

ANDREA DAWN HAWKES

Geology and Geophysics Department, MS 22, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, Tel: 508 289 3422; E-mail: ahawkes@whoi.edu;
<http://www.whoi.edu/science/GG/coastal/people/index.html>

EDUCATION

- 1996 - 2001: BSc Honors in Geology and Political Science, Dalhousie University, Canada.
- 2002 - 2004: MSc in Earth Science, Dalhousie University, Canada (supervisor Prof Dave Scott).
- 2004 - 2008: PhD in Earth and Environmental Science, University of Pennsylvania, USA (supervisor Prof. Benjamin Horton and Dr. Alan R. Nelson, USGS).

EMPLOYMENT HISTORY

- 2008 – 2010: Postdoctoral Scholar, NOSAMS and the Geology and Geophysics Department, Woods Hole Oceanographic Institution, USA.
- 2010 – present: Postdoctoral Investigator, Geology and Geophysics Department, Woods Hole Oceanographic Institution, USA.

MAIN ACHIEVEMENTS

- Published 8 papers or articles in refereed journals, including papers in *Marine Geology*, *Quaternary International* and *GSA Bulletin* (Hawkes et al., 2005a was selected as editor's choice in *Science* 308).
- Presented over 19 invited lectures and seminars to international conferences and workshops.
- Edited manuscripts for peer-reviewed journals including *The Holocene*, *Earth Science Reviews*, *Journal of Geophysical Research*, *Marine Geology*, *GSA Bulletin*, *Marine Micropaleontology*, *Marine Ecology Progress Series*, *Journal of Foraminiferal Research* and *Wetland Ecology and Management*.
- External support of research program from 2004-present which totals in excess of \$194,849.
- Developed and applied a quantitative approach to reconstruct paleo-earthquake subsidence.
- Refined methods for detailed analyses of tsunami and hurricane deposited sediments.

RESEARCH INTERESTS

My main research interests include the development and application of environmental modeling and quantitative palaeoenvironmental reconstruction techniques with the aim of understanding the role of earthquakes, tsunamis and storms as driving mechanisms of Quaternary relative sea-level change and coastal evolution. My research has been undertaken in coastal and wetland ecosystems in temperate and tropical environments, which are under increasing pressure from a variety of natural and artificial processes. The key output of my PhD was the development of a "transfer function" which allowed for very precise reconstructions of former sea levels using a statistically based relationship between contemporary foraminifera and their correlation to elevation and fossil foraminiferal assemblages. This developing research is at the forefront of a new generation of high precision sea-level reconstructions. The transfer function was used primarily to estimate megathrust induced coseismic subsidence along the Oregon coast of the Cascadia subduction zone (Hawkes et al., 2005, *submitted, in press*). I am presently continuing research on the sedimentary and foraminiferal characteristics of 2004 Indian Ocean tsunami deposits along the Malaysia-Thailand Peninsula (Hawkes et al., 2007a,b), Aceh, Sumatra as well as paleo-earthquake and -tsunami deposits near Padang, Sumatra. Presently at Woods Hole Oceanographic Institution, I am using a multiproxy approach (e.g., surface sampling, coring, GPR, CHIRP, micropaleontology, sedimentology, stratigraphy, and AMS ^{14}C , ^{210}Pb , ^{137}Cs dating) to develop high-resolution Holocene tropical cyclone records from coastal New England, Florida and the Caribbean. Proxies such as grain size distribution and foraminiferal assemblages may be useful as a potential surrogate for storm surge intensity and reconstructions of the tropical cyclone record could show how tropical cyclone intensity may have varied under past climatic conditions.

TEACHING EXPERIENCE

Teaching Workshop; Woods Hole Oceanographic Institution - Massachusetts Institute of Technology, Sanjoy Mahajan (MIT professor).

Teaching Associate; University of Pennsylvania, Department of Earth and Environmental Sciences, 2004-2007. *Course Titles:* Introduction to Environmental Analysis (ENVS 200); 2004-2005, Natural Disturbances and Disasters (GEOL-103); 2004-2007, Advanced Stratigraphy (GEOL-206); 2007. Responsibilities included teaching and grading labs and homework, holding recitation for groups of 30-40 students and individual tutoring, examination preparation, monitoring and grading. At the graduate level I led an intensive two-week hurricane Katrina/Rita field course to Alabama and Louisiana where results were developed in Horton et al., 2009.

Teaching Associate; Dalhousie University, Department of Earth Sciences, 2002-2004. *Course Titles:* Stratigraphy (ERTH 3303); 2002-2004, Quaternary Sedimentary Environments (ERTH 3302); 2002-2004. Responsibilities included teaching and grading labs, as well as running field trips to teach the students the basic geologic skills (rock and mineral identification, use of geologic compass, construction of maps, measured cross-section, etc.).

HONORS AND AWARDS

Postdoctoral Scholar, Woods Hole Oceanographic Institution, 2008-2010; Dean's Dissertation Completion Fellowship, University of Pennsylvania, 2007-2008; Benjamin Franklin Fellowship; University of Pennsylvania, 2004-2007; Henry Lewis Endowment Fund; University of Pennsylvania, 2004-2005; MacEachern-Ponsford Award; Dalhousie University, 1998-1999

PROFESSIONAL SOCIETIES

American Geophysical Union, Geological Society of America, Cushman Foundation, Quaternary Research Association, International Geological Correlation Program, Society of Sedimentary Geology.

INVITED LECTURES AND SEMINARS

Geological Society of America Annual Meeting (2009), Northeast Beaches Conference (2009), American Quaternary Association Meeting (2008), MYRES III (2008), University of California - Santa Barbara (2009), East Carolina University (2009), Florida State University (2008), University of Texas A&M (2008), State University of New York – Potsdam, Philadelphia Geological Society (2007), University of Delaware (2007), Delaware Valley GEO Institute (2007).

OUTREACH ACTIVITIES

- Woods Hole Oceanographic Institution summer student mentor, Coastal Systems Group, Geology and Geophysics Department (8 students summer 2009, 2010).
- Field leader of an Earthwatch Student Challenge Awards Program (SCAP) for high school students (2007-2009).
- Hill College Graduate Fellow, University of Pennsylvania (2005-2008) lived-in residence full-time with 550 undergraduate students.
- Field leader for Operation Wallacea for undergraduate honors thesis students from the UK, (August 2006).

RESEARCH COLLABORATORS

Woods Hole Oceanographic Institution (*Donnelly, Evans, Ashton, Bernhard*), Brown University (*MacDonald*), University of Massachusetts – Amherst (*Woodruff*), University of Pennsylvania (*Horton*), East Carolina University (*Culver*), Humboldt State University (*Kelsey*), Oregon Department of Geology

and Mineral Industries (*Witter*), Oregon State University (*Hill*), Smithsonian Institution (*Buzas, Stanley, Toscano*), Tulane University (*Törnqvist*), United States Geological Survey (*Nelson, Williams*), Central Washington University (*Rubin*), James Cook University, Australia (*Bird, Nott*), Australia Tsunami Research Centre (*Goff*), Geological Survey of Japan (*Sawai*), British Geological Survey, UK (*Vane*), Bermuda Department of Conservation (*Madeiros*), Belize Fisheries Department (*Azueta*), Universiti of Sans Malaysia (*Zulfigar, Shau Hwai, Eong Ong, Tiong Sa*).

RESEARCH GRANTS

- Foraminifera and hurricane intensity; NSF (2010-2011, \$89,299).
- Arctic warming, coastal landforms and estuarine ecosystems; WHOI ARI (2010-2012, \$47,500).
- Intense hurricane disturbance; NICCR (2010-2011, \$13,500).
- Holocene sea-level change from the Caribbean: implications for geophysical modeling and ocean-climate interactions; subcontract with Toscano; NSF (2009-2011, \$26,650).
- Pacific Northwest earthquake research; USGS (2006 - \$27,880; 2007 - \$5400).
- Earthquake subsidence; Society of Sedimentary Geology (2005-2007, \$4000).
- Tsunami and earthquake research in Malaysia and Thailand; University of Pennsylvania (2005-2006, \$4000).
- Tsunami deposited foraminifera; Cushman Foundation (2005, \$500).

Funding collaboration as a postdoctoral Scholar/Investigator (Woods Hole Oceanographic Institution) and graduate student (University of Pennsylvania, PA)

Tracking sea-level source contributions: A hemispheric approach to high resolution sea-level variations over the last two millennia; Co-PI with Donnelly; \$291,305 (*pending*): Millennial-scale records of sea-level change along the Atlantic coast of the United States; postdoctoral investigator with Donnelly and Horton; NSF \$250,084; 2010-2011 (*pending*): Microfossil-based approach to estimate hurricane intensity from the sedimentary record; Co-PI with Donnelly; NSF \$89,299; 2010-2011: Examining the Effects of Arctic Warming on Coastal Landforms and Estuarine Ecosystems; Co-PI with Donnelly, Bernhard, Giosan, Karnauskas, and Ashton; WHOI ARI \$393,438; 2010-2012: Understanding the impact of frequent intense hurricane disturbance on the coastal pine/scruboak forests of the northeastern United States; postdoctoral investigator with Donnelly; NICCR \$60,000; 2010: Megathrust Paleogeodesy at the central Cascadia subduction zone; collaborator with Witter, Horton, and Nelson; NSF \$233,086; 2009-2011: A Paleoseismic Record of Great Earthquakes on the Sunda Subduction Megathrust, Northern Sumatra; collaborator with Horton, Kelsey and Rubin; NSF \$190,148; 2007-2011: Indian Ocean Tsunami – Environmental and socio-economic impacts on the Malay-Thai Peninsula; NSF \$68,282; 2005-2006.

PUBLICATIONS

Refereed papers or articles

1. **Hawkes, A.D.**, Donnelly, J.P., (*in prep*). A regional perspective of New England hurricanes using sedimentary, micropaleontology and modeled historic archives. (*in prep*).
2. **Hawkes, A.D.**, Horton, B.P., (*in prep*). High resolution grain size and foraminiferal analysis of 2004 Indian Ocean tsunami sediment deposit provenance at Banda Aceh and paleo-tsunami deposits at Padang, Sumatra.
3. **Hawkes, A.D.**, Horton, B.P., (*in prep*). Hurricane Ike sediment and foraminiferal signature near Galveston, Texas. *Journal of Foraminiferal Research*.
4. **Hawkes, A.D.**, Horton, B.P., Nelson, A.R., Sawai, Y., Vane C.H., (*in prep*). Foraminiferal reconstruction of coastal subsidence in Oregon, USA, during the Giant Cascadia earthquake of AD 1700. *Quaternary Science Reviews*.
5. Sawai, Y., Witter, R., **Hawkes, A.D.**, Horton, B.P., (*submitted*). Tsunami deposits in Pichilemu generated by the 2010 Chile Earthquakes. *Quaternary Science Reviews*.
6. Lane, P., Donnelly, J.P., Woodruff, J.D., **Hawkes, A.D.**, (*submitted*). Gulf Coast hurricane activity and climate variability during the last half of the Holocene. *Quaternary Science Reviews*.

7. **Hawkes, A.D.**, Horton, B.P., Nelson, A.R., Hill, D.F., 2010. The application of Intertidal Foraminifera to reconstruct Coastal Subsidence during the Giant Cascadia Earthquake of AD 1700 in Oregon, USA. *Quaternary International*, v. 221, p. 116-140.
8. Horton, B.P., Rossi, V., and **Hawkes, A.D.**, 2009. The sedimentary record of the 2005 hurricane season from the Mississippi and Alabama coastline. *Quaternary International*, v. 195, p. 15-30.
9. Horton, B. P., Bird, M., Birkland, T., Cowie, S., Grundy-Warr, C., **Hawkes, A. D.**, Tan Shau Hwai, A., Law, L., Macgregor, C., Nott, J., Eong Ong, J., Rigg, J., Robinson, R., Tan-Mullins, M., Tiong Sa, T. and Zulfigar, Y., 2008. Environmental and socio-economic dynamics of the Indian Ocean Tsunami. in Penang, Malaysia. *Singapore Journal of Tropical Geography*, v. 29, p. 307-324.
10. Bird, M., Cowie, S., **Hawkes, A.D.**, Horton, B.P., Macgregor, C., Eong Ong, J., Tan Shau Hwai, A., Tiong Sa, T., and Yasin, Z., 2007. Indian Ocean Tsunami – Environmental and Socio-economic Impacts in Langkawi, Malaysia. *The Geographical Journal*, v. 173.
11. **Hawkes, A.D.**, Bird, M., Cowie, S., Grundy-Warr, C., Horton, B.P., Tan Shau Hwai, A., Law, L., Macgregor, C., Nott, J., Eong Ong, J., Rigg, J., Robinson, R., Tan-Mullins, M., Tiong Sa, T., and Zulfigar, Y., 2007a. “The Sediments Deposited by the 2004 Indian Ocean Tsunami along the Malay-Thai Peninsula”: *Marine Geology Special IGCP 495 Issue 242*, p. 169-190.
12. **Hawkes, A.D.**, Engelhart, S., and Horton, B.P., 2007b. Tsunami: a white cobra hits Pangandaran West Java. *Geology Today*, v.23, p. 12-14.
13. **Hawkes, A.D.**, Scott, D.B. And Lipps, J.H., 2005a. Evidence for possible precursor events of mega-thrust earthquakes on the west coast of North America. *GSA Bulletin*, v. 117, no. 7/8, p. 996-1008. (Editors Choice, Science 308)

Books and edited volumes

1. **Hawkes, A.D.** and Scott, D.B., 2005b. Attached benthic foraminifera as indicators of past and present distribution of the deep-sea coral *Primnoa resedaeformis* on the Scotian Margin: In A. Freiwald and J. M. Roberts (eds): "Deep-water Corals and Ecosystems", Springer-Verlag, Berlin Heidelberg, p.881-894.

Other publications

1. **Hawkes, A.D.** The application of foraminifera to characterize tsunami sediment and quantify coseismic subsidence along the Sumatra and Cascadia subduction zones. PhD. 2008, University of Pennsylvania, Philadelphia, Pennsylvania, 214p.
2. **Hawkes, A.D.** A study of attached benthic foraminifera associated with the deep-sea coral *Primnoa resedaeformis* on the Scotian Margin. MSc. 2004, Dalhousie University, Halifax, Nova Scotia, 126p.
3. **Hawkes, A.D.** Evidence of precursor events for mega-thrust earthquakes on the west coast of North America. Honors Bsc. 2001, Dalhousie University, Halifax, Nova Scotia, 86p.

Conference abstracts (15 most recent first author only)

1. **Hawkes, A.D.**, Donnelly, J., Horton, B., 2009. Identification of abrupt coastal events: earthquakes, tsunamis and hurricanes. GSA Annual Meeting 2009 Portland, OR. October 17-21. (Invited).
2. Horton B.P., Kemp, A., **Hawkes, A.D.**, 2009. Reconstructions of relative sea-level variations over the last two millennia, North Carolina, USA. Northeast Beaches Conference, Sept 21-23, 2009. (Invited).
3. **Hawkes, A.D.**, Horton, B.P., Nelson, A.R., 2008. Late Holocene coseismic deformation at the Cascadia subduction zone, Oregon, USA. AGU Annual General Meeting 2008 San Francisco, California. December 15-19.
4. **Hawkes, A.D.**, Horton, B.P., Nelson, A.R., 2008. Quantifying Coseismic Subsidence during the most recent Cascadia Earthquake (AD 1700). GSA Annual Meeting 2008 Houston, Texas. October 15-19.
5. **Hawkes, A.D.**, Horton, B.P., Nelson, A.R., 2008. The distribution of Foraminifera in Oregon intertidal zones: Implication for estimating coseismic subsidence. AMQUA State College, Pennsylvania. June 7-9. (Invited).
6. **Hawkes, A.D.**, Horton, B.P., 2008. Tsunamis and Hurricanes: Teasing the two apart. MYRES III New Orleans, Mississippi. May 20-23. (Invited).

7. **Hawkes, A.D.**, Horton, B.P., Nelson, A., Grand Pre, C., 2007. A microfossil-based approach to constraining megathrust-induced coseismic land displacement of the 1700AD even in the Pacific Northwest (presentation). AGU Annual Meeting 2007 San Francisco, California. December 10-15.
8. **Hawkes, A.D.**, Horton, B.P., Nelson, Kemp, A., 2007. Foraminiferal assemblage zones of Oregon salt marshes: implications for studies of relative sea-level change (poster). AGU Annual Meeting 2007 San Francisco, California. December 10-15.
9. **Hawkes, A.D.**, Horton, B.P., Nelson, A., Grand Pre, C., 2007. A microfossil-based approach to constraining megathrust-induced coseismic land displacement in the Pacific Northwest. GSA Annual Meeting 2007 Denver, Colorado. October 27-31.
10. **Hawkes, A.D.**, Horton, B.P., Nelson, A., Grand Pre, C., 2007. A microfossil-based approach to constraining megathrust-induced coseismic land displacement in the Pacific Northwest. INQUA 2007 Cairns, Australia. July 28 – August 3.
11. **Hawkes, A.D.**, Horton, B.P., 2007. 2004 Indian Ocean tsunami sediment characteristics along the Malaysia-Thailand Peninsula, Eos Trans. AGU, 88(23), Jt. Assem. Suppl., Abstract T43B-02.
12. **Hawkes, A.D.**, Horton, B.P., 2007. Using a microfossil-based approach to constrain megathrust-induced coseismic land displacement in coastal Oregon, USA, Eos Trans. AGU, 88(23), Jt. Assem. Suppl., Abstract T41B-01.
13. **Hawkes, A.**, Bird, M., Cowie, S., Horton, B.P., Hwai, A.T.S., Law, L., Macgregor, C., Ong, J.E., and Yasin, Z., 2006. The Taphonomy of Sediments Deposited by the Indian Ocean Tsunami Along the West Coast of the Malay-Thai Peninsula, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract PP43B-1237.
14. **Hawkes, A.D.**, Horton, B.P., Robinson, R., Bird, M., and Nott, J., 2006. The sediments deposited by the Indian Ocean Tsunami along the Malay-Thai Peninsula. GSA Annual Meeting, Philadelphia. October 22-26.
15. **Hawkes, A.D.**, Bird, M., Cowie, S., Horton, B.P., Nott, J., Robinson, R., and Won Aik, L., 2006. Indian Ocean Tsunami deposits along the west coast of the Malay-Thai Peninsula: Foraminiferal and grain size analysis. FORAMS 2006, Natal, Brazil. September 10-15.

REFEREES

- Dr. Jeff Donnelly
Geology and Geophysics Department MS22
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
Relationship: postdoctoral advisor and co-author
phone: (508) 289-2994
email: jdonnelly@whoi.edu
- Dr. Benjamin P. Horton
Department of Earth and Environmental Sciences
University of Pennsylvania
Philadelphia, PA 19104
Relationship: Ph.D. advisor, collaborator and co-author
phone: (215) 573-5388
fax: (215) 898-0964
email: bphorton@sas.upenn.edu
- Dr. Alan Nelson
United States Geological Survey
P.O. Box 25046 Mail Stop 966
Golden, CO 80225-0046
Relationship: Ph.D. external advisor, collaborator and co-author
phone: (303) 273-8592
email: anelson@usgs.gov
- Dr. Steve Culver
Department of Geology
East Carolina University
Greenville, NC 27858-4353
Relationship: collaborator
phone: (252) 328-6360
email: culvers@ecu.edu