ADRIEN J. MOUREY

VOLCANOLOGY · GEOCHEMISTRY · PETROLOGY

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Research Fellow, Earth Observatory of Singapore 2023 - current

Education

Ph.D., Department of Earth Sciences, University of Hawai'i at Mānoa 2018 - 2021
Research adviser: Dr. Thomas Shea
Thesis: Olivine in four dimensions: a textural and chemical record of magmatic phenomena underneath Kīlauea Volcano (Hawai'i)

M.Sc., University of Lorraine Speciality Earth and Planetary 2015 - 2017
Research adviser: Dr. Lyderic France
Thesis: *Characterization of volatile contents in primitive magmas of an active carbonatitic volcanic complex (Oldoinyo Lengai, Tanzania)*

B.A., Department of Geology, University of Lorraine (France) 2012 - 2015
Thesis: *Study of morphology of the segment centerline Manda Hararo in East African Rift System*

Teaching experience

- ERTH 101L Dynamic Earth Laboratory (1 semester, 2020)
- ERTH 302 Igneous and Metamorphic Petrology (1 semester, 2020)

Research interests and projects

Research interests

- 1-atmosphere high-temperature experiments
- Volatiles in glass inclusions
- Piston cylinder experiments
- Microstrain and microstructural studies with the electron backscatter diffraction
- Analysis for major elements and trace elements with the electron probe and laser ablation ICP-MS
- X-ray microtomography
- Diffusion modeling in minerals
- Thermodynamic geochemical modeling
- Mantle source characteristics

Research projects

- Genesis and evolution of carbonatites, the main Rare Earth Elements deposits: quantification of the concentration processes from source to metal-rich magma
- Experimental investigation of chemical zoning in olivine: applications to Hawaiian basalt
- Petrological insights into the 2018 Kilauea Eruption

Field experience

- Maui fietrip (3 days, organized by John Sinton) to study the geology of West and East Maui — 2019
- California fieldtrip (7 days) to study the rheology of volcanic deposits at Mt Shasta and Medicine Lake Volcano (organized by Tom Shea) — 2019
- New Zealand (Taupo Volcanic Zone) field trip (12 days) to study explosive deposits (organized by Bruce Houghton) — 2019
- Hawaiian Volcano Observatory (HVO) volunteer during the 2018 Lower East Rift Zone eruption, conducting field sampling — 2018
- Volcanic and tectonic fieldwork in the Aeolian Islands and in the Apennines (2 weeks) — 2016
- General Geology Field Course - Lorraine, France (1 week) — 2015
  Examined the lateral and vertical relationships of sedimentary deposits in eastern part of Paris Basin in order to determine the possible cause of subsidence in this area
  Completed fossil, mineral and rock identification
- Magmatology and metamorphism Field Course- Alps, France-Italy (1 week) — 2015
  Studied various igneous rocks, crustal structure and geodynamic position in the orogenic cycle
  Structural deformations and data interpretation, along with a logbook containing all measurements and sketches; learnt how those magmatic structures are formed; interpreted geological landscapes
- Field Course - Bedar, Spain (2 weeks) — 2015
  Examined the formation of those structures (including sedimentary zone and crystalline basement) and the relation between tectonic event and sedimentation
  Constructed the geologic map based on the observation conducted on the field
- Volcanology - Eifel Volcano (Germany) and the Vosges (France) — 2014
- Sedimentary Field Course - Ardeche, France — 2014
- Basic Introduction of Geological Mapping - Viterne, France — 2014

Technical skills

Software: MELTS, Adobe+microsoft suites / Iolite / Matlab / Python / ArcGIS / LaTeX

Analytical: LA-ICP MS, Electron Microprobe, Secondary Electron Microscopy, Petrographic microscopy, Secondary Ion Mass Spectrometry, Electron Backscatter Diffraction

Specialization: Diffusion modeling / mineral X-ray maps / X-ray microtomography

Languages: English & French

Outreach

Diffusion modeling workshop (part of the organizing team for Goldschmidt 2020)	2020
Former member of the «Objectif Terre» association for Earth science projects at the University of Lorraine	2016-2017
Manager of a volcano stand at the minerals exposition in Sainte-marie-aux-mines (France)	2013-2017
Organizer of a fieldtrip in the Eiffel region (Germany) for engineers of the Engineering National School of Geology (Nancy, France)	2017

Peer-reviewed publications

ORCID iD: 0000-0003-3498-9307

[10] Temporal variation of melt chemistry at Kīlauea Volcano (Hawai'i) during the 2008-2020 period and storage conditions of East Rift Zone Magmas. *in preparation*

MOUREY, A.J., SHEA, T., COSTA, F., et al.

[9] The influence of olivine settling on the formation of basaltic cumulates revealed by micro-tomography and numerical simulations. (under review) *Journal of Volcanology and Geothermal Research*

MOUREY, A.J., CARRARA, A., SHEA, T., et al.

[8] Genesis of carbonatite at Oldoinyo Lengai (Tanzania) from olivine nephelinite: protracted melt evolution and reactive porous flow in deep crustal mushes *Journal of Petrology 2023*

MOUREY, A.J., FRANCE, L., ILDEFONSE, B. et al.

[7] Years of magma intrusion primed Kīlauea Volcano (Hawai'i) for the 2018 eruption: evidence from olivine diffusion chronometry and monitoring data. *Bulletin of Volcanology 2023*

MOUREY, A.J., SHEA, T., COSTA, F., et al.

[6] Preservation of magma recharge signatures in Kīlauea olivine during protracted storage *Journal of Geophysical Research: Solid Earth 2023*

MOUREY, A.J., SHEA, T., HAMMER, J.E.

[5] Experimental study of Fe-Mg partitioning and zoning during rapid olivine growth in Hawaiian tholeiites. *Contribution Mineralogy Petrology 2022*

SHEA, T., MATZEN, A., **MOUREY, A.J.**

[4] Trace elements in olivine fingerprint the source of 2018 magmas and shed light on explosive-effusive eruptive cycles at Kīlauea. *Earth and Planetary Science Letters 2022*

MOUREY, A.J., SHEA, T., LYNN, K.J., et al.

[3] The petrologic and degassing behavior of sulfur and other magmatic volatiles from the 2018 eruption of Kīlauea, Hawai'i: melt concentrations, magma storage depths, and magma recycling.

Bulletin of Volcanology *2021*

LERNER, A.H, WALLACE, P.J., SHEA, T., **MOUREY, A.J.**, et al.

[2] Forming olivine phenocrysts in basalt: a 3D characterization of growth rates in laboratory experiments.

Frontiers in Earth Science *2019*

MOUREY, A.J., SHEA, T.

[1] Phosphorus and aluminum zoning in olivine: contrasting behavior of two nominally incompatible trace elements.

Contribution Minerology Petrology *2019*

SHEA, T., HAMMER, J.E., HELLEBRAND, E., **MOUREY, A.J.**, et al.

Selected conference abstracts and talks

Mourey A., France L., Ildefonse B., Gurenko A., Laporte D. Reactive porous flow in deep crustal mushes, and early evolution of primitive magmas in a continental rift: the Oldoinyo Lengai volcanic area example (Goldschmidt 2023)

Mourey A., Shea T., Lynn K., Lerner A., et al. Mantle processes related to the explosive-effusive transition during the last eruptive cycle at Kilauea (Hawai'i) (V15E-0128, AGU2021)

Shea T., Lubbers J., **Mourey A.**, Terada M., et al. Crystallographic orientation of crystal clusters in 3D using laboratory diffraction contrast tomography: initial tests on Kilauea olivine (V11B-08, AGU2021)

Brouillet F., France L., Koornneef J.M., **Mourey A.J.**, Casola V. Homogenisation of heterogeneous mantle melts in transcrustal plumbing system (Goldschmidt 2021, session 2e)

Lerner A.H., Wallace P., Shea T., **Mourey A.J.**, Kelly P., Nadeau P., Ellias T., Kern C., Clor L., Gansecki C., Lee R., Moore L., Werner C. Magma source depths and magma recycling in the 2018 eruption of Kīlauea, Hawai'i based on volatiles in melt inclusions (*poster V002-0007, AGU 2020*)

Shea T., **Mourey A.J.** Fe-Mg zoning in olivine during rapid growth: kinetic effects are small, zoning nearly flatlines (Goldschmidt 2020, session 5c) doi.org/10.46427/gold2020.2354

Mourey A., Shea T., Costa F., Shiro B., Oalmann J,. Lee L., Gansecki C. Preservation of mantle-derived recharge signatures in olivine during protracted magma storage (Goldschmidt 2020, session 5c) doi.org/10.46427/gold2020.1858

deGraffenried R., Houghton B., Walker B., Beucler O., Cline J., Cockshell W., Evans K., Mourey A., Nelson W., Tisdale C., Tremblay J., Zinn M. Products of Littoral Explosions and their Formation Conditions: A Case Study from Episode 58 of Pu'u 'Ō'ō, Kīlauea Volcano, HI (Goldschmidt 2020, session 5e) doi.org/10.46427/gold2020.542

Mourey A., Shea T., Costa F., Shiro B., Lee L., Gansecki C., Oalmann J. Diffusion timescales in olivine from the 2018 eruption at Kilauea Volcano reveal syn-eruptive (months) and long term (years) magma mixing processes (V43C–0208, AGU 2019)

Gansecki C., Lee R., Shea T., Lundblad S., **Mourey A.,** Hon K. Complex mixing of old and new: a petrological overview of the Kilauea 2018 eruption (Goldschmidt 2019, session 6k poster 302)

Mourey A., Shea T., Lee R.L., Gansecki C., Costa F., Hammer J.E., Coombs M. *(2018)*. Mineralogical insights into the 2018 Puna eruption at Kīlauea volcano: magma origins and mixing timescales. (*poster, V43J-0284, AGU 2018)*

Mourey A., Shea T., (2018). 3D quantification of olivine growth rates. Goldschmidt, Boston *(session 6h)*

Shea T., Hammer J.E., Hellebrand E., **Mourey A.**, First E., Lynn K.J. (2018). Phosphorus and Aluminum Partitioning during Olivine Growth: Both Sides of the Story. Goldschmidt, Boston *(session 6h, P153)*

Mourey A., France L., Laporte D., Gurenko A. *(2017)*. Characterization of Volatile Contents in Primitive Magmas of an Active Carbonatitic Volcanic Complex (Oldoinyo Lengai, Tanzania). Goldschmidt, Paris *(session 5f, P2215)*

Journal reviewer

- Earth and Planetary Science Letters
- Lithos
- Nature Communications

Honors & Awards

PhD funded by the National Science Foundation (NSF- EAR 1725321)	*2017-2021*
GSO travel grant for AGU fall meeting 2018	*2018*
Scholarship from the John J. Naughton Memorial Grant Fund for fieldwork at Kilauea volcano	*2018*
Travel grant from the *French Society of Mineralogy and Crystallography* for the 2018 EMPG conference	*2018*

Students mentored

• *Nathalie Powers*, previous undergraduate at UH Mānoa (Guided her with micro tomography data processing, and mineral picking)	*2019*
• *Florian Brouillet*, previous undergraduate at University of Lorraine (France) (Guided him with melt inclusion preparation)	*2017*

Diversity, equity, inclusion

Part of the organization team for the Honolulu pride festival to celebrate diversity in the LGBTQIA+ community.	*2022*

References

Thomas Shea

PhD advisor

- **Assistant Professor, Department of Earth Sciences, University of Hawai'i at Mānoa**
- **tshea@hawaii.edu**

Julia Hammer

Collaborator

- **Professor, Department of Earth Sciences, University of Hawai'i at Mānoa**
- **jhammer@hawaii.edu**

Fidel Costa

Collaborator

- **Professor, Institut de Physique du Globe de Paris, Université Paris Cité, CNRS, France**
- **costa@ipgp.fr**