

ALEXANDER S. LLOYD

Columbia Science Fellow

Lecturer in Discipline in the Department of Earth
and Environmental Sciences at Columbia University

Lamont Doherty Earth Observatory of Columbia University
61 Route 9W - PO Box 1000, Palisades, NY 10964
Ph 610-334-8719, Fax 845-365-8155
Email: alloyd@ldeo.columbia.edu
URL: <http://www.ldeo.columbia.edu/~alloyd/>

EDUCATION

Columbia University, New York City, New York, 2008 - 2014

Ph.D. in Earth and Environmental Sciences, June 2014

M.Phil. in Earth and Environmental Sciences, May 2012

M.A. in Earth and Environmental Sciences, March 2010

Dickinson College, Carlisle, Pennsylvania, 2003 - 2007

B.Sc. in Geology (Honors), May 2007

William T. Vernon Prize for Excellence in Geology

TEACHING APPOINTMENTS

Teaching Assistant, Environmental Risks and Disasters, Columbia University, Spring 2010 and Spring 2011.
Weekly recitation section lecturer and grading.

Teaching Assistant, Introduction to Igneous Petrology, Columbia University, Spring 2012.
Laboratory (volunteered in an unofficial capacity).

Teaching Assistant, Physical Geology, Dickinson College, Spring 2005.
Laboratory and field trips.

TEACHING INTERESTS

- Igneous Geochemistry
 - Petrology
 - Mineralogy
 - Volcanology
 - Geology of Natural Disasters
 - Introductory Earth Science
 - Teaching and Learning Concepts in Earth Science
 - Earth Resources
 - Field Geology
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RESEARCH EXPERIENCE

Doctoral Research, Department of Earth and Environmental Science, Columbia University, 2008 - 2014

Research Adviser : **Dr. Terry Plank**

- Designed a natural experiment that exploited the different cooling rates of volcanic pyroclasts to quantify water loss from melt inclusions during magma ascent and post-eruption cooling.
- Utilized the unique capabilities of a NanoSIMS to analyze concentration gradients in magmatic volatiles dissolved in embayment glass and applied a decompression diffusion model to quantify magma ascent rates during explosive, basaltic volcanism.
- Explored the possibility of using water analysis in the nominally anhydrous mineral clinopyroxene as another magma ascent chronometer and as a proxy for magmatic water in arc volcanism.

Undergraduate Honors Research, Department of Earth Sciences, Dickinson College, 2006 - 2007

Research Adviser : **Dr. Benjamin Edwards**

- Field study of glaciovolcanic ridges and interpretation of the transition in eruptive style from volcanic breccia to pillow lavas.
- Measured plagioclase growth rate in pillow lavas through the use of a conductive cooling model and crystal size distribution techniques.

RESEARCH INTERESTS

Time scales and processes of magma ascent and emplacement; upper volcanic conduit dynamics; magmatic differentiation; the interpretation, mechanisms of formation, and post-entrapment modification of melt inclusions hosted in igneous phenocrysts; new education methods in earth science.

RESEARCH APPOINTMENTS

Research Assistant, NSF Grant EAR-09-48533 : Volatile Loss during Magma Ascent and Cooling.
Sample preparation, data collection, modeling and interpretation.

Research Assistant, NSF Grant EAR-04-39707 : Using the Products of Volcano-Ice Interaction to Constrain Paleo-Ice Conditions. Field work, sample preparation, data collection, modeling and interpretation.

ANALYTICAL INSTRUMENTAL EXPERIENCE

- Electron Microprobe, Cameca SX-100, AMNH, volcanic glass and mafic minerals
 - Laser Ablation ICP-MS, VG PQ-ExCell, LDEO, trace elements in various phases
 - Ion Microprobe, Cameca IMS 6F, DTM-CIW, volcanic glass and nominally anhydrous minerals
 - Scanning Electron Microscope, LDEO and Dickinson College, crystal size distribution
 - XRF and XRD, Dickinson College, bulk volcanic and sedimentary rock analysis for major/trace elements
 - Various thin section preparation techniques
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FIELD EXPERIENCE

- Adirondack Park, NY, Grenville Orogeny and Mineral Collecting, LDEO (one week, 2013)
 - Nova Scotia/New Brunswick, Tr-J Paleontology, LDEO (two weeks, 2012)
 - Wyoming Regional Geology, Yellowstone, and the Stillwater Complex, LDEO (two weeks, 2011)
 - Beaver Dam Mountains, Utah, Near-Surface Seismic Refraction field assistant (three weeks, 2010)
 - Mount Edziza Volcanic Complex, Northwest British Columbia, Glaciovolcanism/Constraining Paleo-Ice Conditions (two months, 2006)
 - Llanengan, Wales, United Kingdom, Applied Geophysics Field Camp, (two weeks, 2006)
 - Mount Eldfell, Heimaey, Iceland, Human Response to Volcanic Disaster (one week, 2005)
 - Christie Lake, Southern Ontario, Structural Geology Field Camp (two weeks, 2005)
 - Soufriere Hills Volcano, Montserrat, West Indies, Geology and Sociology of Disasters (two weeks, 2005)
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PREVIOUS EMPLOYMENT

Park Ranger Intern, Bureau of Land Management, Hassayampa Field Office, AZ
Winter 2007 to Summer 2008

Botany Intern, U.S. Fish and Wildlife Service, Sevilleta National Wildlife Refuge, NM
Summer 2007 to Fall 2007

Assistant Technician/Mineral Curator, Department of Earth Sciences, Dickinson College, Carlisle, PA
Summer 2005

Facility Condition Audit Technician, Architect of the Capitol, Washington, DC
Summer 2004

INVITED SEMINAR

“What geochemistry and melt inclusions can tell us about magma ascent”
Dickinson College, ERSC Common Hour Lecture, October 2012

OUTREACH

- Lamont Doherty/Boy Scouts Earth Day: “Crystal Clocks of Volcanic Eruptions” (2014)
 - PS 84 Volcano Education Program: “Viscosity and Volcanos” (2013)
 - First Lego League, Robot Alliance Team: Volcanic Hazard Expert (2013)
 - Lamont-Doherty Open House (2011-2012): “Trash Can Volcano”
 - Columbia University Girls Science Day: “Volcano Demonstration: Trash Cans and Corn Syrup”(2012)
 - Columbia Alumni Association Picnic: “Volcanoes and Magmas” (2012)
 - Columbia University Girls Science Day: “Volcano Demonstration: Trash Cans and Leaf Blowers” (2011)
 - World Science Day Festival: “Volcanic Eruption Styles” (2011)
 - Columbia University Girls Science Day: “Why Volcanoes Erupt the Way They Do: Insights from Corn Syrup and Cake Sprinkles” (2009)
 - Lamont-Doherty Open House (2009): “Disaster Planning Scenario: Pyroclastic Flows and Lahars”
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SERVICES AND COMMUNITY WORKSHOPS

- NAGT On the Cutting Edge Workshop, “Preparing for an Academic Career in the Geosciences,” University of Colorado, July 7-10, 2013
 - Committee Chair, Chevron Student Initiative Fund, Columbia University, Fall 2011 to Fall 2013
 - UCLA Ion Microprobe Student Workshop, Feb. 22-25, 2011
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PROFESSIONAL AFFILIATIONS

American Geophysical Union, Mineralogical Society of America, International Association of Volcanology and Chemistry of the Earth’s Interior, Geologic Society of America, National Association of Geoscience Teachers

PUBLICATIONS

PUBLISHED OR IN PEER-REVIEW PROCESS

Lloyd AS, Plank T, Ruprecht P, Hauri E, Rose W, Gonnermann HE (2013) NanoSIMS results from olivine hosted melt embayments: Magma ascent rate during explosive basaltic eruptions, *Journal of Volcanology and Geothermal Research*, *in press*.

Lloyd AS, Plank T, Ruprecht P, Hauri E, Rose W (2013) Volatile loss from melt inclusions in pyroclasts of differing sizes. *Contributions to Mineralogy and Petrology* 165:129–153. (16)

Edwards BR, Skilling IP, Cameron B, Haynes C, **Lloyd AS**, Hungerford JHD (2009) Evolution of an englacial volcanic ridge: Pillow Ridge tindar, Mount Edziza volcanic complex, NCVP, British Columbia, Canada, *Journal of Volcanology and Geothermal Research*, 185:251-275. (16)

(*BOLD ITALICS = CITATIONS BASED ON GOOGLE SCHOLAR SEARCH*)

THESES

Lloyd AS (2014) Timescales of magma ascent during explosive eruptions: Insights from the re-equilibration of magmatic volatiles (unpubl.), Columbia University Department of Earth and Environmental Science, New York, NY, Ph. D. Thesis.

Lloyd AS (2010) The Effect of Cooling Rates on Volatile Concentrations in Olivine Hosted Melt Inclusions: Insights from pyroclasts of various sizes from the 1974 Volcán de Fuego eruption, M.A. Thesis (unpubl.), Columbia University Department of Earth and Environmental Science, New York, NY.

Lloyd AS (2007) Plagioclase growth rates in pillow basalts: A study in thermal modeling and crystal size distribution, B.Sc. Honors Thesis (unpubl.), Dickinson College Geology Department, Carlisle, PA.

ABSTRACTS

- Lloyd AS**, Plank T, Ruprecht P, Hauri EH, Rose WI (2013) Timescales of magma ascent recorded by H₂O zonation in clinopyroxene. AGU Fall Meet. Suppl., Abstract V21B-2718.
- Plank T, **Lloyd AS**, Ruprecht P, Hauri E, Zhang Y (2013) Short Timescales of Magma Ascent Recorded in Melt Inclusion Diffusion Profiles. Goldschmidt Conference 2013, Florence.
- Plank T, **Lloyd AS**, Ruprecht P, Ferguson D, Hauri E, Zhang Y (2013) Short Timescales of Magma Ascent Recorded in Melt Inclusion Diffusion Profiles. 22nd meeting of the European Current Research on Fluid Inclusions, ECROFI, Antalya, Turkey.
- Lloyd AS**, Plank T, Ruprecht P, Hauri EH, Gonnermann HM, Rose WI (2012) NanoSIMS results from olivine-hosted melt embayments: Modeling ascent rate in explosive basaltic eruptions. AGU Fall Meet. Suppl., Abstract V12B-02.
- Plank T, **Lloyd AS**, Ruprecht P, Hauri E, Rose W (2012) Water loss from melt inclusions in pyroclasts of differing sizes. Goldschmidt Conference 2012, Montreal.
- Lloyd AS**, Plank T, Ruprecht P, Hauri E, Rose W (2010) Volatile Loss from Melt Inclusions in Clasts of Differing Sizes. AGU Fall Meet. Suppl., Abstract V24C-04. (6)
- Ruprecht P, Plank T, **Lloyd AS** (2010) Melt inclusion re-equilibration with complex shapes. AGU Fall Meet. Suppl., Abstract V53C-2265. (1)
- Edwards B, **Lloyd AS**, Russell JK, Mathews A, Renfrew I, Skilling I (2007) Convolute columns and pillow piles: constraints on lava cooling from field, CSD, and conduction models, Volcano-Ice Interactions on Earth and Mars II. Vancouver, British Columbia, 19-22 June.
- Lloyd AS**, Edwards BR, Endress C, Skilling I, LeMoreaux K (2006) Preliminary Interpretation of Processes and Products at two Basaltic Glaciovolcanic Ridges: Tsekone and Pillow Ridges, Mount Edziza Volcanic Complex (MEVC), NCVP, British Columbia, Canada. AGU Fall Meet. Suppl. Abstract V53C-1754.
- Skilling I, Edwards B, Hungerford J, Lamoreaux K, Endress C, **Lloyd AS** (2006) Using Glaciovolcanic Processes and Products at the Mount Edziza Volcanic Complex (MEVC), British Columbia, Canada to Constrain Paleo-Ice Conditions: Initial Results. AGU Fall Meet. Suppl. Abstract V53C-1755.
- Endress C, Edwards B, Skilling I, **Lloyd AS**, Lamoreaux K, Hungerford J (2006) Preliminary Interpretation of Glacial and Glaciofluvial Deposits Associated with 1 Ma Glaciovolcanism of the Ice Peak Formation, Edziza volcanic complex, British Columbia, Canada. AGU Fall Meet. Suppl. Abstract V53C-1753.
- Hungerford J, Skilling I, **Lloyd AS**, Edwards B (2006) Preliminary Interpretation on the Role of Sub-Ice Topography on the Emplacement of Basaltic Pillow Lavas at Tennana Cone, Mount Edziza Volcanic Complex, British Columbia, Canada. AGU Fall Meet. Suppl. Abstract V53C-1756.
- Lamoreaux K, Skilling I, Endress C, Edwards B, **Lloyd AS**, Hungerford J (2006) Preliminary Studies of the Emplacement of Trachytic Lava Flows and Domes in an Ice-Contact Environment: Mount Edziza, British Columbia, Canada. AGU Fall Meet. Suppl. Abstract V53C-1757.
- Jackson MS, **Lloyd AS**, Noiger M, Reiss K, Cresci C, Goldstein R, Sak PB (2006) Recognition of Shear Zones within the Westernmost Frontenac Terrane of the Central Metasedimentary Belt, Grenville Province, Ontario. GSA Abstracts with Programs Vol. 38, No. 2, p. 77.
- Edwards B, Alexander A, Adia K, Bailin E, Draskovich C, Endress C, Fox K, Freeman W, Haywood A, **Lloyd AS**, Merel M, Pattley D, Powroznik K, Ruben E, Russell T, Tate C, Wetherell K (2005) Preliminary stratigraphy of volcanoclastic and pyroclastic deposits on the northwestern flanks of the Centre Hills volcano, Montserrat. Soufriere Hills Volcano - Ten Years On, 24-30 July.