

Carolyn Parcheta

November 21, 2023

RE: Nomination for Volcano Geology Commission co-leadership

Dear Volcano Geology Commission members,

Since the first International Volcano Geology Workshop in Madeira in 2014, it has been a deeply fulfilling experience to be a member of our group, and it would be an honor to serve you in a leadership capacity if you elect me as a co-leader. Our collective passion on the importance of detailed field mapping, stratigraphic columns, eruption chronologies, volcano histories, and documentation of physical properties and processes of volcanic products is positively impacting all of volcanology. The ripple effects of our work spread even farther when our data is used by communities that live on volcanoes to prepare for hazards and leverage their environment safely for geothermal, agriculture, or other economic avenues. Our vocal dedication has propelled the Volcano Geology working group into a fully fledged IAVCEI commission to keep volcano geology equal and equitable to the up-and-coming modern branches of volcanology (made possible with modern computing and technology) by encouraging that models *must* rely on high quality, detailed, boots-on-the-ground field data and observations.

If elected to the commission's co-leadership role, I can offer several relevant experiences and perspectives from the first 10 years of my career if they help the group move in any (or multiple) desired direction(s) that improve field volcanology data collection and information sharing. My relevant experiences include:

- *NASA*: invented VolcanoBot to map post-eruptive volcanic fissures in 3D at cm scale resolution - the first time a volcanic conduit has been measured directly from the inside. Surely other members have dreamed up tools they wished existed to collect specific physical measurements? Or perhaps you've thought of a tool to make current data collection faster and more standardize? Let's build those tools - I'd be happy to help our field connect with industry folks who can help make our ideas for novel data collection and field efficiency a reality.
- *Hawaiian Volcano Observatory (HVO) eruption response*: being the lead operational geologist for Kilauea's Lower East Rift Zone eruption in 2018, as well as participate in active volcanic eruption response, field mapping, and lava sampling (molten, tephra fall, and cold lava) of 4 lava lake eruptions, the Pu'u'ō'ō eruption, and the Mauna Loa 2022 eruption.
- *HVO tephra lab*: I also helped create a new state-of-the-art volcanic tephra laboratory at HVO, pushing the boundaries on efficiently measuring physical properties of volcanic tephra of all sizes (bombs to ash). The tephra lab can process density, grain size, and componentry 50-75% faster than standard techniques without compromising data quality or integrity. I also worked with a student intern to develop a new technique for measuring density of bombs and lapilli that is

accessible and affordable for volcanologists from underrepresented regions or with limited financial resources.

Data preservation is essential to our growth as a field and I've collaborated with USGS folks who are pursuing geochemical databases in the hopes of pursuing and building a physical volcanology database. I would encourage and fully support our volcano geology field in developing any database encompassing the preservation of field data (including but not limited to photos, sample locations in X,Y, and Z (for Strat columns), as well as analyses on samples themselves (i.e. density, grain size, componentry, etc).

Education and outreach is also a priority that I fully support. And I am fully motivated to help and support the Volcano Geology Commission in any pursuits of engaging K-12 kids (develop a game?), organizing field trips for both the general public and our fellow specialists at conferences to share the important knowledge we gather during our field campaigns, and public lectures for interested communities. I will support and encourage small workshops and special themed publications, as well as training field camps and skill-building internships for field work or sample processing.

I bring a strong hands-on, in-the-field, applied science and engineering flavor to volcano geology, while staying true to the core value of our group - detailed, accurate, quality field mapping to understand Earth's volcanoes. If you choose to elect me as a co-leader of the Volcano Geology Commission, it would be an honor to serve our community.

Sincerely and with aloha,

Carolyn Parcheta

Dr. Carolyn Parcheta

Carolyn Parcheta

- Monitoring Network Maintenance
- Field Operations
- Field geologist
- Eruption volcanologist

<http://www.linkedin.com/in/carolynparchetaphd>

Education

University of Hawai'i at Mānoa

Attended (2008-2013)

Ph.D. in Geology and Geophysics

- Specialization: Physical Volcanology of basaltic fissure eruptions & low lava fountains.

Attended (2004-2008)

B.Sci. in Geology and Geophysics

- With honors
- AGU Outstanding Student Presenter, Spring 2007
- NASA Best Student Presenter Award, April 2006

Core Competencies

- | | |
|---------------------|--------------------|
| -Operations | -Public speaking |
| -Field mapping | -Media Interviews |
| -Helicopter safety | -Leadership |
| -sUAS pilot | -Organization |
| -Network monitoring | -Teamwork |
| -Project management | -Coordination |
| -Volcano robotics | -Budgeting |
| | -Problem Solving |
| | -Basic Engineering |

Awards

Team awards:

2018 – Department of the Interior Unit award for Excellence (HVO Staff)

2019 – Service to America (HVO Staff)

Individual Awards:

2019 – USGS STAR award

I am a highly motivated person who can work within a team but also function independently under minimal guidance. Excellent team-building abilities, hard working, and acquires new skills easily. Diplomatic, tactful, poised, and competent with professionals, media, and the general public. I thrive in field environments, research projects, and during public speaking opportunities.

Work Experience

Field Operations Manager, Alaska Earthquake Center

U.S. Geological Survey, Aug 2017 - present

- Responsibilities: monitoring and maintaining state-wide seismic network that is used to assess earthquake hazards; independently plan and conduct field maintenance and repairs, delegate teams to specific field campaigns (dominated by helicopter access)
- Certifications: agile project management, supervisor training.

Operational Geologist, Hawaiian Volcano Observatory

U.S. Geological Survey, Aug 2017 - present

- Responsibilities: Monitoring volcanic unrest; assessing volcanic hazards; independently plan and conduct field mapping, sampling, and data collection in hazardous & uneven terrain; design, develop, and maintain webcam monitoring network; maintain detailed quarterly reports of ongoing volcanic activity; assist with media, outreach, and public education programs; purchase, install, calibrate, operate ~\$500k tephra physical properties analysis laboratory.
- Certifications: Wilderness First Aid, CPR, Aviation Safety, sUAS Pilot, SFM modeling,
- Milestones: 2018 eruption chronology approaching publication

Systems Engineer II, Science Operations for Mars Insight Lander

Jet Propulsion Laboratory, Caltech, Feb 2017-Aug 2017

- Responsibilities: facilitated delivering the HP3 instrument from Germany to Denver for integration with the InSight lander; helped write and verify space flight command codes for the instrument and provide code documentation (written and flow charts).
- Certifications: Systems engineering,

NASA Postdoctoral Fellow

Jet Propulsion Laboratory, Caltech, Feb 2014-Feb 2017

- Responsibilities: Designed, constructed, and modified a rotart microspine robot to descend into non-eruptive volcanic fissures and document conduit geometries (a data set previously not possible to obtain, but in critical need; Parcheta et al 2016).
- Certifications: 3D printing, laser cutter, CNC/milling, project design and management
- Milestones: mapped a 100 m length of fissure conduit to 30 m depth to make the first ever volcanic conduit geometry map and 3D model at cm scale resolution.

Visiting Scientist at USGS Hawaiian Volcano Observatory

Research Council of the University of Hawai'i, Jun 2013 – Jan 2014

- Responsibilities: Reconstructed eruption chronology and physical processes of the eruption deposits from the 2011 kamoamo eruption of Kīlauea.

Doctoral Candidate, Topic: *Weak-intensity, basaltic, explosive volcanism: dynamics of Hawaiian fountains.*

University of Hawai'i at Mānoa, Aug 2008 – May 2013

- Responsibilities: Investigated three perspectives on Hawaiian fissure lava fountains: (1) documentation and analysis of spatter ramparts, (2) vent geometries and shallow conduit depths, and (3) the distribution, grain size, density, and vesicularity of tephra.
- Certifications: FEMA Volcano Hazards Course instructor
- Milestones: attended 1 month course on seismology and infrasound in Ecuador,

Undergraduate Seismology Assistant

University of Hawai'i at Mānoa, Oct 2007 – Jul 2008

- Responsibilities: Picked P and S-wave arrival times for Dr. Cecily Wolfe's PLUME experiment on Hawaiian hotspot tomography, used in Dr. Anchieta's PhD thesis.

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Languages

- English – fluent
- Spanish – beginner
- Hawaiian – student

Published in

- Nature Scientific Reports
- Science
- Bulletin of Volcanology
- JVGR
- Frontiers in Earth Science
- Geochem., Geophys., Geosys.

Education/Outreach

Primary Advisor/Mentor:

- 2020-2022, Alice Martin, UH Hilo, tephra bulk densities

Co-Advisor:

- 2011-2013, Christine Kosinski, lava flow inundation field data

Co-instructor:

- 2017-2019, Girl Scout STEM fest, hawaii.
- 2012, Introduction to Volcanology (UH Mānoa)
- 2012, Natural Hazards and Disaster Mitigation course (UH Mānoa)
- 2011 – 2013, FEMA Volcano Crisis Awareness Course
- 2010- present, Kīlauea field trips for university students and conferences
- 2010- 2023: Lava sampling techniques for university field trips on geologic field methods

Major Field Experience

Eruption Reponse, Kīlauea and Mauna Loa volcanoes

Hawai'i, August 2017 – May 2023

- 2022 Mauna Loa: Daily operations rotating between sUAS operator, lava and tephra sampling, helicopter SFM (3D) photography, lab tephra sample processing, and chronology organizer/writer.
- 2017-2018, 2020 and 2021 Kīlauea Summit eruptions: daily-to-weekly field shift rotations for laser range finder measurements of the lava lake and lava fountains; sUAS operator; tephra collection and sample processing
- 2018 Kīlauea Ahu'a'ilā'au eruption: Lead operational geologist, 4 months of 24/7 field shift rotations, helicopter and ground based monitoring, lava and tephra sampling, coordination/debriefing with Civil Defense and FEMA, nationally televised press conference and media engagement, chronology lead author
- 2017-2018 Pu'u'ō'ō eruption: Helicopter based observations, SFM (3D) photography, ground mapping, lava sampling, advisement to National Park on fluctuating hazards.

Underground mapping for caves, lava tubes, and fissures

New Mexico, Arizona, Hawai'i, Feb 2014-Feb 2017, 2019-2020, 2022-present

Scrambled through narrow spaces with sensitive and heavy robotic field gear; rappelled/ascended within vertical ground cracks; cave surveying.

Active and inactive lava flow fields, lava fountain deposits

Kīlauea Volcano, Hawai'i, August 2008 - present

Mapped active lava flow margins at Pu'u'ō'ō; documented older lava flows for crustal thickness flow directions, tree mold depths, and spatter deposits to reconstruct unobserved eruption chronologies; quantified fissure vent shapes and conduit depths; dug tephra pits for grainsize, density, componentry analyses.

Explosive eruption deposits

Hekla Volcano, Iceland, July – August 2012

Dug and sampled over 100 pits for ash/tephra analyses. Data processed by Dr. Janebo and used in her dissertation.

Infrasound and Seismology Field Course

Tungurahua Volcano, Ecuador, June -July 2009

Deployed/retrieved seismic, infrasound, and time-lapse stations, recovered data from the instruments, learned basic data analysis and interpretation.

Structural geology mapping of a giant dike swarm, field assistant

Antarctica, December 2007 -January 2008

Mapped and sampled the large-scale structure of the bimodal (mafic and felsic) Vanda Dike Swarm spanning Wright, Taylor, and Victoria dry valleys; measured the strike and dip of 642 dikes (approximately 25% of the swarm); hiked 215 miles.

Structural geology mapping of fracture patterns, field assistant

Yosemite National Park, July 2007

Mapped sheeting/exfoliation joints with a total station at centimeter-scale resolution over 50-100 m² regions within 3 topographic surface curvatures: dome, saddle, bowl.

Publications (91 items as of March 2023)

My full publication list is available upon request and includes 23 peer reviewed journal articles with 4 as first author, 1 robotics patent, 59 conference presentations (12 talks and 16 posters as first author and the remaining 31 as coauthored talks and posters), and 3 invited university seminars. The two most recent items on the list are:

- Cahalan, Ryan, et al., including **Parcheta, Carolyn**. (2023) Dynamics of the December 2020 ash-poor plume formed by lava-water interaction at the summit of Kīlauea Volcano, Hawai'i. *Geochemistry, geophysics, geosystems*.
- Gestrich, Julia et al., including **Parcheta, Carolyn**. (2022). Lava fountain jet noise during the 2018 eruption of fissure 8 of Kīlauea volcano. *Frontiers in Earth Science*. 1