dominica Unrest

  As the Dominica volcanic unrest continued, the section shared the '2-minute science' video done for the island and also information and graphics regarding the situation.

E. STRATEGY REVIEW

Please see Appendix I.

Appendix I: Biennial Estimates 2020/2021-2021/2022

In addition to routine monitoring operations, the key projects with which the Centre were engaged during the period are summarized below, with an indication of their alignment with the University's 2017-2022 Strategic Objectives provided in the footnotes. *All of these projects **are ongoing and will continue during the 2021/2022 period**.*

1. **Management of the Montserrat Volcano Observatory[2].** Successful execution of the new contract signed in 2016 for the management of the Montserrat Volcano Observatory continued. The contract is for **a fixed sum of EC$17.9 million** and largely supports the employment of 8 members of staff (7 based at MVO and 1 at SRC).
2. **Seismic Microzonation Studies in Trinidad and Tobago[3]** – This Ministry of Planning and Sustainable Development, Government of Trinidad and Tobago funded project continued with the collection of data moving to the San Juan/Barataria area. It caters for microzonation of ten major population centres in Trinidad and Tobago and has a total budget of **US$2.1M**.
3. The **PREPARE TT[4]** project has ended in 30th of November 2021. The geophysics team assisted in collecting building stock information that was reviewed by civil engineers, to calculate the exposure in Port of Spain. The results of the TTMP: PoS were also used from Miyamoto International to calculate the seismic hazard in the same area. Budget **US$55K**
4. **Dominica Geothermal Project in Roseau Valley[5]**: In April 2021 a small seismic network comprising of 4 broadband sensors was installed in Trafalgar, Dominica. The purpose of the network is to monitor any induced seismicity that can be caused by the drilling operations during Phase II of the geothermal project.
5. **Volcano-Ready Communities in St. Vincent[6].** 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.
6. **Revised web site for the SRC & more effective use of social media and developing video products[7]**. Work on our revised website is now nearly completed and is expected to be launched during the 2020-2021 period. Attention will continue to be focused on enhancing the education and outreach work of the Centre to vulnerable island communities using social media but also developing short videos.
7. **Development of the myHAZ citizen science system[8]**. This project was supported by the British Geological Survey NC-ODA grant NE/R000069/1: Geoscience for Sustainable Futures, with input from the following BGS Challenge Areas: Multihazards and Resilience, Digital and Global. It involves stakeholder awareness and participation in the development of the prototype citizen science 'myHAZ' platform, which consists of three components: (1) a citizen science smartphone

[2] Aligned to AC3 through expansion of CORE internship to MVO & AG2 through consultancy funding received.
[3] Aligned to AC4
[4] Aligned to AC4 & AG2
[5] Aligned to AC2, AC4 & AG2
[6] Aligned to AC4, AL3 & AG2
[7] Aligned to AL1 & AC3 as is all of the Education & Outreach work undertaken by the SRC.
[8] Aligned to AL1 & AC3 as is all of the Education & Outreach work undertaken by the SRC.

app for gathering multihazard observations and providing users with a 'quick glance' of ongoing hazards, environmental change and impacts; (2) a management dashboard to manage and respond to incoming observations in-country, and; (3) a web portal for exploring, visualising and downloading data collected by the app. **Budget US$42K**

8. **Quantitative methods for hazard assessment at the Soufriere Hills Volcano, Montserrat**[9]. A research project to employ 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 micro-zonation 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.

Appendix II: ***Main objectives for the current academic year and planned activities for 2022/2024 indicating their alignment with the University's 2017-2022 Strategic Objectives***

The income received from our contributing territories has been inconsistent (TT$5.5-11.6M during the period 2010 - 2021) and provide only sufficient funds for routine monitoring (i.e. operation of a minimal seismic network). All other work, including most research, major developments in the network and outreach, has to be undertaken through grant funding mainly from external sources or from applications to the SRC Departmental Consultancy Fund (DCF).

I. **Management of the Montserrat Volcano Observatory**[10]**.** The contract signed in 2016 for the management of the Montserrat Volcano Observatory ended in September 2021. A new 2-year Interim contract, covering the period 1 October 2021 – 30 September 2023, was signed for **a fixed sum of EC$6.9 million** and largely supports the employment of 8 members of staff (7 based at MVO and 1 at SRC).

II. **Seismic Microzonation Studies in Trinidad and Tobago**[11] – This Ministry of Planning and Sustainable Development, Government of Trinidad and Tobago funded project continued with the collection of data moving to the San Juan/Barataria area. It caters for microzonation of ten major population centres in Trinidad and Tobago and has a total budget of **US$2.1M**.

III. **Disaster risk management in the Caribbean, support for the Seismic Research Centre**[12]**.** This project funded by the Government of New Zealand through its Ministry of Foreign Affairs and Trade was extended by one year to allow completion of all activities. It involves GNS Science of New Zealand helping the SRC to build capacity in: a) continuous monitoring of volcano-hydrothermal systems using remote techniques; b) ground deformation monitoring using remote sensing and c) improved alerting systems for volcanic emergencies. Phase II of this project is being finalised to be implemented from 2021 - 2024. Budget **NZ$730K**

[9] Aligned to AC4, AL3 & AG2.
[10] Aligned to AC3 through expansion of CORE internship to MVO & AG2 through consultancy funding received.
[11] Aligned to AC4
[12] Aligned to AC4

IV. **CCC - DRiP Dominica**[13]**.:** This initiative will collect, use and integrate a range of existing and new sources of data: physical, climatological, social and economic sources as well as the identification of data gaps. New technologies and advances in data management will be used to develop multi-dimensional hazard and vulnerability mapping to prepare DRM programs and early warning systems. **Budget US$50K**

V. **Establish a communications hub co-located with a multi-parametric monitoring station (consisting of 3-component broadband seismic station, accelerometer & continuous GPS station) at Mt. St. Benedict's**[14]. This will involve the construction of a vault, erection of a communications tower and installation of seismic monitoring equipment. This work is being entirely funded from the SRC Departmental Consultancy Fund. Budget **TT$200K**

VI. **Explore options for developing and expanding work in terms of geothermal consultancy services**[15]. This will involve an investigation of the demand for and requirements of providing professional services to geothermal production companies in the Eastern Caribbean.

VII. **Finalize the outfitting and occupation of the entire new SRC building**[16]. This includes a) provision of space for postgraduate students and the Education and Outreach section; b) provision of space for lectures and c) transferral of our existing IT server room to the new building. We anticipate that we can raise sufficient **funds from our SRC DCF** to enable some of these activities, while we will explore the availability of grant funding to contribute towards this

VIII. **Development and creation of more effective use of social media and developing video products**[17]. Attention will continue to be focused on enhancing the education and outreach work of the Centre to vulnerable island communities using social media but also developing short videos and other digital products.

IX. **Re-location of computer servers to new building and expansion of the SRC IT infrastructure**[18]**.** This work is still outstanding but expected to be completed during the upcoming year. The estimated cost is as follows: servers for data - **US$32K**, storage for data - **US$15K**, network infrastructure (racks, switches, UPS) - **US$50K. (TOTAL ~US$100K from SRC DCF).**

X. **Risk at the Margins (RAM): a blueprint for defragmenting disaster risk reduction with populations at risk**[19]. The objective is to develop a blueprint for prospective practice that will assist communities in understanding how to monitor, characterise and mitigate extensive hazard. With focus on the perspective of those who experience these changes in producing "visual knowledge" and interpreting images with attention to how photographs and visual storytelling (re)orient discussions about change. Funding is primarily from UKRI NERC.

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[13] Aligned to AC2, AC4 & AG2
[14] Aligned to AC4 & AG5
[15] Aligned to AC2, AC4 & AG2
[16] Aligned to AG4 & AG5
[17] Aligned to AL1 & AC3 as is all of the Education & Outreach work undertaken by the SRC.
[18] Aligned to AG4 & AG5
[19] Aligned to AC4, AL1 & AL2

Appendix III: Conference Presentations and Publications

Journal Manuscripts

- Weber, J., H. Geirsson, P. La Femina, **R. Robertson**, C. Churches, K. Shaw, **J. Latchman**, M Higgins and K. Miller. 2019. Fault creep and strain partitioning in Trinidad-Tobago: Geodetic measurements, models, and origin of creep. Tectonics 39: 1: 15pp. Doi: 10.1029/2019TC005530.
- **Papadopoulos, I., K. Reddock, J. Manzano and J.L. Latchman** 2019. The Trinidad and Tobago Microzonation Project: Port of Spain. Geophysical Journal International 222: 1936-1951. Doi 10.1093/gji/ggaa275.
- **Papadopoulos, I., Reddock, K., Manzano, J., & Latchman, J. L**. (2020). The Trinidad and Tobago Microzonation Project: Port of Spain. Geophysical Journal International, 222(3), 1936-1951.
- Chatzopoulos, G., **Papadopoulos, I**., Vallianatos, F., Makris, J. P., & Kouli, M. (2021). Strong Ground Motion Sensor Network for Civil Protection Rapid Decision Support Systems. Sensors, 21(8), 2833.
- Tucker, M.E., Carey, S.N., Sparks, R.S.J., **Stinton, A**., Leng, M., Robinson, L., Li, T., Lewis, J., Cotton, L., 2020. Carbonate crusts around volcanic islands: Composition, origin and their significance in slope stability. Marine Geology 429, 106320. https://doi.org/10.1016/j.margeo.2020.106320
- **Basant, R.A., Ryan, G.A**., Peacock, J.R., Camacho, A.G., Blake, O.O., Hautmann, S. and Lynne, B.Y. (2021). Multi-geophysical parameter classification of the Montserrat geothermal system. Geothermics, 90: 102006.
- Higgins, M., La Femina, P.C., Weber, J.C., Geirsson, H., **Ryan, G.A.** and Wauthier, C., 2021. Strain Partitioning and Interseismic Fault Behavior Along the Caribbean-South American Transform Plate Boundary. Tectonics, 40(8): e2021TC006740.
- van Rijsingen, E.M., Calais, E., Jolivet, R., de Chabalier, J.-B., Jara, J., Symithe, S., **Robertson, R. and Ryan, G.A**. (2021). Inferring Interseismic Coupling Along the Lesser Antilles Arc: A Bayesian Approach. Journal of Geophysical Research: Solid Earth, 126(2): e2020JB020677.
- **Smith, P.J**., Bean, C.J. (November 2020) RETREAT: A REal-Time TREmor Analysis Tool for Seismic Arrays, With Applications for Volcano Monitoring. Frontiers in Earth Science. doi:10.3389/feart.2020.586955
- Thompson, Glenn., Power, John A., Braunmiller, Jochen., Lockhart, Andrew B., **Lynch, Lloyd.,** McCausland, Wendy., Rowe, Charlotte A., Shea, Thomas., White, Randall A.,Breithaupt, Charles I. (July 2020) Capturing, Preserving, and Digitizing Legacy Seismic Data from the Montserrat Volcano Observatory Analog Seismic Network, July 1995–December 2004. Seismological Research Letters 91 (4): 2127–2140. https://doi.org/10.1785/0220200012.

Technical Reports

- **E. Joseph, R. Robertson, R. Stewart** - 2020/12/29 – 2021/07/31 La Soufrière volcano, St. Vincent Scientific Advisories 202011_SVG_04 - 202111_SVG_117.
- IVHHN Briefing note on interpreting volcanic gas measurements. Tamar Elias (US Geological Survey), Claire J. Horwell (Durham University, UK). Reviewed by **Erouscilla Joseph (UWI SRC), Victoria Miller (Montserrat Volcano Observatory),** Sally Edwards (PAHO), Carol Stewart (Massey University, NZ), and Evgenia Ilyinskaya (University of Leeds, UK). Version 1.5. Last edited 13 May 2021. https://www.ivhhn.org/uploads/IVHHN_briefing_note_interpreting_gas_measurements_FINAL.pdf
- **Joan L. Latchman, Ilias Papadopoulos, Kafele Reddock, Jevan Manzano, Cory George, Jason D. Kanhai, Graham Ryan, Monique Johnson, Lloyd L. Lynch, Richard E.A. Robertson, Stacey Edwards, Clevon Ash, Nisha Nath and Ian Juman** 2018/08/21 Magnitude 6.9 West of Port of Spain Earthquake Report on the 2018/08/21 West of Port of Spain Earthquake. In Preparation for the Government of Trinidad and Tobago 74pp.
- **Papadopoulos, J. L. Latchman, R. Robertson, L. Lynch, K. Reddock, C. Ash, J. Manzano, C. Sobion, J. Seemungal.** Trinidad and Tobago Microzonation Project Monthly Reports August 2019-July 2020
- **Papadopoulos, J. L. Latchman, R. Robertson, L. Lynch, K. Reddock and J. Manzano**. Quarterly Trinidad and Tobago Microzonation Project Progress Reports: 30 - 33
- **James, D., Miller, V**. (2020) Lahar Hazard Assessment for the Soufriere Hills Volcano, Montserrat. Open File Report OFR 20-02

Press Releases and Non-refereed Articles

- Numerous radio, newspaper and television interviews related to the eruption of La Soufrière volcano, St. Vincent.
- UWI Today article: "UWI Seismic Research Centre on the Ground in St. Vincent" published 23rd May 2021.
- UWI Today article: "Be Vigilant, Be Prepared: UWI Seismic Research Centre on La Soufrière" published 31st January 2021.

Conferences, Meetings & Workshops

1. **Erouscilla Joseph.** 2021. ASHRAE CARICOM Chapter, Impact of Volcanic Eruptions on Health and Infrastructure. 19 April, 2021*(Virtual)*
2. **Erouscilla Joseph, Richard Robertson, Joan L. Latchman, Lloyd Lynch, Stacey Edwards, Thomas Christopher, Roderick Stewart, Graham Ryan, Adam Stinton, Michal Camejo, Karen Pascal, Victoria Miller, Rodrigo Contreras Arratia**. Management, Monitoring and Impact of the 2020 – 2021 La Soufrière, St. Vincent Eruption. 17 June, 2021. IAVCEI Webinar.
3. **Erouscilla Joseph**, Elizabeth Riley, Michelle Forbes, Rose-Ann Smith. SCIENCE FOR TODAY FORUM: Ash in the Air, Eruption in Effect: La Soufrière, St. Vincent, 2020-2. Wednesday, June 9, 2021