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APPOINTMENTS

Baylor University/University of Pittsburgh, Postdoctoral Researcher (September 2020-present)

EDUCATION

University of Pittsburgh, Pittsburgh, PA, U.S.A.

June 2016 – August 2020

Ph.D., Remote Sensing and Geoscience, Geology and Environmental Science

Dissertation: *Quantifying thermal infrared emission from active lava surfaces to improve models of effusive volcanism*

Advisor: Michael S. Ramsey

University of Bristol, Bristol, U.K.

September 2014 – September 2015

M.Sc., Volcanology, Earth Sciences

Thesis: *Volcanic activity surveillance using thermal infrared cameras at Volcán de Fuego, Guatemala*

Advisors: I. Matthew Watson and Katharine Cashman

University of Southampton, Southampton, U.K.

September 2011 – June 2014

B.Sc., Geology, Ocean and Earth Science

Dissertation: *The Solid Geology of the Petrich Region in Sofia Province, Bulgaria*

Advisor: Stephen Roberts

PEER-REVIEWED ARTICLES

Thompson, J.O., Ramsey, M.S., Lee, R.J., and Williams, D.B., Quantitative thermal emission spectroscopy at high-temperatures: A laboratory approach for measurement and calibration, *JGR: Solid Earth*, 126, e2021JB022157, 2021.

Thompson, J.O. and Ramsey, M.S., Influence of variable emissivity on lava flow propagation modeling, *Bull. Volc.*, 83 (6), 1-19, 2021.

Thompson, J.O. and Ramsey, M.S., Spatiotemporal variability of active lava surface thermal properties using ground-based multispectral thermal infrared data, *J. Volcanol. Geotherm. Res.*, 408 (107077), 2020.

Thompson, J.O. and Ramsey, M.S., Uncertainty analysis of remotely-acquired thermal infrared data to extract the thermal properties of active lava surfaces, *Rem. Sens.*, 12 (1), 193, 2020.

Thompson, J.O., Ramsey, M.S., and Hall, J.L., MMT-Cam: A new miniature multispectral thermal infrared camera system for capturing dynamic Earth processes, *IEEE Trans. Geosci. Rem. Sens.*, 57 (10), 7438-7446, 2019.

MAJOR RESEARCH FUNDING

Infrared detection of gas and ash compositions in volcanic plumes

Period: 2021-Present

NASA, Earth Surface and Interior

Postdoctoral Researcher: James Thompson

Improving the near real-time monitoring, modeling, and forecasting of ash- and SO₂-rich plumes

Period: 2020-Present NASA, Earth Science Research from Operational Geostationary Satellite Systems

Postdoctoral Researcher: James Thompson

Improving thermal modeling of effusive volcanism: Quantifying the variability in radiant emission from active lava flows and lakes

Period: 2017-2020

NASA, Earth and Space Sciences Fellowship

Pre-Doctoral Fellow: James Thompson

Quantifying active volcanic processes and hazards with HypsIRI

Period: 2016-2018

NASA, HypsIRI Preparatory Airborne Activities Program

GSR: James Thompson

PI: Michael Ramsey

The spectral and thermal response of active basaltic surfaces: Constraining lava cooling, petrology and flow propagation models

Period: 2016-2017

NSF, Petrology and Geochemistry Program

GSR: James Thompson

PI: Michael Ramsey

PENDING RESEARCH FUNDING

Earth Venture Mission

Period: 2021-2028

NASA, Earth System Science Pathfinder Program

Calibration Team and Participating Scientist: James Thompson

RESEARCH/EXPERIENCE

Postdoctoral Researcher

September 2020 - Present

Baylor University/University of Pittsburgh

Advisors: Kenneth Befus/Michael Ramsey

- Develop a new frame-work to automatically extract, calibrate, and subset GEO data over targeted volcanoes following an eruption detection in LEO data
- Derive volcanic ash composition and particle size during eruptions to improve future eruption forecasting
- Develop sUAS TIR instrumentation to investigate thermal variability across active lava channels
- Derive the storage depth and ascent rates of magma for eruptions in western USA

Graduate Student Researcher/NASA Pre-Doctoral Fellow

June 2016 – August 2020

Advisor: Michael Ramsey, University of Pittsburgh

IVIS Laboratory

- Developed and calibrated a new ground-based miniature multispectral thermal camera system
- Experience in automation of data collection, processing, and manipulation for geoscience analysis
- Hyperspectral laboratory FTIR spectroscopy (high-temperature emission) and microscope analysis
- Improved geospatial analysis and manipulation techniques to spatially quantify surface land processes and hazards using ground, airborne, and orbital geophysical remote sensing data (Python, IDL)
- Developed multi-scale land surface forecasting models for data visualization and hazard assessments including a variable emissivity module for PyFLOWGO (a Python based propagation model)

Junior Researcher**February - May 2016**

Advisor: Nick Varley, University of Colima

Colima Exchange and Research in Volcanology (CIIV)

- Improved thermal infrared, ultraviolet, and infrasound monitoring techniques for hazard assessments
- Evaluated geospatial datasets to improve monitoring and interpretations of volcanic activity (QA/QC)

Graduate Student Researcher (Masters)**September 2014 – September 2015**

Advisors: I. Matthew Watson and Katharine Cashman, University of Bristol

COMET Group

- Improved volcanic activity surveillance at Volcán de Fuego (Guatemala) using thermal infrared cameras
- Developed a long-term thermal infrared monitoring strategy to reduce volcanic risk to local populations

Student Researcher (Undergraduate)**January 2013 - June 2014**

Advisor: Stephen Roberts, University of Southampton

Geochemistry Research Group

- Geological mapping of a metamorphic intra-arc basin in central Bulgaria
- Petrological, structural, paleontological analysis evaluating syn- and post- emplacement processes

TEACHING EXPERIENCE**Integration of Research, Teaching, and Learning Training Courses****September – November 2019**

CIRTL Network

- An Introduction to Evidence-Based Undergraduate STEM Teaching

Supervisor**2018 - 2019**

Department of Geology and Environmental Science, University of Pittsburgh

- Supervised and trained an undergraduate researcher investigating textural properties of basaltic lavas

Guest Lecturer**2018 - 2021**

Department of Geology and Environmental Science, University of Pittsburgh

- Undergraduate lecture(s)

(1) GEOL 0800: Geology

(2) GEOL 0802: Geology of National Parks

- Graduate lecture(s)

(1) GEOL 3974: Hazard Observation, Modelling and GIS

(2) GEOL 2460: Applied Remote Sensing & GPS Techniques

Department of Geosciences, Baylor University

- Undergraduate lecture(s)

(1) GEO 4485: Introduction to Geographic Information Systems

- Graduate lecture(s)

(1) GEO 5308:

Substitute Teaching Assistant**2016 – 2019**

Department of Geology and Environmental Science, University of Pittsburgh

- Undergraduate recitation lecture(s)

(1) GEOL 0820: Natural Disasters

(2) GEOL 1001: Mineralogy

(3) GEOL 2003: Igneous and Metamorphic Petrology

SELECTED PUBLISHED ABSTRACTS

- Rogic, N.* , Thompson, J.O., Rymer, H., Ramsey, M.S. and Ferrucci, F., 'Dynamic Emissivity-Temperature Trend' and its impact to Spaceborne Applications: Mount Etna case study, AGU Fall Mtg., 2020.
- Ramsey, M.S.* , Harris, A.J.L., Thompson, J.O. and Williams, D.B., Recent advances in thermal infrared data systems for studies of active volcanic processes, 27th IUGG Gen. Assembly, IUGG19-3371, 2019.
- Ramsey, M.S., Williams, D.B.* , and Thompson, J.O., Beyond multispectral/multiday thinking: What the Decadal Survey really says about thermal infrared (TIR) data and volcanic systems. NASA Surface Biology and Geology: Community Workshop, 2019.
- Thompson, J.O.* and Ramsey, M.S., Active Lava Surface Properties and Flow Propagation Derived from Infrared Data, AGU Fall Mtg., 2019 (Oral).
- Thompson, J.O.* and Ramsey, M.S., Constraining the inherent uncertainties in thermal infrared (TIR) measurements of active lava surfaces: The need for improved spatial and spectral resolution data. NASA Earth Surface and Interior: Science Team Meeting, 2019.
- Thompson, J.O.* , Williams, D.B., and Ramsey, M.S., The importance of multispectral thermal infrared (TIR) data for quantitative volcanic monitoring. NASA Surface Biology and Geology: Community Workshop, 2019.
- Ramsey, M.S. and Thompson, J.O.* , Emissivity retrievals from active lava surfaces: Implications for improved flow modeling and hazard assessment, AGU Fall Mtg., 2018 (Oral).
- Thompson, J.O.* and Ramsey, M.S., Hawaii's subaerial intraplate volcanic activity: Thermal infrared measurements of Kilauea's lava lake and flows, AGU Fall Mtg., 2018 (Oral).
- Thompson, J.O.* and Ramsey, M.S., Emissivity retrievals from active lava surfaces: Results from the NASA Hawaii airborne campaigns, 2018 HypsIRI Science and Applications Workshop, Washington, DC, 2018 (Poster).
- Thompson, J.O.* and Ramsey, M.S., Thermal infrared measurements of active lava surfaces: Implications for improved flow modeling and future instrument development, Asia Oceania Geosci. Soc. Annual Mtg., 2018 (Oral).
- Thompson, J.O.* and Ramsey, M.S., Thermal infrared data of active lava surfaces using a newly developed camera system, AGU Fall Mtg., 2017 (Poster).
- Thompson, J.O.* and Ramsey, M.S., MMT-Cam: A new miniature multispectral thermal infrared camera system for field-based emissivity measurements, 2017 HypsIRI Science and Applications Workshop, Pasadena, CA, 2017 (Poster).
- Ramsey, M.S.* and Thompson, J.O., Can HypsIRI-like data constrain accurate temperature and emissivity measurements of active volcanic surfaces?, 2017 HypsIRI Science and Applications Workshop, Pasadena, CA, 2017 (Oral).
- Lee, R.J.* , Thompson, J.O., Ramsey, M.S. and King, P.L., Does the Emissivity of Basaltic Lava Surfaces Change with Temperature and Why Do We Care?, 2017 IAVCEI General Assem., Portland, OR, 2017 (Poster).
- Thompson, J.O.* and Ramsey, M.S., Identifying silicic surface textures and flow relationships using thermal infrared image data, 2017 IAVCEI General Assem., Portland, OR, 2017 (Poster).
- Ramsey, M.S.* and Thompson, J.O., The HypsIRI volcano airborne campaign: Development of a new infrared camera for data acquisition and validation, 2016 HypsIRI Science and Applications Workshop, Pasadena, CA, 2016 (Oral).

* indicates presenting author

COLLOQUIA TALKS

- 18/27/2021 **Volcanology Through the Eyes of Thermal Infrared**, Department of Geosciences, Baylor University, TX, USA
- 09/05/2019 **Quantifying the Fury of Tūtū Pele: Improving Lava Modeling using Novel Thermal Camera Data**, Department of Geology and Environmental Science, University of Pittsburgh, PA, USA

FIELD EXPERIENCE**Long Valley, CA, USA****2021**

Field campaign to acquire samples of rhyolitic deposits from the Mono Domes volcano complex to evaluate the magmatic evolution of the system.

Llano Uplift, TX, USA**2021**

Undergraduate field trip introducing metamorphic and igneous petrology and processes on the Llano uplift region. The trip included a general geological history, geological mapping, and remote sensing integration.

Yellowstone National Park, WY, USA**2020**

Field campaign to acquire samples of fallout deposits from large explosive eruptions and characterize the evolution of deposits as the eruptions progressed.

NASA HypsIRI Hawaii field campaigns, HI, USA**2017 and 2018**

Two field campaigns supporting the NASA HypsIRI airborne campaign to acquire unsaturated multispectral thermal infrared data of the Kilauea lava lake and pahoehoe lava flow on the coastal plain at different spatial resolutions.

IAVCEI Holocene age dike-fed silicic domes and flows in Oregon and California field course, USA**2017**

Investigated how physical and chemical processes responsible for the textural and structural diversity of these domes and associated explosive products can be inferred from field observations and laboratory simulations.

Monitoring at Colima, Mexico**2016**

Monitored and interpreted activity at Volcán de Colima, using thermal infrared cameras, infrasound arrays, seismic logs, UV spectroscopy, and visual datasets. Photogrammetry surveys of dome growth and pyroclastic flow deposits.

Guatemala Field Trip**2015 and 2018**

Investigated a variety of volcanic processes and the current and potential hazards they pose.

Geological field mapping in the Petrich region, Bulgaria**2014**

Geological field mapping in the metamorphic intra-arc basin, containing reworked volcanic deposits.

PROGRAMMING AND SOFTWARE SKILLS

Programming languages: IDL, Python, MATLAB

Programs – ENVI, FLIR ResearchIR, Agisoft, ESRI ArcGIS, Microsoft Suite, Illustrator, Corel, LaTeX

Experience with geospatial and geophysical data retrieval and image processing

Datasets – ASTER VIS/TIR and DEM, MASTER, AVIRIS, HyTES, GEOS ABI, LiDAR, FLIR, UV FLYSPEC, Seismic

AWARDS

2019 NASA Earth Surface and Interior: Solid-Earth Team: Meeting Travel Award
2017-2020 NASA Earth and Space Science Fellowship
2017 Henry Leighton Memorial Graduate Award, University of Pittsburgh
2012 Progression Scholarship, University of Southampton, U.K.

PROFESSIONAL ORGANIZATIONS

Institute of Electrical and Electronics Engineers (IEEE), 2019 --
American Geophysical Union, 2016 --
International Association of Volcanology and Chemistry of the Earth's Interior, 2017 --

SERVICE

Elsevier: Remote Sensing of the Environment Journal – Reviewer – 2020 --
University of Pittsburgh: Elizabeth Baranger Teaching Awards – Selection Committee – 2019
University of Pittsburgh: Summer Research Grant – Selection Committee – 2019
University of Pittsburgh: PITT Mobile Science Lab – Outreach Volunteer – 2017-2019