S. Adam Soule

Associate Scientist, Geology and Geophysics Dept.
Woods Hole Oceanographic Institution
Clark S. 272C, MS #24, Woods Hole, MA 02543
508.289.3213 • ssoule@whoi.edu • www.whoi.edu/people/ssoule

Education

1998-2003	University of Oregon (Eugene, OR) Ph.D., Dept. of Geological Sciences, Advisor: Kathy Cashman. Thesis: *Basaltic lava flow surface morphology: genesis, evolution and impact on flow dynamics.*
1993-1997	Carleton College (Northfield, MN) B.A., Geology Department, Honors in Geology.

Professional Experience

2009-present	Associate Scientist, Woods Hole Oceanographic Institution.
2005-2009	Assistant Scientist, Woods Hole Oceanographic Institution.
2003-05	Post-Doctoral scholar, Woods Hole Oceanographic Institution.
2001-2003	Graduate Research Assistant, University of Oregon.
2000	Volunteer at the Hawai'i Volcanoes Observatory, Geophysics Group.
1998-2000	Graduate Teaching Assistant, University of Oregon.

Research Interests

My research focuses on the physical processes of magmatism and volcanism with an emphasis on the dynamics of magma transport and eruption and volcanic deposition in submarine volcanic systems. I use a variety of research methods to investigate submarine volcanic processes including: geospatial analysis of field and remote sensing observations from deep-submergence vehicles, geophysical measurements, micro-scale textural analysis of rocks, and geochemistry. Data derived from those sources are analyzed quantitatively and used to constrain numerical models of volcanic and magmatic processes across a range of temporal and spatial scales. My submarine research is built upon a foundation of observational, experimental, and geochemical studies in terrestrial volcanic systems from my early research. I continue to work in subaerial volcanology with an emphasis on evaluating the dynamics of eruptions to improve predictive models of lava flow emplacement, which pose significant hazards to humans and infrastructure.

Honors and awards

2011	Chercheur Invité (Invited research fellow) – University Brest, France
2010	Ridge2000 Distinguished Lecturer
2003	Postdoctoral Scholar Fellowship, WHOI
2001	Staples Fellowship, U. Oregon Dept. of Geosciences
1999	Staples Fellowship, U. Oregon Dept. of Geosciences
1997	Honors in Geology, Carleton College
1996	Keck Geology Consortium Fellowship for Undergraduate Research

Professional affiliations

American Geophysical Union (AGU)
Geological Society of America (GSA)
Int. Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)
Sigma Xi

Teaching Activities

2009 →	WHOI/MIT JP Marine Geology and Geophysics II [MIT 12.711] *This course, offered annually and co-taught with N. Shimizu, provides an overview of mid-ocean ridge geology, geochemistry, and geophysics. The course uses summary papers to introduce topics followed by lectures and in-class activities that reinforce analytical skills related to marine geology and geophysical methods and concepts.*
2011	British Petroleum short-course in Oceanography (WHOI). *2-week short course on oceanographic science and methodology for workers assessing enviromental impact of BP ocean resource exploration and development (2-day teaching on seafloor mapping and data analysis).*
2010	Topics in Oceanography teacher training workshop (WHOI). *One-day workshop for regional middle- and high-school teachers learning about mid-ocean ridges for curriculum development.*
2007	Led Graduate Seminar (U. Oregon) in Advanced Field Methods in Central Oregon Cascades.
2004	Field Trip Leader (WHOI), Geodynamics Seminar Series, Hawaii.
2003	Lectures in Geologic Hazards (U. Oregon GEOL 353) and Introduction to Geology (U. Oregon GEOL 103)
2002	Teaching Assistant, University of Oregon Field Camp, Dylan, MT and Bend, OR.
2001	Teaching Assistant, Geology of the National Parks (U. Oregon GEOL 213).
2001	Field Trip co-leader, Staples Field Trip to Hawaii (U. Oregon).
2000	Teaching Assistant, Metamorphic Petrology (U. Oregon GEOL 515) and Igneous Petrology (U. Oregon 514).
1999	Teaching Assistant, Geology of the National Parks (U. Oregon GEOL 213).
1997	Teaching Assistant, Petrology (Carleton College GEO 255).

Student Supervision

PostDocs

2010 →	Eric Mittelstaedt; *Geochemical, geophysical, and volcanic expressions of Plume-ridge interaction in the North Galápagos Volcanic Province.*

Graduate Students

2009 →	Claire Pontbriand (w/ R. Sohn) Ph.D. candidate, MIT/WHOI JP; *Volcanic accretion at the ultraslow spreading Gakkel Ridge, Arctic Basin.*
2009 →	Min Xu (committee member) Ph.D. candidate, MIT/WHOI JP; *3-D seismic studies of the N. East Pacific Rise.*
2009-2011	Susan Schnur (w/ G. Fruh-Greene & J. Escartin) Masters, ETH Dept. of Geography, currently Ph.D. candidate at Oregon State University.

Automated fault extraction at mid-ocean ridges from multi-scalar bathymetry data.

2008-2010 D. Samantha Nakata, Masters, WHOI/MIT JP; *Syn-emplacement degassing of CO_2 during the 2005-06 East Pacific Rise eruption.*

2008-2010 Alison Fundis (w/ M. Perfit), Masters, University of Florida; *Lava flow surface morphology and emplacement of the 2005-06 EPR eruption.*

2006-2011 Chris Waters (w/ K. Sims), Ph.D., WHOI/MIT JP; *High-resolution U-series dating of lavas and volcanic construction at the EPR.*

Undergraduate Students

2011 Laura Stevens, Wellesley College.

2009 Garret Mitchell , U. Maryland, currently Ph.D. student at U. New Hampshire.

2008 Thibaut Barreyre, École Normale Supériore, currently Ph.D. candidate at U. Paris, IPGP.

2007 Dorene Nakata, Carleton College, completed Masters at WHOI/MIT.

2007 Sarah Hale, Williams College, completed Masters at LDEO at Columbia U.

2006 Bridget Dieffenbach, U. Idaho.

2005 Jennifer Glass, U. Washington, completed Ph.D. at Arizona State U.

Cruises/Field Studies

2011 Cruise TAN11-04 to the Kermadec Arc (R/V Tangaroa): AUV Sentry surveys of several hydrothermally active volcanoes including first deployment of Sentry-mounted sidescan sonar system. Towed camera surveys of Kermadec Arc volcanoes.

2010 Cruise MV1007 to the North Galápagos Volcanic Province (R/V Melville): Co-PI and shore-based participant in cruise to conduct sidescan sonar, multibeam bathymetry, geophysical, and towed camera surveys and dredging to investigate expressions of ridge-hotspot interaction.

2010 Ground-based lidar study of Lone Star Geyser, Yellowstone National Park: Repeat surveys to examine ground deformation related to geyser pressurization during eruption cycles in concert with broadband seismometer and tilt-meter network deployment.

2009 Cruise AT15-54 to the Guaymas Basin, Gulf of California (R/V Atlantis): Chief scientist on a cruise to map basin seafloor using sidescan sonar and near-bottom photography to look for evidence of widespread shallow sill intrusions into carbon-rich sediments.

2009 Airborne lidar study of recent lava flows on Kiluaea and Mauna Loa volcanoes: Surveys and field work to understand controls on emplacement of basaltic lava flows including processes of channelization, interaction with topography, and surface solidification.

2009 Bluff erosion on Boston Harbor Islands. Repeat surveys of coastal bluffs on glacial islands in Boston Harbor by ground-based LiDAR to quantify rates of retreat for civil planning and resource preservation.

2007-2008 Rates of Cryoturbation in the Antarctica Dry Valleys. Surveying patterned ground with LiDAR and mapping and sampling of periglacial features in volcanic and glacial landscapes.

2007 Ground-based LiDAR study of Holocene volcanic deposits, Central Oregon.

2007 Cruise AT15-17 to EPR (R/V Atlantis): Deep-towed sidescan and bathymetry survey and ROV operations over the site of the 2005-06 eruption at 9°50'N and the overlapping spreading center at 9°03'N with ROV Jason2 and TowCam.

2006 Cruise GRAVILUCK to the Lucky Strike segment of the MAR (N/O Atalante): Near-bottom geological and geophysical surveys of recent volcanic and tectonic processes in a slow spreading MOR using HOV Nautile and TowCam.

2006 Cruise AT15-7 to the East Pacific Rise (R/V Atlantis): Rapid response to the 2006 eruption, sampling and mapping the newly emplaced lava flow with HOV Alvin and TowCam.

2006 Field study of Deccan Flood basalts, Maharashtra, India.

2006 Cruise OR-217 to offshore Taiwan (R/V OR1): Surveys of methane hydrates with deep-towed camera system and dredging.

2005 Cruise AT11-27 to the Eastern Galapagos Spreading Center (R/V Atlantis): Sampling and observation of recent volcanics and associated hydrothermal vent communities with HOV Alvin and TowCam.

2004 Cruise AT11-7 to the East Pacific Rise, 9°N (R/V Atlantis): Sampling and observation of channelized lava flows and crustal accretion in young MOR volcanics with HOV Alvin and TowCam.

1999-2003 Field studies of active and historic lava flows on Kilauea Volcano, Hawaii: Mapping flow surface morphology, sampling, and active flow monitoring with geophysical methods in coordination with HVO.

Funding History

WHOI Deep Ocean Exploration Institute: High-resolution acoustic imaging of submarine volcanoes in the Kermadec Arc: new capabilities of the AUV Sentry for seafloor characterization (2011-2012; $61,673).

NSF OCE-0926637: Collaborative Research: Plume-Ridge Interaction in the Northern Galapagos: Understanding Mantle-lithosphere Dynamics through Geochemistry, Geophysical Mapping and Gravity Modeling, with D. Fornari (2009-2011; $384,191).

NSF OCE-0751901: Off-axis Sills of Guaymas Basin: Implications for Thermogenic-carbon Flux of a Sedimented Rift Basin, with D. Lizarralde & J. Seewald (2008-2011; $287,729).

NSF EAR-0739153: Collaborative Research: Closing the Loop on Lava Flow Models: Linking Thermal and Mechanical Controls on Flow Emplacement Dynamics using Novel Field and Experimental Techniques (2008-2011; $116,928).

NSF OCE–0732366: Eruption Processes Associated with the 2005-06 Volcanic Episode at the East Pacific Rise ISS (2007-2010; $146,408).

NSF OCE-0639601: SGER: Assessing the Extent and Volume of the 2006 Eruption of the East Pacific Rise (2006-2007; $23,002).

WHOI Deep Ocean Exploration Institute: Cooperative Investigations of Deep-Sea Brine Areas in the Red Sea, with T. Shank & M. Tivey (2008-2010; $20,911).

WHOI Internal: Off Axis Volcanic Fields at the Ultraslow Spreading SW Indian Ridge, with H. Dick (2008-2010; $43,852).

WHOI Coastal Ocean Institute: Monitoring Bluff Erosion in Boston Harbor with Terrestrial Laser Scanning (2009-2010; $31,413).

WHOI Arctic Research Initiative: Cryoturbation Rates and Depths in Arctic Permafrost from Cosmogenic Nuclides (2008-2011; $136,339).

NSF OCE-0851015: ETBC: Collaborative Research: Controls on the Flux, Age, and Composition of Terrestrial Organic Carbon Exported by Rivers to the Ocean, with B. P-Ehrenbrink, T. Eglinton, V. Galy (2009-2012; $1,457,448).

NSF ANT-0839045: Periglacial Landscape Evolution in Antarctica: New Constraints on Patterned Ground Formation, with M. Kurz & W. Jenkins (2009-2010; $191,466).

NSF ANT-0636629: Periglacial Landscape Evolution in Antarctic Lava Flows and Glacial Tills, with M. Kurz & W. Jenkins (2007-2008; $151,158).

NSF OCE-0623838: Testing the Resolution of U-Series Age Constraints: An Application to Volcanic Construction at 9 degrees 50'N EPR, with K. Sims (2006-2008; $188,181).

NSF OCE-0623744: Magmatic and Tectonic Controls on Crustal Construction at Lucky Strike a Slow-Spreading Segment of the Mid-Atlantic Ridge (2006-2008; $153,405).

NSF OCE-0525863: ABR: Detailed Mapping and Modeling of Submarine Lava Flows and Emplacement Processes: The East Pacific Rise 9 degrees 25'N to 9 degrees 55'N, with D. Fornari (2005-2009; $378,017).

NSF OCE-0451983: Collaborative Research: The Generation of Georeferenced Video Mosaics in Support of Submersible and ROV Operations, with S. Beaulieu & T. Shank (2005-2008; $210,394).

Professional Service

Reviewer of Journal Contributions for: Geology; Earth and Planetary Science Letters; Journal of Volcanology and Geothermal Research; Bulletin of Volcanology; Geochimica Cosmochimica Acta; Geophysical Research Letters; Geosphere; Geoscience Canada; American Mineralogist; Geochemistry, Geophysics, Geosystems; Journal of Geophysical Research; AGU Geophysics Monographs; GSA Monographs.

Sessions convened at AGU: Fall 2011, Rates of pre- and syn-eruptive processes in submarine volcanic systems; Fall 2003, Kinetic and Rheologic Controls on Transport and Eruption of Magmas.

Reviewer of Proposals for: National Science Foundation: OCE, EAR, OPP; Interridge Student Fellowships, served on Geoprisms NSF Panel (2011).

WHOI Committees: WHOI Deep Submergence Advisory Committee (2009-present)
WHOI Scientific Advisory Committee on Computing (2010-present)
WHOI Scientific Staff Executive Committee (2010-present)

Contributed to popular press for: Discovery Channel, History Channel, Boston Globe, Discover Magazine

Invited Talks (» denotes Non-technical/Outreach)

Dec. 2011	'Volcanic construction of submarine Kermadec arc volcanoes from near-bottom sidescan sonar data collected by the Sentry AUV' *Fall AGU 2011.*
Nov. 2011	'Degassing-based geospeedometry of submarine lava flows' *U. Texas at Austin, UTIG.*
April 2011	'Volcanism and upper oceanic crust construction.' *Appalachian State University, Dept. of Geology.*
Dec. 2010	'Length-scales of volcanic deposition: a comparison of the fast-spreading EPR and slow spreading MAR', *Fall AGU 2010.*
Oct. 2010	'Dynamics of seafloor eruptions.' *University of Washington, School of Oceanography.*
»*June 2010*	'Exploring seafloor volcanic systems.' *Topics in Oceanography Teacher Workshop, Woods Hole Sea Grant/WHOI.*
May 2010	'Explosive eruptions in the deep sea.' *Lawrence University* (R2K distinguished lecture series).
May 2010	'MOR Volcanism.' *Colgate University.* (R2K distinguished lecture series).
April 2010	'Explosive eruptions in the deep sea.' *University of Kentucky* (R2K distinguished lecture series).
March 2010	'Explosive eruptions in the deep sea.' *Princeton University.*
Nov. 2009	'Seafloor eruptions across the global MOR system' *U. Rhode Island School of Oceanography.*
»*Sept. 2008*	'Volcanoes on the ocean floor: seafloor eruptions across the global mid-ocean ridge system', *WHOI Ocean Science Journalism Fellowship Program.*
June 2008	'Application of ground-based laser mapping to patterned ground in periglacial environments: Antarcitc Dry Valleys', Keynote Lecture at *Studying Earth Surface Processes with High-Resolution Topographic Data Workshop*, Boulder, CO.
May 2008	'The 2005-06 eruption of the EPR at 9°-10°N: insight into fast-spreading ridge volcanic processes' *Insitut Physique du Globe de Paris, U. Paris.*
March 2008	'Volcanism and Hydrothermalism at the Lucky Strike Segment of the MAR (37°N)', *Ridge2000 Community Workshop*, Portland, OR.
Oct. 2007	'Volcanic processes at the East Pacific Rise, 9°-10°N: insight from the 2005-06 eruptions', *Syracuse University.*
Oct. 2007	'Volcanic processes at the East Pacific Rise, 9°-10°N: insight from the 2005-06 eruptions', *Johns Hopkins University.*
July 2007	'Volcanism in the deep ocean: insights into mid-ocean ridge eruption processes from field studies at the East Pacific Rise' *Hawai`i Volcanoes Observatory.*

»Oct. 2006 'Capturing volcanic eruptions in the deep-ocean', *WHOI Deep Ocean Exploration Institute Steering Comm. meeting.*

March 2006 March, Ridge2000 EPR Working Group, Lamont Doherty Earth Institute

»March 2006 'Visualizing the ocean floor: tools for exploiting large, multi-scalar datasets' *WHOI Development News at Noon Seminar Series.*

Oct. 2005 'Ridge exploration using Alvin, ABE, CTD, and camera', *WHOI / Los Alamos Nat. Lab. Image Understanding Symposium.*

»April 2005 'Long waves: the 2005 Indian Ocean tsunami', *Carleton College Alumni Club of Boston.*

March 2005 'Channelized lava flows at the East Pacific Rise: building the oceanic crust', *San Francisco State University.*

March 2005 'Construction of the uppermost oceanic crust: volcanic processes on the fast-spreading East Pacific Rise, 9°-10°N', *University of South Carolina.*

»March 2005 'The Big Island of Hawaii: from mantle to mythology', *Concord High School, Concord, MA.*