

## Biographical Sketch

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NICHOLAS W. HAYMAN

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*Married to Marianne Schat (Acupuncturist) with two daughters (2 and 8) and one dog (11).*

### Education

Doctorate in Philosophy, Geological Sciences, University of Washington, 2003

Master of Science, Geological Sciences, SUNY Albany, 1997

Bachelor of Science, Geological Sciences, SUNY Albany, 1995, *Magna Cum Laude*

### Positions Held

Research Scientist, Institute for Geophysics, University of Texas - Austin, 2013 - *present*

Research Associate, Institute for Geophysics, University of Texas - Austin, 2007 - 2013

Lecturer, Department of Geological Sciences, University of Texas - Austin, 2009 - *present*

Postdoctoral Research Associate & Research Scientist, Duke University, 2003 - 2007

Graduate Research & Teaching Assistant, University of Washington, 1997 - 2003

Graduate Research & Teaching Assistant, SUNY Albany, 1995 - 1997

Chevron Production Technology Company Intern, La Habra CA laboratory 1998

National Science Foundation Undergraduate Research Fellow, Lamont Doherty Earth Observatory, 1994

### Professional Activities

1995-*present*: Geological field mapping and structural analysis with a focus on fault zones.

Key areas include the New York-Vermont Taconics, Death Valley region, Central Cascade Range of Washington State, the Western French Pyrenees, Western Iceland, Cyprus, Japan coastal regions.

2005-*present*: Mid-Ocean Ridge studies (see cruise list below)

2003-*present*: Experiments on granular and other rock-analog materials.

2010-*present*: Continental Rift and Margin studies.

2011-*present*: Microstructure of sedimentary mudrocks.

Marine geological & geophysical investigations:

- 2015: CaySEIS, Active- and Passive-source seismic imaging of the Caribbean spreading center, Grevemeyer chief scientist, 2015.
- 2010: Sloop Pelagic work in the Cordillera Darwin, Lavier & Dalziel co-chiefs.
- 2010: RRS James Cook expedition to the Cayman Trough, D. Connelly chief-scientist
- 2009: IODP Expedition 319, Riser Drilling of the Kumano Basin, Nankai Accretionary Margin, Japan, McNeil, Byrne, Araki, Saffer co-chiefs
- 2008: Shinkai 6500 Investigation of Tenryu Canyon, Nankai Accretionary Prism, Japan, Kawamura and Anma co-chiefs
- 2005: IODP Expedition 312, Superfast-spread East Pacific Rise crust, J. Alt co-chief
- 2005: NSF/NOAA/JASON Project: The Lost City, Mid-Atlantic Ridge, Shore-based participant, Ballard and Kelley PIs
- 2005: Alvin/Jason II submersible investigation of Pito Deep rift wall, NE-edge of Easter Microplate, Karson chief-scientist
- 2004: IODP Expedition 304, Atlantis Massif, Mid-Atlantic Ridge, Blackman co-chief, 2004

### Professional Affiliations

Geological Society of America; American Geophysical Union; American Association of Petroleum Geologists.

### Publications

- Svartman Dias, A.E., Lavier, L.L., **Hayman, N.W.**, 2015 (accepted w/ minor revision), The width and asymmetry of conjugate rifted margins: interplay between lithospheric strength and thermo-mechanical processes, *Journal of Geophysical Research*.
- Reber, J.E., Lavier, L.L., **Hayman, N.W.**, 2015 (in press), Experimental demonstration of a semi-brittle origin for crustal strain transients, *Nature Geoscience*, doi: 10.1038/NCEO2496.
- Reber, J.E., **Hayman, N.W.**, Lavier, L.L., 2014, Stick-slip and creep behavior in lubricated granular material: Insights into the brittle-ductile transition, *Geophysical Research Letters*, 41, doi: 10.1002/2014GL059832
- Ramirez, S. G., S. P. S. Gulick, and **N. W. Hayman**, 2015, Early sedimentation and deformation in the Kumano forearc basin linked with Nankai accretionary prism evolution, southwest Japan, *Geochem. Geophys. Geosyst.*, 16, 1616–1633, doi:10.1002/2014GC005643.
- Hayman, N.W.**, and Lavier, L.L., Geologic record of deep episodic tremor and creep, 2014, *Geology*, DOI: 1130/G34990.1
- Veloso, E.E., **Hayman, N.W.**, Anma, R., Tominaga, M., Gonzales, R.T., Yamazaki, T., Astudillo, N., 2013, Melt Flow Directions in the Sheeted Dike Complex at Superfast Spreading Mid-Ocean Ridges: Insights from IODP Hole 1256D, Eastern Pacific, *Geochem. Geophys. Geosyst.* doi: 10.1002/2013GC004957
- Hayman, N.W.**; Byrne, T.; McNeill, L.; Kanagawa, K.; Kanamatsu, T.; Browne, C.M.; Schleicher, A.M.; Huftile, G., 2012, Structural evolution of the inner wedge and sub-forearc basin, Nankai margin, Japan. *EPSL*, 353-354, 163-172, <http://dx.doi.org/10.1016/j.epsl.2012.07.040>.
- Hayman, N.W.**, Burmeister, K., Kawamura, K., Anma, R., and Yamada, Y., 2011, Oblique deformation in Tenryu Canyon of the Nankai accretionary prism, in *Springer volume Accretionary Prisms and Convergent Margin Tectonics in the Northwest Pacific Basin*, edited by Yujiro Ogawa.
- Hayman, N. W.**, N. R. Grindlay, M. R. Perfit, P. Mann, S. Leroy, and B. M. de Lépinay, 2011, Oceanic core complex development at the ultraslow spreading Mid-Cayman Spreading Center, *Geochem. Geophys. Geosyst.*, 12, Q0AG02, doi:10.1029/2010GC003240.
- Hayman, N.W.**, Ducloué, L., Foco, K.L., and Daniels, K.E.D., 2011, Granular controls on periodicity of stick-slip events: kinematics and force-chains in an experimental fault, *Pure and Applied Geophysics*, doi: 10.1007/s00024-011-0269-3
- Barker, A. K., Coogan, L.A., Gillis, K.M., **Hayman, N.W.**, Weis, D, 2010, Direct observation of a fossil high-temperature, fault-hosted, hydrothermal upflow zone in crust formed at the East Pacific Rise, *Geology*, 38, 379-382.
- Hayman, N. W.**, and J. A. Karson, 2009, Crustal faults exposed in the Pito Deep Rift: Conduits for hydrothermal fluids on the southeast Pacific Rise, *Geochem. Geophys. Geosyst.*, 10, Q02013.
- Cheney, E.S., and **Hayman, N.W.**, 2009, Cenozoic shortening of the central Cascade Range, Washington State, USA, *GSA Bulletin*, v.121, pp.1135-1153.
- Hayman, N.W.**, Anma, R. and Veloso, E. 2009, Data Report: Microstructure of chilled margins in the sheeted dike complex of Integrated Ocean Drilling Program (IODP) Hole 1256D. In Teagle, D., Alt, J., Umino, S., Miyashita, S., Banerjee, N., Wilson, D. and the Expedition 309/312 Scientists, *Proceedings of the IODP, 309/312*: College Station, TX, USA.
- Daniels, K.E., and **Hayman, N.W.**, 2008. Force Chains in seismogenic faults visualized with photoelastic granular shear experiments, *Journal of Geophysical Research*, v. 113, B11411.
- Hirose, T., **Hayman, N.W.**, 2008, Structure, permeability, and strength of a fault zone in the footwall of an oceanic core complex, the Central Dome of the Atlantis Massif, Mid-Atlantic Ridge, *Journal of Structural Geology*, 30, pp.1060-1071.

**Publications** (*continued*)

- Hayman, N.W.**, Karson, J.A., 2007, Faults and damage zones in fast-spread crust exposed on the north wall of the Hess Deep Rift: Conduits and seals in axial hydrothermal systems, *Geochem. Geophys. Geosyst.*, 8, Q10002.
- Hayman, N.W.**, 2006, Shallow-crustal fault rocks from the Black Mountains, CA. *Journal of Structural Geology*, 28, 1767-1784.
- Hayman, N.W.**, Housen, B.A., Cladouhos, T.T., Livi, K., 2004, Magnetic and clast fabrics as measurements of grain-scale processes within the Death Valley shallow crustal detachment faults: *Journal of Geophysical Research*, v. 109, B05409.
- Hayman, N.W.**, Knott, J., Cowan, D.S., Nemser, E., Sarna-Wojcicki, A.M., 2003, Quaternary low-angle slip on detachment faults in Death Valley, California: *Geology*, v.31, pp. 343-346.
- Hayman, N.W.**, and Kidd, W.S.F., 2002. Reactivation of prethrust, synconvergence normal faults within the Champlain-Taconic thrust system, west-central Vermont, U.S.A.: *Geological Society of America Bulletin*, v. 114, pp. 476-489.

*Shipboard party contribution to noteworthy publications*

- Boutt, D.F., and multiple authors, 2012, Scale dependence of in-situ permeability measurements in the Nankai accretionary prism: The role of fractures, *Geophysical Research Letters* 39, doi:10.1029/2012GL051216.
- Connelley, D.P., and multiple authors, 2012, Hydrothermal vent fields and chemosynthetic biota on the world's deepest seafloor spreading center, *Nature Communications*, 3, doi:10.1038/ncomms1636.
- Blackman, D.K., and multiple authors, 2011, Drilling constraints on lithospheric accretion at Atlantis Massif, Mid-Atlantic Ridge, 30N, *Journal of Geophysical Research*, 116, B07103, doi:10.1029/2010JB007931
- Lin, W., and multiple authors, 2010, Present-day principal horizontal stress orientations in the Kumano forearc basin of the southwest Japan subduction zone determined from IODP NanTroSEIZE drilling Site C0009 *Geophysical Research Letters*, 37, L13303.
- Ildefonse, and multiple authors (as "shipboard party"), 2007, Oceanic core complexes and crustal accretion at slow-spreading ridges. *Geology*, 35, 623-626.
- Wilson, D.S., and multiple authors, 2006. Drilling to gabbro in intact oceanic crust. *Science*, 312, 1016-1020.

*Shipboard party contribution to Expedition 304/305, 312, and 319 reports see:*

<http://www.iodp.org/scientific-publications>

*Additional publications*

- Hayman, N.W.**, et al., 2010, Future scientific drilling of oceanic crust (headline article), *EOS*, Transactions, American Geophysical Union, 91, pp. 133-134.
- Cheney, E.S. & **Hayman, N.W.**, 2010, The Chiwaukum Structural Low: Cenozoic shortening of the central Cascade range, Washington State: USA: Reply, *GSA Bulletin*, 122, 2103-2108.
- Daniels, K. E. and **Hayman, N. W.** 2009, Boundary conditions and event scaling of granular stick-slip events. Powders and Grains 2009: *Proceedings of the 6th International Conference on Micromechanics of Granular Media*, p. 567-570.
- Cheney, E.S. and **Hayman, N.W.** 2009, The Chiwaukum Structural Low, eastern Cascade Range, Washington, *GSA Field Guide* 15, pp.19-52.
- Cheney, E.S., and **Hayman, N.W.**, 2007, Regional Tertiary sequence stratigraphy and structure on the eastern flank of the Central Cascade Range, Washington, *GSA Field Guide* 9, pp. 179-208.
- Givens, S., Ludwig, K., **Hayman, N.**, 2005, Troodos ophiolite field program, *Ridge 2000*, p.27.
- Karson, J.A., and multiple authors, 2005, Nested-scale Investigation of tectonic windows into super-fast spread crust exposed at the Pito Deep rift, Easter Microplate, SE Pacific, *InterRidge News*, v. 14, 5-8.
- Hayman, N.W.**, and Kidd, W.S.F., 2002. Champlain Thrust System in the Whitehall-Shoreham area: in Karabinos, P., McLelland, J. (eds.) *Field guide for the 2002 NEIGC/NYGSA field conf.*, pp. A1-A27.

### Meeting Abstracts

(a selection of those not well represented in other publications from >40 abstracts)

- Svartman Dias, A.E., Lavier, L.L., **Hayman, N.W.**, 2014, Force required to breakup a continent, AGU Fall Meeting Abstracts, #T43A-4704.
- Hayman, N.W.**, 2014, What the rock record tells us about ocean crustal faulting, AGU Fall Meeting Abstracts, #T41B-4627.
- Pinto, V. H., Manatschal, G., Karpoff, A.M., Masini, E., Lemarchand, D., **Hayman, N.**, Truow, R., Viana, A., 2013, Fluid history in hyper-extended rifted margins: Examples from the fossil Alpine and western Pyrenean rift systems and the present-day Iberia rifted continental margin. EGU General Assembly Conference Abstracts 15, 7003
- Browne, C.M., and **Hayman, N.W.**, 2011, Hydrothermal and tectonic processes recorded in fault rocks from the upper oceanic crust, Abstract T31C-2356 presented at 2011 Fall meeting AGU.
- Hayman, N.W.**, Karson, J.A., 2010, Ocean crustal fault rocks and the chemo-mechanical record of hydrothermal fluid flow, OS14A-06 presented at 2011 Fall meeting AGU.
- Hayman, N.W.**, 2009, Flexing the margin: Alternative hypotheses for flank uplift along the Texas Gulf of Mexico margin, GSA South-Central Section, Paper No. 11-1
- Hayman, N.W.**, 2008, Oxide Gabbros from IODP Hole 1309D: Recorders of High-Temperature Strain and Alteration of the Atlantis Massif, An Oceanic Core Complex on the Mid-Atlantic Ridge, Annual meeting of the GSA, Paper no.130-5
- Tartarotti, P., **Hayman, N.W.**, and others, 2006, Structure of Hole 1256D, *Eos Trans. AGU* 87(52), Fall Meet. Suppl., Abstract B31B-1091.
- Pollock, MA, Klein, EM, Karson, JA, and **Hayman, N.W.**, 2006, Geochemistry of dikes and lavas in ocean crust, *Eos Trans. AGU* 87(52), Fall Meet. Suppl., Abstract T41B-1571.
- Morgan, L.A., and multiple authors, 2005. Internal structure of basaltic lavas and sheeted dikes in 3 Ma Super-fast EPR crust exposed at Pito Deep: *Eos Trans. AGU* 86(52), Fall Meet. Suppl., Abstract T33D-0588.
- Hirth, G., and multiple authors, 2005. Structural constraints on the evolution of the Atlantis Massif based on results from IODP Expedition 304/305: *Eos Trans. AGU* 86(52), Fall Meet. Suppl., Abstract T41D-1334.
- Bowles, M., **Hayman, N.W.**, Karson, J.A., Kelley, D.S., 2004, Fault-hosted hydrothermal breccia at 22°40'N on the Mid-Atlantic Ridge, *Eos Trans. AGU* 85(47), B13A-0197.
- Hayman, N.W.**, 2001, Mineral growth associated with, but potentially post-dating a late crenulation cleavage in Taconic slates, Abstracts, Northeast GSA, Abstract 2848.
- Cowan, D.S., Cladouhos, T.T., **Hayman, N.W.**, Morgan, J., Vrolijk, P., 1999, Field and Laboratory studies of fault rocks from detachment faults, western Black Mountains, Death Valley, in *USGS Open-File Report* 99-153.

### Select Invited Lectures

- Tokyo, Japan, Chikyu +10 planning workshop, April 21-23, 2013.
- Strythclade University, Glasgow, UK, March 27 2013, “Granular Mechanics of Tectonic Faults”
- University of Strassbourg, France, March 29, 2012, “Vive Le Bassin and Range”.
- Texas A&M, Center for Tectonophysics, February 25<sup>th</sup>, 2009, “Faults of subaxial origin exposed in the Hess and Pito Deep Rift walls: implications for hydrothermal systems and seismicity of axial regions.”
- European Geophysical Union, Hayman, N.W. and Karson, J.A., 2008, “The role of brittle deformation during fast-to-superfast seafloor spreading inferred from tectonic windows into East Pacific Rise-spread crust.”
- Chiba University, Japan, Kanto Asperity Project Workshop, February 16-17, 2008.
- Rice University, November 15, 2007, “Faults of subaxial origin exposed in the Hess and Pito Deep Rift walls: implications for hydrothermal systems and seismicity of axial regions.”

**Select Invited Lectures** (*continued*)

- East Carolina University, November 17, 2006, “Drilling and diving into fault zones in the ocean crust”.
- Iowa State University, November 3, 2006, “Faults and fault-rocks in the desert and the ocean: granular controls on Earth’s fundamental plate boundaries.”
- SUNY Albany/RPI, April 14, 2004, “A record of shallow crustal faulting preserved within rocks from the Death Valley low-angle normal (detachment) faults.”
- University of North Carolina, September 16, 2004, “A record of shallow crustal faulting preserved within rocks from the Death Valley low-angle normal (detachment) faults.”

**Thesis & Dissertation:**

- Hayman, N.W., 1997, Pre-thrust normal faults and post-tectonic micas in the tectonic range of west-central Vermont, M.Sc. thesis for SUNY Albany, Department of Earth and Atmospheric Sciences, 179 pp.
- Hayman, N.W., 2003, Structure and petrology of gouge and breccia bearing shallow crustal shear zones of detachment faults in Death Valley, California, Ph.D. dissertation for University of Washington, 167 pp.

**Synergistic Activities**

*Committee member:* NSF-Deep Submergence Science Committee (DESSC), Woods Hole Oceanographic Institution

*University of Texas, Austin committees:* UTIG seminar series (head); Jackson School of Geosciences Strategic Planning Council; Jackson School Equipment Matching Program; Jackson School Energy Sciences Theme Advisory Board; UTIG Science Planning Council; UTIG APEC (Staff Review); UTIG Innovation & Opportunity fund; UTIG library committee

*Editorial Board Member* for Geology

*Associate Editor* for Sociedade Brasileira de Geologia (Brazilian journal of Geology)

*Ad-Hoc Reviewer for:*

- American Journal of Science, AAPG Bulletin, Geophysical Research Letters, G-Cubed, GSA Bulletin, Journal of Geophysical Research, Journal of Structural Geology, Nature Geosciences, Proceedings of the IODP, Tectonophysics.
- National Science Foundation; Swiss National Science Foundation; Natural Environment Research Council (NERC, UK); Agence Nationale de la Recherche (ANR, France).

*Co-chair/convener of:*

- 2013 Fall AGU session: T26: Oceanic detachment faulting and associated processes at Mid-Ocean Ridges (w/ Javier Escartin, Pablo Canales, & Andrew McCaig)
- 2013 Fall GSA session: T25A. From extension to rift to drift (w/ Eunsoi Choi & Beatrice Magnani)
- 2010 Fall AGU session: OS14A. Integrated Studies at Oceanic Spreading Centers (Laurent Montesi, lead convener)
- Ocean Leadership workshop: Scientific Drilling of Mid-Ocean Ridge and Ridge Flank settings, August 27-28, 2009, UTIG (see Hayman et al., 2010 EOS article) (w/ Gail Christeson)
- Special Session on Faulting in the Oceanic Crust at the 2007 Fall meeting of the AGU, with Delwayne Bonenstiehl
- Co-convener of Special session on Transpression and Transtension, 2002 annual meeting of the Geological Society of America, (w/ Mike Edwards and John Dewey)

*Attended the following workshops:*

- DOE/NETL Carbon Capture and Storage Workshop, Pittsburgh, PA, August 18-20.
- Chikyū +10 planning workshop, Tokyo, Japan, April 21-23, 2013.
- Ocean Exploration planning workshop, University of Rhode Island, May 9-10, 2011
- Polar Research Vessel planning workshop, National Science Foundation, Feb 28-March 1, 2011

*Attended the following workshops (continued):*

GeoPRISMS Subduction cycles and deformation initiative meeting, Texas, Jan 5-7, 2011  
GeoPRISMS Rift Initiation and Evolution workshop, Santa Fe, NM, November 4-5, 2010.  
Gordon Conference on Rock Deformation, Tilden, New Hampshire, August 8-13, 2010.  
Margins renewal workshop, San Antonio, TX, February 15-17, 2010.  
INVEST, a planning workshop for IODP renewal, September 23-25, 2009, Bremen, Germany.  
ICDP workshop for “Testing the Extensional Detachment Paradigm: A borehole observatory in the Sevier Desert basin, western United States”, Solitude, Utah, July, 2008  
Kanto Asperity Project workshop, Chiba City, Japan, February 2008  
Ridge 2000 Field Program as summarized in Givens et al. (2005).  
IODP “Mission Moho” Planning committee, Portland, OR, September, 2006.  
East-coast Earthscope NSF Planning committee, Arlington, VA, March, 2004.

*Other:*

Co-proponent of IODP drilling proposals: Kanto Asperity Project (Kobayashi lead), South China Sea drilling (Chung-Fen Li lead), Brazilian margin IODP proposal(s), & East Pacific Rise flank (Haymon lead)  
Leader of unaffiliated field conferences in Death Valley, CA: past conferences have been with rock mechanics groups from Rice and Penn State Universities, members of Petrobras and faculty from Universite de Cergy-Pontoise, Fr.

**Teaching & Education**

Marine Geology (co-lecturer), Fall, 2015  
Marine Tectonics (co-lecturer), Spring, 2011-*present*.  
Topics in Marine Geology and Geophysics (readings, co-convener), 2009-2014.  
EOS 11: The Dynamic Earth (Survey class), Duke University, Summer 1, 2006.  
Teaching assistant from 1995-2003 including course development, lecture, & laboratory: Structural Geology, Mineralogy, Geodynamics, Field Mapping, Geobiology.  
*Current graduate students:* Joel Lunsford (w/ Kitty Milliken, expected M.Sc. 2015); Cassandra Browne (expected Ph.D. 2015); Anna Eliza Svartmann Dias (w/ Luc Lavier, expected Ph.D. 2015); Sebastian Ramirez (w/ Sean Gulick & Brian Horton, expected Ph.D. 2016); Rodrigo Lima (expected Ph.D. 2017); Jennifer Harding (w/ Harm van Avendonk, expected Ph.D. 2018).  
*Current undergraduate researchers:* Valeriy Shakenov  
*Previous Postdocs:* Jacqueline Reber Vettiger (December, 2012-2015, now Asst. Prof. at Iowa State)  
*Previous undergraduate researchers:* Keri Belcher (UT Austin, 2013-2014), Jennifer Locke (U. Washington, 2002)  
*Previously supervised/cosupervised students:* Max Pommer (w/ Kitty Milliken, M.Sc. 2014), Lucie Ducloué (visiting ENS student, 2010), Marshall Bowles (M.E.M., Duke University, 2005)  
*Committee member:* Han Liu (K. Spikes Student, UT Austin, Ph.D. expected 2017; Lindsay Morgan (M.Sc. Duke University, 2006)

**Grants and Awards**

*Current Grants and Awards:*

Petrobras, Geological and Geophysical Investigations of Rift Processes, September 1, 2011-August 31, 2017 (Luc Lavier lead PI)  
Research Partnership to Secure Energy for America: Connectivity between Fractures and Pores in hydrocarbon-rich mudrocks, September 1, 2014-June 30, 2016 (H. Daigle lead PI)

*Current Grants and Awards (continued):*

National Science Foundation, Ocean Sciences Division: Ultraslow crustal accretion at the Mid-Cayman Spreading Center (Van Avendonk lead PI), September 1, 2014-August 31, 2017.  
DOE Center for Frontiers of Subsurface Energy Security (L. Lake lead PI).

*Past support, grants, and awards:*

SUTUR (Shell-UT Unconventional Research): Advanced microstructural characterization of mudrocks: a high-resolution view of deposition and diagenesis, Spring, 2012-Spring-2014 (Kitty Milliken lead PI)

National Science Foundation, Ocean Sciences Division, OCE-1130078, Expedition Oriented Research: Sedimentation and Tectonics in Kumano forearc basin evolution, NantroSEIZE study area, September 1, 2011-August 31, 2013 (continuing with no-cost extension), Hayman lead-PI, Sean Gulick & Kitty Milliken co-PIs.

National Science Foundation, Ocean Sciences Division, OCE-0961775, Constraints on the Mechanics of Ocean Crustal Faults, September 1, 2010-August 31, 2013 (continuing with no-cost extension), Hayman single PI

Ocean Leadership-IODP, participation in Expedition 319, including post-cruise award, 2009-2013.

Non-PI support from Mudrock Systems Research Laboratory (MSRL) (Ruppel lead PI), 2011.

Non-PI support from the Caribbean Basins, Tectonics, and Hydrocarbons (CBTH) Project (Mann lead PI), 2010.

UTIG, Innovation & Opportunity Awards 2010, 2011.

Ocean Leadership-IODP, support for Workshop on Mid-Ocean Ridge drilling, (Christeson lead PI).

USSSP-IODP, Salary Support and post-expedition awards for Expeditions 304 & 312.

Non-PI support from NSF-OCE 0222154: Nested-Scale Investigation of Pito Deep (multi-institution; to Karson & Klein, Duke University): 2/14/04-1/31/08 (extended).

Non-PI support from Petroleum Research Fund: Outcrop Analogue for fault seal, (authored by Hayman to Darrel S. Cowan, University of Washington), 2000-2003.

Non-PI support from NSF-EAR 94177590: Fault rock research (to Darrel Cowan, University of Washington).

Mineralogical Society of America, Kraus Crystallography Award: Mesophases and minerals: A comparison of electron, X-Ray, and modeled diffraction patterns from low crystallinity clay minerals, 2003. Hayman recipient.

University of Washington: Chevron Research Fellowship, 1998; Peter Misch Award, 2000; Joe Vance Award 2002 (each with graduate student support).

Geological Society of America graduate student research grant, 1998.

**Advisors:**

Postdoctoral Advisor (Duke University): Jeffrey Karson

Ph.D. Committee (University of Washington): Darrel Cowan (advisor), Mark Ghiorso, Sean Willett, Trenton Cladouhos.

M.Sc. Committee (SUNY Albany): Win Means (advisor), W.S.F. (Bill) Kidd, Greg Harper.

Chevron internship supervisor: Doug Goff

Lamont-Doherty summer fellow advisor: Jeff Gee

**Professional Affiliations** (last 48 months):

Ryo Anma (Tsukuba, JP), Harm Van Avendonk (UTIG), David Boutt (UMass), Kurt Burmeister (College of the Pacific), Tim Byrne (UConn), Hugh Daigle (UT Austin), Karen Daniels (NCSU), Dan Dunkley (Curtin), Ingo Grevemeyer, (GEOMAR, DE), Nancy Grindlay (UNCW), Sean Gulick (UTIG), Kyuichi Kanagawa (Chiba U, JP), Luc Lavier (UT), Chris Marone (Penn State), Bernard Mercier de Lepinay (Nice, FR), Sylvie LeRoy (CNRS, FR), Weiren Lin (JAMSTEC, JP), Gianreto Manatschal (Strasbourg, FR), Paul Mann (U Houston), Lisa McNeill (Southampton, UK), Bram Murton (Southampton, UK), Yujiro Ogawa (Tsukuba, JP), Christine Pierce (Durham, UK), Mike Perfit (UFla), Victor Hugo Pinto (Petrobras), Kyle Spikes (UT Austin), Ken Tani (JAMSTEC), Masako Tominaga (Michigan State), Andres Veloso (Santiago), Adriano Viana (Petrobras, BR), Yamada, Y. (Kyoto, JP)