

Heather A. Broadbent

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EDUCATION

Ph.D., Marine Science/ Biological Oceanography, May 2012
University of South Florida
Dissertation Title: A CTD Biotag for Mid-sized Marine Predators

M.S., Marine Science, December 2005
University of South Florida
Thesis Title: Development of a CTD System for Environmental Measurements Using Novel PCB MEMS Fabrication Techniques

B.S., Biology, minor Chemistry, August 1994
Eastern Michigan University

TEACHING & MENTORING EXPERIENCE

Adjunct Instructor, Saint Petersburg College, 01/12 – 05/12

- Taught two sessions of Introduction to Biology Laboratory, BSC1005L

Laboratory Instructor, University of South Florida, College of Marine Science, Oceanography Camp for Girls, 05/12 – 7/12

- Taught a biology/ engineering lab for middle school aged girls.
- Taught the girls scientific method and experimentation in the field.

Mentor, University of South Florida, College of Marine Science, Center for Ocean Technology, 11/00 – 06/09

- Mentored several high school students in the Executive Internship program for Marine Science by teaching them design, development and fabrication of ocean sensors and instruments.

RESEARCH EXPERIENCE

Postdoctoral Scholar, University of South Florida, 06/12- present

- Conducting field work in Antarctica on an NSF project (SCINI Penguin) titled, “Benthic pelagic coupling in an intact ecosystem: the role of top predators in McMurdo Sound.”
- Examining Antarctic food web interactions between microalgal primary producers, zooplankton, fish and apex predators (i.e., killer whales, adelic penguins, weddell seals).
- Collecting environmental and physical oceanographic data of McMurdo Sound, Antarctica.

Chief Scientist, University of South Florida, 06/13 – present

- Aboard the R/V Weatherbird II for the Center for Integrated Modeling and Analysis of Gulf Ecosystems (C-IMAGE).

- Investigating the impact of the BP oil spill on the northern Gulf of Mexico ecosystem, focusing on the lower end of the water column food web.
- Assessing benthic, microbial, phytoplankton, zooplankton communities in relation to oil concentrations through:
 - abundance and distribution
 - species composition
 - toxicity studies
 - indicators of health and condition (phytoplankton, zooplankton) in relation to environmental parameters (temp, salinity, nutrients, PAR, etc.)

Scientific Researcher, University of South Florida, College of Marine Science, Center for Ocean Technology, 11/00 – 06/11

- Research work was the development, fabrication and field testing of a miniature, low-cost CTD bilogger that archives conductivity, temperature, depth, GPS location, compass direction, ambient light, 3-D accelerometer and wet/dry measurements while deployed on small to medium marine animals. Target animals are penguins, manatees, turtles and sharks. Tagged Magellanic penguins and Loggerhead turtles.
- Conducted field research in Punta Tombo, Argentina and Casey Key, Florida.
- Developed processes to fabricate microsensors, microfluidics and microsystems using PCB/MEMS techniques.

PUBLICATIONS

H. A. Broadbent, T. P. Ketterl, A. M. Silverman, J.J. Torres. 2012. "Development of a CTD biotag: Challenges and pitfalls." *Deep- Sea Research II*, online 27 July 2012.

H. A. Broadbent, T. P. Ketterl, C.S. Reid, J. Dlutowski. 2010. "A Low-Cost, Miniature CTD for Animal-Borne Ocean Measurements." Oceans 2010 MTS/IEEE, Seattle, 1-7.

H. A. Broadbent, T. P. Ketterl, C.S. Reid. 2010. "A miniature rigid/flex salinity measurement device fabricated using printed circuit processing techniques." *J. Micromech. Microeng.* **20** 085008.

D.P. Fries, S. Ivanov, P. Bhanushali, J. Wilson, **H. Broadbent**, A. Sanderson. 2007. "Low Cost, High Bandwidth, Coastal Sensor Networks." *Oceanography*, Vol 20, No 4, 74-79.

H.A. Broadbent, S. Ivanov, D. Fries. 2007. "A miniature, low cost CTD system for coastal salinity measurements." *Meas. Sci. Technol.* 18: 3295-3302.

H.A. Broadbent, S. Ivanov, D. Fries. 2007 "Fabrication of a LCP-based conductivity cell and resistive temperature device via PCB MEMS technology." *J. Micromech. Microeng.* 17 722-729.

PRESENTATIONS & TECHNICAL POSTERS

H. A. Broadbent, T. P. Ketterl, A. M. Silverman, J.J. Torres. "A CTD-tag to determine physical microstructure use by marine predators." 4th International Science Symposium on Biologging, Hobart, Tasmania, Australia, March 14-18, 2011.

H.A. Broadbent, S. Ivanov, D. Fries. "Miniature low-cost CTD bilogger for environmental measurements." Poster presentation at 3rd International Biologging Science Symposium, Pacific Grove, CA, September 1-5th, 2008.

H. Broadbent, S. Ivanov, D. Fries. "PCBMEMS Environmental Sensors in the Field." Oral presentation at 2007 IEEE International Symposium on Industrial Electronics (ISIE2007), Vigo Spain, June 4-7, 2007.

H. Broadbent, S. Ivanov, G. Steimle, D. Fries. "Development of a miniature oceanographic CTD system." Poster Presented at ASLO 2005 Aquatic Sciences meeting, Salt Lake City, UT, Feb. 20-25, 2005.

H. Broadbent, D. Fries, S. Ivanov, S. Natarajan, A. Cardenas, J. Fu, T. Weller, and G. Steimle. "LCP PCB/MEMS for Field Systems." Presented at the IPC Annual Conference, Minneapolis, MN, USA, October 1, 2003.

H. Broadbent, G. Steimle, D. Fries, S. Ivanov, S. Natarajan, A. Cardenas, M. Janowiak, T. Weller, R. Benson and J. Fu. "Maskless Lithographic LCP PCB/MEMS for Field Sensors." Paper presented at the Liquid Crystalline Polymer Material Processing and Applications Symposium, PMTEC conference at Huntsville, AL, on October 29, 2002.

H. Broadbent, D. Fries, G. Steimle, S. Ivanov, S. Natarajan, T. Weller. "PCB/MEMS Salinity Analyzer." Poster presented at the conference for New Horizons for Environmental Analytical Chemistry through Minuturization and Nanotechnology, 6th Euroconference on Environmental Analytical Chemistry at Peer, Belgium on October 18-22, 2002.

AWARDS

- Recipient, **C.W. Bill Young Fellowship**, University of South Florida, 2004/2005
- Recipient, **C.W. Bill Young Fellowship**, University of South Florida, 2008 – 2010
- Recipient, **Sanibel-Captiva Shell Club Mary & Al Bridell Memorial Fellowship**, University of South Florida, 2011/2012

PATENTS

Heather Broadbent, David Fries, Stan Ivanov, George Steimle, "Micro Sensor System for Liquid Conductivity, Temperature and Depth." Patent No. 7,259,566, August 21, 2007.

David Fries, George Steimle, **Heather Broadbent**, "Method for Etching Microchannel Networks within Liquid Crystal Polymer Substrates." Patent No. 7,425,276, September 16, 2008.

David Fries, Michelle Janowiak, George Steimle, **Heather Broadbent**, "Self-propelled Sensor Apparatus for In Situ Analysis of Environmental Parameters." Patent No. 8,577,183 B2, October 15, 2013.