

JULIE A. BOWLES

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EDUCATION

University of California, San Diego

Ph.D, Earth Science, 2005

Advisors: Jeff Gee and Lisa Tauxe

Thesis: *“Paleointensity of Earth’s magnetic field, with applications to the study of mid-ocean ridge accretionary processes”*

University of Washington, Seattle, WA

B.S., Oceanography (Marine Geology), 1999

University of Puget Sound, Tacoma, WA

B.A., International Business, 1993

POSITIONS HELD

Research Associate/Staff Scientist, Institute for Rock Magnetism, University of Minnesota, Minneapolis, Jan. 2008 – present

Post-Graduate Researcher, University of Hawaii, Aug. 2006 – Dec. 2007

Post-Graduate Researcher/Lecturer, Scripps Institution of Oceanography, Sept. 2005 – 2007

Graduate Student Researcher, Scripps Institution of Oceanography, Sept. 1999 – Sept. 2005

Paleomagnetist, Ocean Drilling Program Leg 208, March – May 2003

Undergraduate Researcher, Magnetics Lab, University of Washington, June 1997 – Aug 1999

TEACHING EXPERIENCE AND DEVELOPMENT

Instructor, Summer School for Rock Magnetism, University of Minnesota, 2011

Guest Lecturer, University of Hawai’i, Summer 2007

- *Geology of the Hawaiian Islands*: course for non-majors

Lecturer, University of California, San Diego, Winter 2005, Spring 2006

- *The Solid and Fluid Earth*: core course for Environmental Systems majors
- *Graduate Seminar on Ophiolites*

Teaching Assistant, University of California, San Diego, Fall 2001 and 2002, Spring 2004

- *Introduction to Earth Science*: lab-based course for Earth Science majors
- *Water*: lower-division survey course for non-majors

Preparing Professional Faculty Participant, UCSD Center for Teaching Development, 2005

- Workshop series includes Course Development, Cognition & Learning, Classroom Management

RESEARCH INTERESTS

- Short-period variations in the geomagnetic field
- Paleomagnetism as a tool to study mid-ocean ridge processes
- Paleomagnetic constraints on dynamo formation, evolution, and processes
- Planetary magnetism
- Tectonics and structure
- Marine magnetism
- (Paleo-)Environmental magnetism
- Application of experimental petrology and rock magnetism to the formation of magnetic minerals in igneous materials

FUNDED WORK

Static and shock pressure treatment of synthetic Mars basalts: Implications for understanding the evolution of crustal magnetic anomalies

Agency: NASA

Duration: 2011 - 2014

Role: co-I (Lead Investigator Stefanie Brachfeld, Montclair State University)

Collaborative Research: Fine-scale crustal accretion processes and rates of magma supply and replenishment at the southern Juan de Fuca Ridge neovolcanic zone

Agency: NSF-OCE

Duration: 2011 - 2013

Role: PI (with PI Brian Dreyer, UC Santa Cruz)

Facility Support: Institute for Rock Magnetism

Agency: NSF-EAR

Duration: 2011 - 2014

Role: co-PI (PI Bruce Moskowitz)

Development of a Closed Cycle Cryostat for Full-Vector, Low-Temperature Magnetic Measurements of Geologic Materials

Agency: NSF-EAR

Duration: 2009 – 2011

Role: co-PI (PI Josh Feinberg)

Collaborative Research: An Evaluation of Ash Flow Tuffs as Geomagnetic Paleointensity Recorders

Agency: NSF-EAR

Duration: 2010 - 2012

Role: PI (with PI Jeff Gee, UC San Diego)

Collaborative Research: Volcanic Eruptions on the Galapagos Spreading Center: Effect of Variable Magma Supply on Eruption and Magma Chamber Processes on Mid-Ocean Ridges

Agency: NSF-OCE

Duration: 2009 - 2012

Role: PI with PIs John Sinton and Ken Rubin (Univ. Hawaii) and Scott White (Univ. South Carolina)

Linking Rock Magnetic Properties to the Performance of Paleointensity Techniques

Agency: NSF-EAR

Duration: 2009 - 2011

Role: co-PI (PI Josh Feinberg)

Collaborative Research: Origin of magnetite and magnetic remanence in submarine basaltic glass and implications for glass paleointensities

Agency: NSF-EAR

Duration: 2006 - 2009

Role: proposal co-written with PIs Jeff Gee (UC San Diego) and Reid Cooper (Brown University)

Magnetostratigraphy for ODP Leg 208 Sites, and Paleointensity study of the mid- to late-Paleocene

Agency: Joint Oceanographic Institutions/US Science Support Program) Duration: 2003 – 2004

Role: sole proposal writer (PI Lisa Tauxe)

FIELD EXPERIENCE

Mt. Katmai, AK; Mt. St. Helens, WA; and Bishop Tuff, CA, paleomagnetic sampling, 2010-2011
Galapagos Spreading Center (R/V Atlantis with Alvin submersible and Sentry ROV), April-May 2010
Erebus volcanic province, Antarctica, paleomagnetic sampling, November – December 2006
Kilauea Volcano, Hawai'i, volcanology field course – September 2004
Galapagos Triple Junction (R/V Revelle), geophysical cruise, January 2004
Walvis Ridge (ODP Leg 208, R/V JOIDES Resolution), March – May 2003
South Pacific (RV/IB Palmer), geophysical cruises, August 1999, December 2000
Puget Sound/Whidbey Island Fault, gravity and magnetics survey, March 1998

SERVICE

Co-organizer and Instructor, Summer School in Rock Magnetism, Minneapolis, 2011
Geomag./Paleomag. Section Executive Committee, American Geophysical Union, 2010-2012
Mentor, Manoomin Project, Investigating the past, present, and future of wild rice lakes on the Fond du Lac Band of Lake Superior Ojibwe Reservation, 2011
State Science Fair Judge, Honolulu, 2007; Minneapolis, 2011
Professional development workshop for educators at Bakken Museum of Electricity and Magnetism, Minneapolis, 2009
Volunteer Park Interpreter, Hanauma Bay Nature Preserve, Honolulu, 2007
Science Judge/Field Trip Leader, National Ocean Science Bowl, San Diego, 2001–2004, 2006
Guest Lecturer, OASIS (Education for Older Adults), San Diego, 2004
Workshop Leader, Expanding Your Horizons Conference, San Diego, 2002, 2003

- Designed and led hands-on workshops for girls in grades 5-10; local geology/coastal erosion

Reviewer for

• National Science Foundation (EAR, OCE)	• Elements
• Swiss National Science Foundation	• G-Cubed
• Journal of Geophysical Research	• Physics of the Earth and Planetary Interiors
• Earth and Planetary Science Letters	• Solid Earth
• Journal of Metamorphic Geology	
• Studia Geophysica et Geodaetica	

AWARDS AND HONORS

Selected participant in Marine Geoscience Leadership Symposium (2009)
Director's Scholar for postgraduate research and teaching, Scripps Inst. of Oceanography (2005-2006)
Recipient of National Defense Science and Engineering Graduate Fellowship (1999-2003)
Awarded National Science Foundation Graduate Fellowship (1999)

PEER-REVIEWED PUBLICATIONS

- Bowles, J.A., L. Tatsumi-Petrochilos, J.E. Hammer, S.A. Brachfeld, Multi-component cubic oxide exsolution in synthetic basalts: temperature dependence and implications for magnetic properties, *J. Geophys. Res.*, *in press*.
- Bowles, J.A., J.S. Gee, K. Burgess, and R.F. Cooper, Timing of magnetite formation in submarine basaltic glass: a comparison of natural and synthetic samples with implications for geomagnetic paleointensity studies, *Geochem. Geophys. Geosys.*, doi:10.1029/2010GC003404, 2011.
- Burgess, K., R.F. Cooper, J.A. Bowles, J.S. Gee, and D.J. Cherniak, Effects of open- and closed-system oxidation on texture and magnetic response of remelted basaltic glass, *Geochem. Geophys. Geosys.*, 11, Q10007, doi:10.1029/2010GC003248, 2010.
- Jackson, M., J.A. Bowles, I. Lascu, and P. Solheid, Deconvolution of u-channel magnetometer data: Experimental study of accuracy, resolution and stability of different inversion methods, *Geochem. Geophys. Geosys.*, 11, Q07Y10, doi:10.1029/2009GC002991, 2010.
- Gee, J.S., Y. Yu, and J.A. Bowles, Paleointensity estimates from ignimbrites: an evaluation of the Bishop Tuff, *Geochem. Geophys. Geosys.*, 11, Q03010, doi:10.1029/2009GC002834, 2010.
- Bowles, J.A., J.E. Hammer, and S.A. Brachfeld, Magnetic and petrologic characterization of synthetic Martian basalts and implications for the surface magnetization of Mars, *J. Geophys. Res. – Planets*, 114, E10003, doi:10.1029/2009JE003378, 2009.
- Westerhold, T., U. Röhl, I. Raffi, E. Fornaciari, S. Monechi, V. Reale, J. Bowles, H.F. Evans, Astronomical calibration of the Paleocene time scale, *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, 257, 377-403, 2008.
- Bowles, J., Coring-related deformation of Leg 208 sediments from Walvis Ridge: Implications for paleomagnetic data, *Phys. Earth Planet. Int.*, 161, 161-169, 2007.
- Westerhold, T., U. Röhl, J. Laskar, I. Raffi, J. Bowles, L. Lourens, J.C. Zachos, On the duration of magnetochrons C24r and C25n and the timing of early Eocene global warming events: Implications from the Ocean Drilling Program Leg 208 Walvis Ridge depth transect, *Paleoceanography*, 22, PA2201, doi:10.1029/2006PA001322, 2007.
- Bowles, J., Data Report: Revised magnetostratigraphy and magnetic mineralogy of sediments from Walvis Ridge, Leg 208, *In D. Kroon, J.C. Zachos, J.C., and C. Richter (Eds.), Proc. ODP, Sci. Results*, 208: College Station, TX (Ocean Drilling Program), 1–24, doi:10.2973/odp.proc.sr.208.206.2006, 2006.
- Bowles, J., J.S. Gee, D.V. Kent, M. Perfit, A. Soule, D. Fornari, Paleointensity results from 9° - 10°N on the East Pacific Rise: implications for timing and extent of eruptive activity, *Geochem. Geophys. Geosys.*, 7, Q06006, doi:10.1029/2005GC001141, 2006.
- Bowles, J., J. Gee, D. Kent, E. Bergmanis, J. Sinton, Cooling rate effects on paleointensity estimates in submarine basaltic glass and implications for dating young flows, *Geochem. Geophys. Geosys.*, 6, Q07002, doi: 10.1029/2004GC000900, 2005.
- Lourens, L., A. Sluijs, D. Kroon, J. Zachos, E. Thomas, U. Röhl, J. Bowles, I. Raffi, An early Eocene transient warming (~53 Ma): Implications for astronomically paced early Eocene hyperthermal events, *Nature*, 435, 1083-1087, 2005.
- Bowles, J., L. Tauxe, J. Gee, D. McMillan, S. Cande, The source of tiny wiggles in Chron C5: A comparison of sedimentary relative intensity and marine magnetic anomalies, *Geochem. Geophys. Geosys.*, 4, doi:10.1029/2002GC000489, 2003.
- Bowles, J., J. Gee, J. Hildebrand, L. Tauxe, Archaeomagnetic intensity results from California and Ecuador: evaluation of regional data, *Earth Planet Sci. Lett.*, 203, 967-981, 2002.
- Bowles, J., and H.P. Johnson, Behavior of oceanic crustal magnetization at high temperatures: Viscous magnetization and the marine magnetic anomaly source layer, *Geophys. Res. Lett.*, 26, 2279-2282, 1999.

OTHER NON-PEER-REVIEWED SCHOLARLY ARTICLES

(available at <http://www.irm.umn.edu/IRM/quarterly.html>)

Jackson, M., J. Bowles, and B. Moskowitz, Interpretation of Low-Temperature Data Part III: The Magnetite Verwey Transition (Part A), *IRM Quarterly*, 20:4, 2011.

Bowles, J., M. Jackson, and S.K. Banerjee, Interpretation of Low-Temperature Data Part II: The Hematite Morin Transition, *IRM Quarterly*, 20:1, 2010.

Bowles, J., M. Jackson, A. Chen, and P. Solheid, Interpretation of Low-Temperature Data Part I: Superparamagnetism and Paramagnetism, *IRM Quarterly*, 19:3, 2009.

Bowles, J., SQUID Attack! (overview of Superconducting QUantum Interference Devices), *IRM Quarterly*, 19:1, 2009.

SELECTED CONFERENCE ABSTRACTS

(36 total; 20 first author; * = undergraduate student author)

Bowles, J.A., *A. Ab Fatah, A. Colman, J.T. McClinton, J.M. Sinton, S.M. White, K.H. Rubin, Geomagnetic paleointensity constraints on eruption timing at the Galapagos Spreading Center, Fall AGU, V53D-2657, 2011.

Bowles, J.A., J.S. Gee, and M.J. Jackson, Paleointensity in ignimbrites and other volcanoclastic flows, INVITED, Fall AGU, GP13A-07, 2011.

Bowles, J.A., L. Tatsumi-Petrochilos, J.E. Hammer, and S.A. Brachfeld, Multi-component cubic oxide exsolution in synthetic basalts: temperature dependence and implications for magnetic properties, INVITED, MagIC Science & Database Workshop, Scripps Institution of Oceanography, San Diego, 2011.

Bowles, J.A., M. J. Jackson, J. S. Gee, *J. Bowar, J. L. Till, Y. Yu, J. Vavrek, and J. Steindorf, Magnetic mineralogy of ash flow tuffs: Teasing out effects of emplacement and post-emplacement conditions, *Eos. Trans. AGU*, Fall Meet Suppl., Abstract GP43A-1045, 2010

Sinton, J.M., S. M. White, A. Colman, K. H. Rubin, and J.A. Bowles, Volcanic Eruptions on the Western Galapagos Spreading Center: Connecting Magma Supply at Depth to Eruption Rate on the Surface, *Eos. Trans. AGU*, Fall Meet Suppl., Abstract V52A-06, 2010.

Bowles, J.A., J.S. Gee, K. Burgess, and R.F. Cooper, Magnetite Formation in Submarine Basaltic Glass: Insights From Synthetic Analogues, *Eos. Trans. AGU*, 90(52), Fall Meet Suppl., Abstract GP51B-0768, 2009.

Bowles, J.A., and M.C. Brown, Absolute Paleointensity Techniques: Developments in the Last 10 Years, *Eos. Trans. AGU*, 90(52), Fall Meet Suppl., Abstract GP11A-0730 INVITED, 2009.

Cuomo, D.M., L. Petrochilos, S.A. Brachfeld, J.A. Bowles, and J.E. Hammer, Rock Magnetic and Remanence Properties of Synthetic Martian Basaltic Intrusions: Implications for Mars crustal anomalies, *Eos. Trans. AGU*, 90(52), Fall Meet Suppl., GP41B-0823, 2009.

* Schoeller, L.M., J.A. Bowles, B. Dreyer, and D.A. Clague, Expanding Spatial Coverage of Geomagnetic Field Models Using Submarine Basaltic Glass, *Eos. Trans. AGU*, 90(52), Fall Meet Suppl., GP23A-0776, 2009.

Brown, M.C., J. Cropsey, J.A. Bowles, and J.M. Feinberg, Palaeointensity Results from 1951 and 1995 Lava Flows, Fogo, Cape Verde: A Comparison between Thellier and LTD-DHT Shaw Methods, *Eos. Trans. AGU*, 90(52), Fall Meet Suppl., GP41A-0807, 2009.

Bowles, J.A., J.S. Gee, K. Burgess, and R.F. Cooper, A controlled evaluation of magnetite formation in synthetic submarine basaltic glass: implications for paleointensity studies, *Eos. Trans. AGU*, 89(53), Fall Meet Suppl., Abstract GP51B-0768, 2008.

- Burgess, K., R.F. Cooper, D.J. Cherniak, J.A. Bowles, and J.S. Gee, Oxidation Dynamics and their Effects on Texture and Magnetic Response in Remelted and Quenched Submarine Basaltic Glass, *Eos. Trans. AGU*, 89(53), Fall Meet Suppl., Abstract GP31A-0796, 2008.
- Hu, Y., J.M. Feinberg, N. Church, G. Bromiley, J. Bowles, M. Jackson, B.M. Moskowitz, and R.J. Harrison, Suitability of chondrules for studying the magnetic field of the early solar system: an examination of synthetically produced dusty olivine, *Eos. Trans. AGU*, 89(53), Fall Meet Suppl., GP31A-0790, 2008.
- Bowles, J., J. Hammer, L. Tatsumi, S. Brachfeld, Spinel unmixing in Martian analog crustal rocks: implications for the magnetization of Mars, Lunar and Planetary Science Conference XXXIX, 2008.
- Bowles, J., J. Hammer, S. Brachfeld, Magnetic and petrographic characterization of synthetic Martian basalts, Seventh International Conference on Mars, Pasadena, CA, Abstract 3325, 4 pp., 2007.
- Bowles, J., J.S. Gee, D.V. Kent, M.R. Perfit, S.A. Soule, D.J. Fornari, Geomagnetic paleointensity results from 9° - 10°N on the East Pacific Rise and models of lava accretion at fast-spreading ridges, *Eos. Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract GP33B-04 INVITED, 2005.
- Bowles, J., J. Gee, D. Kent, E. Bergmanis, J. Sinton, Cooling rate effects on paleointensity estimates in submarine basaltic glass and implications for dating of young flows, *Eos, Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract GP11C-0845, 2004.
- Bergmanis, E.C., J.M. Sinton, K.H. Rubin, J.J. Mahoney, J. Bowles, J.S. Gee, M.C. Smith, Magma reservoir dynamics and diverse mantle melting at the southern East Pacific Rise, 17°22'S – 17°35'S, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract V53A-0611, 2004.
- Bowles, J., T. Werth, L. Tauxe, N. Bowers, J. Gee, S. Cande, The source of tiny wiggles in Chron 5: A comparison of sedimentary relative intensity and marine magnetic anomalies, *Quaderni di geofisica*, International Symposium on Fundamental Rock Magnetism and Environmental Applications, 26, 9, 2002.
- Bowles, J., S. Cande, Ridge-hotspot interaction, asymmetric spreading, and volcanic lineaments in the South Pacific, RIDGE/NordVulk Iceland Summer School on Plume-Ridge Interactions, 2000.
- Bowles, J., H.P. Johnson, J.B. Diebold, Systematic variations in crustal thickness in young Pacific crust from a sea surface gravity and MCS survey, *Eos, Trans., AGU*, 80(46), Fall Meet. Suppl., 1085, 1999.
- Bowles, J., M. Holmes, Potential field modeling of the South Whidbey Island Fault, northern Puget Sound: Deep structure of a transpressional fault, Pacific Estuarine Research Symposium/Northwest Algal Symposium, 1998.