

CURRICULUM VITAE

LAWRENCE PAUL SANFORD

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I. EDUCATION

1984 Ph.D., Woods Hole Oceanographic Institution/Massachusetts Institute of Technology
Joint Program in Oceanography and Oceanographic Engineering, Oceanographic
Engineering.

1978 Sc.B., magna cum laude, Brown University, Mechanical Engineering.

II. PROFESSIONAL BACKGROUND

2001-present Professor, University of Maryland Center for Environmental Science, Horn Point
Laboratory, Cambridge, MD

1993-2001 Associate Professor, University of Maryland Center for Environmental Science,
Horn Point Environmental Laboratory, Cambridge, MD.

1987-1993 Assistant Professor, University of Maryland Center for Environmental and
Estuarine Studies, Horn Point Environmental Laboratory, Cambridge, MD.

1984-1987 Postdoctoral Research Associate, University of Maryland System Center for
Environmental and Estuarine Studies, Horn Point Environmental Laboratory,
Cambridge, MD.

1981-1984 Graduate Research Assistant, Woods Hole Oceanographic Institution, Woods
Hole, MA.

1978-1981 National Science Foundation Graduate Fellow, WHOI/MIT Joint Program in
Oceanography and Oceanographic Engineering, Cambridge, MA and Woods
Hole, MA.

III. RESEARCH

A. Areas of professional expertise

Coastal and estuarine physical oceanography: fine sediment transport dynamics, turbulence, geophysical boundary layers, surface and internal waves, experimental design and execution, data analysis, oceanographic instrumentation. Special interest in interdisciplinary studies.

B. Publications

1. Refereed Journal Articles, Book Chapters, and Books (published and in review)

- Dickhudt, P. J., C. T. Friedrichs and L. P. Sanford (2011). "Mud matrix solids fraction and bed erodibility in the York River, USA, and other muddy environments." *Continental Shelf Research* 31(10 SUPP 1): s3-s13.
doi:10.1016/j.csr.2010.02.008. UMCES Contribution No. 4400.
- Porter, E.T., Mason, R.P., Sanford, L.P., 2013. Effects of shear stress and hard clams on seston, microphytobenthos, and nitrogen dynamics in mesocosms with tidal resuspension. *Marine Ecology Progress Series*, 479:25-46. UMCES Contribution No. 4744.
- Malpezzi, M.A., Sanford, L.P., Crump, B.C., 2013. The abundance and distribution of transparent exopolymer particles in the turbidity maximum of Chesapeake Bay. *Marine Ecology Progress Series*, 486:23-35. UMCES Contribution No. 4801.
- Palinkas, C.M., Halka, J.P., Li, M., Sanford, L.P., Cheng, P., 2014. Sediment deposition from tropical storms in the upper Chesapeake Bay: field observations and model simulations. *Continental Shelf Research*. 86:6-16.
<http://dx.doi.org/10.1016/j.csr.2013.09.012>; UMCES Contribution No. 4760.
- * Zhu, W., J. Li, and L. P. Sanford (2015), Behavior of Suspended Sediment in the Changjiang Estuary in Response to Reduction in River Sediment Supply, *Estuaries and Coasts*, 38(6), 2185-2197, doi:10.1007/s12237-014-9929-8. UMCES Contribution No. 4979.
- * Scully, M. E., A. W. Fisher, S. E. Suttles, L. P. Sanford, and W. C. Boicourt (2015), Characterization and Modulation of Langmuir Circulation in Chesapeake Bay, *Journal of Physical Oceanography*, 45(10), 2621-2639, doi:10.1175/JPO-D-14-0239.1. UMCES Contribution No. 5151.
- * Testa, J., D. Brady, J. Cornwell, M. Owens, L. Sanford, C. Newell, S. Suttles, and R. Newell (2015), Modeling the impact of floating oyster (*Crassostrea virginica*) aquaculture on sediment-water nutrient and oxygen fluxes, *Aquaculture Environment Interactions*, 7(3), 205-222, doi:10.3354/aei00151. UMCES Contribution No. 5087.
- * Fisher, A. W., L. P. Sanford, and S. E. Suttles (2015), Wind Stress Dynamics in Chesapeake Bay: Spatiotemporal Variability and Wave Dependence in a Fetch-Limited Environment, *Journal of Physical Oceanography*, 45(10), 2679-2696, doi:10.1175/JPO-D-15-0004.1. UMCES Contribution No. 5063.
- * Gurbisz, C, Kemp, WM, Sanford, LP, and Orth, RJ, (in press), Mechanisms of storm-related loss and resilience in a large submersed plant bed, *Estuaries and Coasts*.

2. Published first author abstracts

Sanford, L.P., J.P. Halka, and L. Bell, 2011. Estimating short-term shore erosion rates and associated fine sediment inputs in northern Chesapeake Bay. Abstracts of the INTERCOH 2011 Meeting, Shanghai, China, October 2011.

Sanford, L.P., R.I.E. Newell, J.E. Richardson, S.E. Suttles, S.A. Haghshenas, and S.R. Kwon, 2012. Sediment Transport Processes And Dispersion Of Biodeposits From A Shallow Oyster Aquaculture Site. Abstracts of the AGU/ASLO/TOS Ocean Sciences Meeting, Salt Lake City, Utah, February 2012.

Sanford, L.P., J. Magalen, E. Garland, J. Wands, E. Naranjo, Characterization of sediment erodibility in an urban harbor: Newark Bay, NJ, USA. Abstracts of the INTERCOH 2013 Meeting, Gainesville, FL, October 2013.

Sanford, L.P., Gurbisz, C., and Suttles, S.E., The Physical Environment of Susquehanna Flats, a Seasonally Vegetated River Delta in Upper Chesapeake Bay, USA. Abstracts of the Physics of Estuaries and Coastal Seas Meeting, Porto do Galinhas, Brazil, October 2014

- * Sanford, L.P., and J. Gao, Influences Of Wave Climate And Sea Level On Shoreline Erosion Rates In The Maryland Chesapeake Bay, Abstracts of the Coastal and Estuarine Research Federation Meeting, Portland, OR, November 2015.

3. Technical reports and non-refereed publications

Cartwright, G.C., C.T. Friedrichs, and L.P. Sanford, 2011. "In Situ Characterization Of Estuarine Suspended Sediment In The Presence Of Muddy Floccs And Pellets", Proceedings of Coastal Sediments '11, World Scientific Publishing Company.

Sanford, L.P., Suttles, S.E., 2012. Circulation and Flushing of Spesutie Narrows. SES Consulting, Cambridge, MD, p. 24 pp.

Halka, J. P., and L. P. Sanford. 2014. Contributions Of Shore Erosion And Resuspension To Nearshore Turbidity In The Choptank River, Maryland, p. 64. Report of Investigations No. 83. MD Department of Natural Resources, Maryland Geological Survey. UMCES Contribution No. 4769.

C. **Grants and Contracts**

1. Awarded

a. Active

- * "Role of a resilient submersed plant bed in mitigating the effects of increasing river-borne particulate inputs to Chesapeake Bay: Sediment dynamics". L.P. Sanford and C. Palinkas, Maryland Sea Grant College, 2/1/2014-1/31/2017, \$143,392 total budget.

- * “Natural Engineers in Ecosystem Restoration: Modeling Oyster Reef Impacts on Particle Removal and Nutrient Cycling”, L. Harris, J. Testa, E. North, L. Sanford, US Department of Commerce, NOAA-NMFS-NCBO, 10/1/14-9/30/17, \$403,757 total budget.
- * “The Impacts of Conowingo Particulates on the Chesapeake Bay”, J. Cornwell, L. Sanford, C. Palinkas, W.M. Kemp, J. Testa, Exelon Corp., 12/5/2014 - 12/31/2017, \$1,214,477 total UMCES budget.

b. expired

- * “Improving Understanding and Simulation of Shallow Water Processes in Chesapeake Bay”, L.P. Sanford, USACE, ERDC, 3/1/2013-1/31/2015, \$100,000 total budget.
- * “Long-term Impacts of Different Techniques for Shoreline Stabilization in the Maryland Chesapeake Bay”, MD Sea Grant College, L.P. Sanford and 4 others, 2/1/12-1/31/15, \$25,425 individual budget.
- * “The Role of Wind in Estuarine Dynamics”, W.C. Boicourt, L.P. Sanford, M. Li, M. Scully, and C. Friedrichs, NSF Ocean Sciences, 6/1/2011-5/31/2015, \$353,667 individual budget.
- * “Predicting Impacts of Stressors at the Land-Water Interface”, E.W. Koch and L.P. Sanford, US Department of Commerce, NOAA, 9/1/2009 – 2/31/2016, \$246,728 UMCES budget.

“Nearshore Sediment Inputs due to Shore Erosion in the Maryland Chesapeake Bay”, L.P. Sanford, Maryland Water Resources Research Center, 3/1/09-2/28/11, \$19,392.

“Refining site-selection criteria for restoration of SAV in mesohaline Chesapeake Bay: Responses to variable salinity and light conditions associated with runoff and wind events”, M. Kemp and L.P. Sanford, USACE ERDC, 6/1/10-5/30/11, \$18,277 individual budget.

“Recovery of the UMCES MUDBED Surface Buoy”, L.P. Sanford, NSF Geosciences RAPID Program, 9/1/2010-8/31/11, \$8,678.

“Beyond light: defining sediment and water flow SAV habitat requirements”, E. Koch and L.P. Sanford, USACE ERDC, 6/2/10-6/1/11, \$34,144 individual budget.

“Predicting Spatial Impacts of Bivalve Aquaculture on Nutrient Cycling and Benthic Habitat Quality”, R.Newell, J. Cornwell, and L. Sanford, NOAA, National Sea Grant Office, 10/1/10-9/30/13, \$78,905 individual budget.

2. Pending

- * “Effects of Sediment Resuspension on Nutrient Release and Ecosystem Dynamics following Storm Deposition in Chesapeake Bay”, E.T. Porter, L.P. Sanford, W.T. Pecher, MD Sea Grant Preproposal, 2/1/16-1/31/18, \$ 252,207 total budget. Not funded.

D. Presentations and Invited Seminars

Chesapeake Modeling Symposium, May 21-22, 2012, Annapolis, MD. “Physical characteristics of nearshore environments in Chesapeake Bay”

Dorchester Shore Erosion Group, November 17, 2012, Cambridge, MD, “Sea Level and the Chesapeake Bays”.

Virginia Institute of Marine Sciences Faculty Seminar, April 12, 2013. “Where does oyster poop go? Investigations of bivalve biodeposit dispersal from aquaculture farms”.

UMCES Horn Point Laboratory Faculty Seminar, Feb 12, 2014. “Investigations of bivalve biodeposit dispersal from aquaculture farms”

Chesapeake Modeling Symposium, May 28-29, 2014. Annapolis, MD. “The Physical Environment of Susquehanna Flats”

Chesapeake Biological Laboratory, November 19, 2014. Annapolis, MD. “The Physical Environment of Susquehanna Flats”

- * UMCES Board of Visitors, June 12, 2015, Cambridge, MD. “The Sediments Behind Conowingo Dam: A Perfect Storm”.

CBP-STAC Workshop on Conowingo Infill Influence on Chesapeake Water Quality, January 13-14, 2016, Annapolis, MD. “How Does the Bay Respond to Large Freshwater Events?”

E. Symposia Organized/Chaired for Professional Meetings

“Sediment Transport and Deposition in Lakes, Estuaries, and Shallow Shelves, AGU/ASLO/TOS Ocean Sciences Meeting, Salt Lake City, UT, February 2012. Session Co-chair with N. Hawley and C. Harris.

“Observations and Physical-Biogeochemical Modeling at the Fringes: Land-Water and Air-Water Interactions”, Chesapeake Modeling Symposium, Annapolis, MD May 21, 2012. Session Co-chair with Maria Tzortziou, Carl Cerco, Raleigh R. Hood , Patrick J. Neale and Kevin Rose

Co-organized the INTERCOH 2013 Meeting on Cohesive Sediment Transport, Gainesville, FL, Oct 21-24, 2013, with A Mehta and C Harris.

“Modeling the Shallows in Chesapeake Bay”, Chesapeake Modeling Symposium, Annapolis, MD May 28-29, 2014. Session Co-chair with Carl Cerco, M. Friedrichs, L. Lanerolle

- * “Sediment Dynamics in Coastal Settings: Observations and Modeling of Sediment Transport, Morphology, and Change on Event to Decadal Timescales”, AGU/ASLO/TOS Ocean Sciences Meeting, New Orleans, LA, February 2016. Session Co-organizer with C. Harris, P. Hill, J. Walsh, P. Barnard, J. Long, N. Plant, and P. Ruggiero

F. Memberships in Professional Societies

- * Active - American Geophysical Union, Coastal and Estuarine Research Federation, Association for the Sciences of Limnology and Oceanography

G. Other Professional Recognition

1. Awards and National/International Committee Memberships

- * UMCES President’s Award for Excellence in Application of Science, 2011
INTERCOH Steering Committee Member, 2009-2011; Chair, 2011 – present

2. Peer Review Activities (covering full career, present year indicated)

a. Proposals reviewed (2 in 2015)

- * NSF Oceanography (39; 2 in 2015)
- NSF Other (12)
- NSERC Canada (2)
- City University of New York (1)
- NOAA Coastal Ocean Program (8)
- NOAA Sea Grant (CA, MA, ME, NY, NH, DE, FL, National Office, TX) (27)
- NOAA National Undersea Research Center, CT and NY/NJ (8)
- Hudson River Foundation (19)
- San Francisco Bay-Delta Research Enhancement Program (1)
- National Environment Research Council, UK (4)
- Louisiana DEPSCoR Program (6)
- Elkhorn Slough Research Foundation (3)
- MITACS Canada (1)
- Maine Tech Asset Fund (4)
- NWO/Dutch Research Council (2)
- National Park Service (1)

b. Articles reviewed (9 in 2015)

- Book Chapters (10)
- Marine Geology (3)
- Harmful Algae (1)
- * Journal of Marine Research (5; 1 in 2015)
- Journal of Coastal Research (2)
- Journal of Geophysical Research (Oceans, Earth Surface) (34)
- * Journal of Sedimentary Research (4; 1 in 2015)

- * Estuaries & Coasts (26; 1 in 2015)
Estuarine, Coastal, and Shelf Science (13)
Limnology and Oceanography (22)
- * American Society of Civil Engineers Journals (5; 1 in 2015)
Journal of Oceanic Engineering (2)
Journal of Experimental Marine Biology and Ecology (1)
Journal of Great Lakes Research (2)
- * Ocean Dynamics (10; 1 in 2015)
San Francisco Estuary and Watershed Science (2)
Science of the Total Environment (1)
Scientia Marina (1)
Marine Ecology Progress Series (5)
Continental Shelf Research (8)
Environmental Science and Technology (1)
Integrated Environmental Assessment and Management (1)
Computers and Geosciences (1)
- * Journal of Marine Systems (6; 1 in 2015)
Sedimentology (2)
Journal of Atmospheric and Oceanic Technology (1)
- * Coastal Engineering (3; 1 in 2015)
Journal of the American Water Resources Association (1)
Methods in Oceanography (2)
Journal of Sea Research (2)
Journal of Hydraulic Research (2)
CBP/STAC (1)
- * Journal of Environmental Quality (2 in 2015)

c. External promotion and tenure reviews

- * 2 in 2011; 1 in 2012; 1 in 2015

d. External Review Panels

USACE ERDC Coastal and Hydraulics Laboratory Strategic Plan Review, Summer 2012

3. Invited Participation in Workshops

CBP STAC Workshop, “Using Multiple Management Models in the Chesapeake Bay: A Shallow Water Pilot Project”, April 2012, Gloucester Point, VA

CBP STAC Workshop, “Multiple Models for Management in the Chesapeake Bay (M3.2)”, February 2013, Annapolis, MD

Hudson River Foundation Workshop, “Planning for CARP II”, September 2014, New York, NY

CBP-STAC Workshop, “Conowingo Infill Influence on Chesapeake Water Quality”, January 13-14, 2016, Annapolis, MD.

H. Consulting activities

Circulation and Flushing of Spesutie Narrows, Field and Modeling Studies at APG, Aberdeen, MD, for Morris & Ritchie Associates, Georgetown, DE, 2012.

- * Part-time Consultant/Employee with HDR/Hydroqual, Inc., Mahwah, NJ. 2004-present.

IV. TEACHING AND TRAINING

- * Regular Member, USM Inter-Institutional Graduate Faculty
- * Full Member, UMCES Graduate Faculty

A. USM courses taught

MEES 608K – Fluid Dynamics in Ecology, 2 credit seminar with E. Koch, Fall 2011, 11 students

MEES 608A/B – Topics in Boundary Layers and Sediment Transport, 1 credit seminar with C. Palinkas, Spring 2013, 7 students

- * MEES 708D/E Stratified Turbulence, 2 credit seminar with N. Nidzieko, Spring 2015, 9 students
- * MEES 607 – Quantitative Methods in the Environmental Sciences, Course with E. North, J. Baker, T. Miller. or Lora Harris, Fall 2002, 2003, 2004, 2006, 2007, 2008, 2010, 2012, 2013, 2014, 2015. 4-14 students per year.

B. Education committees

Oceanography AOS Admissions Committee, Oct 2009 – 2010

UMCES Accreditation Readiness Report Committee 2013

- * UMCES Accreditation Self-Study Report 2014-2015
- * HPL Education Committee, 1990, 1991, 1993, 1996, Chair 1994-95, 2015

C. Student training

1. Degrees conferred

Rebecca Swerida, MS, MEES, May 2013, (co-advised with Evamaria Koch) “Water Flow And Sediment Grain Size As Co-Varying Sav Habitat Requirements”

- * Jia Gao, MS, MEES, May 2015, (co-advised with W Boicourt), “Influences Of Wave Climate And Sea Level On Shoreline Erosion Rates In The Maryland Chesapeake Bay”

2. Graduate students currently supervised

- * Alexander Fisher, PhD, MEES, Entered 9/2012, degree expected October 2016
- * Mathew Biddle, MS, MEES, Entered 9/2013, part-time student, co-advising with C Palinkas
- * Stephanie Barletta, MS, MEES, Entered 7/2015

3. Graduate student committees (covering full career, present year highlighted)

MEES doctoral candidates – (5 in 2015 bolded)

- * Luis Alves, Robert Doyle, Marilyn Mayer, Cathy Wigand, Louise Wooten, Judith Stribling, Fung-Chi Ko, Kim Warner, Ken Moore, Karla Heidelberg, Juanita Urban-Rich, John Petersen, Zhen Li, Clark Freise, James Hagy, Gary Smith, Jeff Ashley, Xiping Ma, Brian Badgley, Rick Bartleson, Eun-Hee Kim, Matt Johnson, Scott Lloyd, Abby Schneider, Chih-Wei Chang, Rebecca Holyoke, Dave Scheurer, Daniel Lee, **Cassie Gurbisz**, Qianru Niu, Dale Booth, **Wei Liu, Hao Wang, Emily Russ, Sarah Laperierre**

MEES Masters candidates – (1 in 2015 bolded)

- * Janet Neundorfer, David Nemazie, Kathy Gloersen, Beth Bettendorf, Jonathan Johnston, Kelly Jones, Christine Baier, Peggy Derrick, James Hagy, Kelly Merrell, Koichiro Nakanishi, Carina Chiscano, Kim Benson, Chih-Wei Chang, Abby Cohen/Schneider, Teresa Coley, Jeremy Testa, Ed Davis, Zhenghua Jin, Melissa Grant, Katie McKone, Mike Malpezzi, Renee Gruber, Mindy Forsyth, **Kevin Kahover**

External Graduate Student Committees – (1 in 2014)

Tim Cook, MS candidate, University of Delaware, Lewes, DE
Kathy Ketteridge, Ph.D. candidate, Stevens Institute of Technology, Hoboken, NJ
Lora McGuinness, Ph.D. candidate, Rutgers University, New Brunswick, NJ
Jing Lin, Ph.D. candidate, Virginia Institute of Marine Sciences, Gloucester Pt., VA
Jarrell Smith, Ph.D. candidate, Virginia Institute of Marine Sciences, Gloucester Pt., VA
Grace Cartwright, PhD candidate, VIMS, Gloucester Pt, VA
Patrick Dickhudt, MS candidate, VIMS, Gloucester Pt, VA
James Dioro, PhD candidate, UMCP Mechanical Engineering

Brent Law, MS candidate, Dalhousie University
S. Abbas Haghshenas, PhD Candidate, (unofficial, hosted 3 month visit in 2011), K. N.
Toosi University of Technology, Tehran, Iran

W. Zhu, PhD Candidate, (hosted 16 month visit 9/2012-1/2014), East China Normal
University, Shanghai, China

* Kelsey Fall, PhD Candidate, VIMS, Gloucester Pt., VA

4. Undergraduate advising

Sea Grant NSF REU Program –

* Sarah Kwon 2011 (also on Senior Thesis Committee at Eckerd College, 2012), Angela
Cole 2013, Alex Myrie 2015

D. Postdoctoral Training

None in past 5 years.

V. SERVICE

A. Popular Articles and Presentations

Worked with Jeff Brainard, Maryland Sea Grant, on article in December 2011
Chesapeake Quarterly, “Big Year for Bay Storms,Bad Year for Bay Sediment?”

Presentation to Saints Peter and Paul Middle School 7th Grade on Sea Level and the
Chesapeake Bays, December 2011

Presented public seminar on Sustainable Oyster Aquaculture, Christ Church, St.
Michaels, November 2011

Presented public seminar on “Sea Level and the Chesapeake Bays”, St. Michaels
Women’s Brunch Bunch, January 2012, St. Michaels, MD

Presented public seminar on “Sea Level and the Chesapeake Bays”, Somerset County
Garden Club, March 2012, Princess Anne, MD

Presented public seminar on Sea Level and the Chesapeake Bays, Dorchester Shoreline
Erosion Group, November, 2012

Presented public seminar on Sea Level and the Chesapeake Bays, Christ Church, St.
Michaels, February 2013

* Presented public seminar on “The Sediments Behind Conowingo Dam: A Perfect Storm”.
Chesapeake Bay Maritime Museum, November 18, 2015, St. Michaels, MD.

B. Public Service

Member of the USEPA Chesapeake Bay Program Sediment Workgroup, June 2002 – 2011.

Member of External Review Panel for USACE Engineer Research and Development Center (ERDC) Coastal and Hydraulics Laboratory (CHL) Strategic Planning, Vicksburg, MS, May-September 2012

- * Ad Hoc member of CBP Shallow Water Modeling Inter-comparison Evaluation Group, 2015-present
- * Member of CBP Expert Panel on the use of Oyster Aquaculture and Restoration Activities as Best Management Practices, 2015-2016
- * Steering Committee member for CBP STAC Workshop on “Conowingo Infill Influence on Chesapeake Water Quality”, January 13-14, 2016, Annapolis, MD.
- * Ad Hoc member of CBP Modeling Workgroup, 2010-present

C. Laboratory and Center

Laboratory Committees –

- Chair, UMCES Environmental Sustainability Council, 2008 - 2012
- * Chair, HPL Environmental Sustainability Committee, 2007-2013, Member 2013-present
- Chair, HPL Computer Committee, 1997-99 and 2012-2014; Member 1986, 1988-1994, 1999-2002, 2004-2008, 2011-2012
- Ad-Hoc Scientific Oversight Committee for Horn Point Campus Shoreline Restoration Plan, 2012-14
- * Member HPL Education Committee 2014-present

Faculty Search Committees -

- UNIX System Administrator search, 2011
- Coastal Physical Oceanographer Search Committee, Chair, 2009
- IT Director Search Committee, Chair, 2012
- CBL Food Web Ecologist Search, 2014
- * HPL Faculty Cluster Hire Search, 2015
- * UMCES Faculty Senate 2012 – present
- Chair of UMCES Presidential Review Committee 2012-2013
- Planning Committee for UMCES Convocation 2014
- * Co-chair of UMCES Computing Capacity Committee 2015-2016

UMCES Promotion and Performance Review Committees

- * 1 in 2009, 1 in 2010, 4 in 2011, 1 in 2015
- * Regular participant in HPL Open Houses
- * Participated in and helped with logistics for Chesapeake Champion Event, Sept 2014, Sept 2015