Sean Vitousek

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EMPLOYMENT

University of Illinois at Chicago (UIC) Winter 2016 - present
Research Assistant Professor
Department of Civil & Materials Engineering

United States Geological Survey (USGS) Summer 2014 - Winter 2015
Mendenhall Postdoctoral Scholar
Pacific Coastal & Marine Science Center, Santa Cruz, CA
Supervisor: Patrick Barnard
Project: Long-term shoreline change modeling, impacts of sea-level rise

Stanford University Winter 2014 - Summer 2014
Postdoctoral Scholar and Lecturer
Department of Civil & Environmental Engineering
Environmental Fluid Mechanics & Hydrology
Classes taught: CEE 262C: Modeling environmental flows

EDUCATION

Stanford University Fall 2008 - Fall 2013
Doctor of Philosophy, Civil & Environmental Engineering
Environmental Fluid Mechanics & Hydrology
Advisor: Oliver B. Fringer
Dissertation Title: *Towards Internal Wave Resolving Simulations of the Ocean*

University of Hawai'i Fall 2005 - Fall 2007
Masters of Science, Geology & Geophysics
Coastal Geology Group
Advisor: Charles H. Fletcher
Masters Thesis Title: *Nearshore Hydrodynamics at Kaanapali, Maui & Hawai'i Extreme Wave Statistics*

Princeton University 2005
Bachelor of Science in Engineering, Civil & Environmental Engineering
Senior Thesis Advisor: George W. Scherer
Senior Thesis Title: *The Mechanisms of Salt Swelling in Cement*
Graduated with Honors

Hawai'i Preparatory Academy 2001
Graduated *cum laude*

GRANTS

Understanding the past and predicting the future in a California estuary: The role of sediment dynamics on eelgrass resilience in Morro Bay, funded by Sea Grant ($250,000. Proposal recommended - funding pending receipt of the expected budget for Sea Grant in 2018). PIs: Ryan Walter, Jennifer O'Leary, **Sean Vitousek**, Lisa Needles. 2018

Arthington Mall Plaza Green Storm Water Infrastructure, funded by the National Fish and Wildlife

Foundation ($251,848). PIs: Cynthia Klein-Bania, Ben O'Connor, **Sean Vitousek**. 2017

Coastal Impacts Associated with Climate Change, funded by the U.S. Geological Survey to assess impacts of sea-level rise on the US West Coast ($300,000 over 5 years). PI: **Sean Vitousek**. 2016

Computational Fluid Dynamics for the Environmental-Water Resources Engineering Curriculum, funded by the UIC Teaching Excellence Review Committee to integrate the use of numerical modeling in the Civil & Materials Engineering curriculum ($20,000). PIs: Ben O'Connor, **Sean Vitousek**, & Karl Rockne. 2016

SELECTED HONORS AND AWARDS

Point Blue Outstanding Conservation Partner Award (for work with USGS CoSMoS Team)	2016
Argonne National Lab Director's Postdoctoral Fellowship (declined to pursue position at UIC)	2015
USGS Mendenhall Postdoctoral Fellowship	2014
Awarded invitation to PODS (Physical Ocean Oceanography Dissertation Symposium)	2014
Department of Energy (DOE) Computational Science Graduate Fellowship (CSGF)	2008 - 2012
Awarded invitation to Gene Golub SIAM Summer School (Supercomputing in the Geosciences)	2012
Peer-Selected Best Poster Award - Gene Golub SIAM Summer School	2012
Student Travel Support - IWISE meeting, Kaohsiung, Taiwan	2011
Student Travel Award - EGU general assembly meeting, Vienna, Austria	2011
Best First-Year Poster Award - CSGF annual fellows conference	2010
Sea Grant Research Assistantship	2005 - 2007
American Concrete Institute of New Jersey Achievement Award	2005
Sigma Xi Book Award for Outstanding Senior Thesis	2005

PEER-REVIEWED PUBLICATIONS

· Karoline Qasem, **Sean Vitousek**, Timothy Hoellein, and Ben O'Connor. The effect of storm events on metabolism in urban/suburban streams. 2017. (in prep).

· **Sean Vitousek**. A nonhydrostatic, generalized vertical-coordinate ocean model. 2017. (in prep).

· **Sean Vitousek**. An alternative derivation of the Boussinesq-type water wave equations. 2017. (in prep).

· Bo Zou, Karl J. Rockne, **Sean Vitousek**, and Mohamadhossein Noruzoliaee. Ecosystem and transportation infrastructure resilience to climate change in the great lakes. *Journal of Infrastructure Systems*, 2017. (under review).

· Patrick Limber, Patrick L. Barnard, **Sean Vitousek**, and Li H. Erikson. A model ensemble for projecting multi-decadal coastal cliff retreat during the 21st century. *Journal of Geophysical Research: Earth Surface*, 2017. (under review).

· Ana Rueda, **Sean Vitousek**, Paula Camus, Antonio Tomás, Antonio Espejo, Inigo J. Losada, Patrick Barnard, Li Erikson, Peter Ruggiero, Borja G. Reguero, and Fernando J. Méndez. Global classification of coastal flooding hazard climates. *Scientific Reports*, 7(5038), 2017.

· **Sean Vitousek**, Patrick L. Barnard, Charles H. Fletcher, L. Neil Frazer, Li Erikson, and Curt D. Storlazzi. Doubling of coastal flooding frequency within decades due to sea-level rise. *Scientific Reports*, 7(1):1399, 2017.

· **Sean Vitousek**, Patrick L. Barnard, and Patrick Limber. Can beaches survive climate change? *Journal of Geophysical Research: Earth Surface*, 122(4):1060–1067, 2017.

- **Sean Vitousek**, Patrick L. Barnard, Patrick Limber, Li Erikson, and Blake Cole. A model integrating longshore and cross-shore processes for predicting long-term shoreline response to climate change. *Journal of Geophysical Research: Earth Surface*, 122(4):782–806, 2017.
- Ana Rueda, Christie A. Hegermiller, José Antonio A. Antolínez, Paula Camus, **Sean Vitousek**, Peter Ruggiero, Patrick L. Barnard, Li H. Erikson, Antonio Tomás, and Fernando J. Méndez. Multiscale climate emulator of multimodal wave spectra: Muscle-spectra. *Journal of Geophysical Research: Oceans*, 122:1400–1415, 2017.
- José Antonio A. Antolínez, Fernando J. Méndez, Paula Camus, **Sean Vitousek**, E. Mauricio González, Peter Ruggiero, and Patrick Barnard. A multiscale climate emulator for long-term morphodynamics (muscle-morpho). *Journal of Geophysical Research: Oceans*, 121(1):775–791, 2016.
- Ana Rueda, Paula Camus, Antonio Tomás, **Sean Vitousek**, and Fernando J. Méndez. A multivariate extreme wave and storm surge climate emulator based on weather patterns. *Ocean Modelling*, 104:242 – 251, 2016.
- Patrick L Barnard, Andrew D Short, Mitchell D Harley, Kristen D Splinter, **Vitousek, Sean**, Ian L Turner, Jonathan Allan, Masayuki Banno, Karin R. Bryan, Andre Doria, Jeff E. Hansen, Shigeru Kato, Yoshiaki Kuriyama, Evan Randall-Goodwin, Peter Ruggiero, Ian J. Walker, and Derek K. Heathfield. Coastal vulnerability across the pacific dominated by el nino/southern oscillation. *Nature Geoscience*, 8(10):801–807, 2015.
- **Sean Vitousek** and Oliver B. Fringer. A nonhydrostatic, isopycnal-coordinate ocean model for internal waves. *Ocean Modelling*, 83(0):118 – 144, 2014.
- **Sean Vitousek** and Oliver B. Fringer. Stability and consistency of nonhydrostatic free-surface models using the semi-implicit θ-method. *International Journal for Numerical Methods in Fluids*, 72(5):550–582, 2013.
- **Sean Vitousek** and Oliver B. Fringer. Physical vs. numerical dispersion in nonhydrostatic ocean modeling. *Ocean Modelling*, 40(1):72 – 86, 2011.
- Patrick C Caldwell, **Sean Vitousek**, and Jerome P Aucan. Frequency and duration of coinciding high surf and tides along the North Shore of Oahu, Hawai'i, 1981-2007. *Journal of Coastal Research*, pages 734–743, 2009.
- **Sean Vitousek** and Charles H Fletcher. Maximum annually recurring wave heights in Hawai'i. *Pacific Science*, 62(4):541–553, 2008.

PROCEEDINGS PAPERS, BOOK CHAPTERS, TECHNICAL REPORTS, ETC.

- Li H. Erikson and Andrea O'Neill and Patrick L. Barnard and **Sean Vitousek** and Patrick Limber. Climate change-driven cliff and beach evolution at decadal to centennial time scales. *The Proceedings of Coastal Dynamics 2017*, (210):125–136, 2017.
- **Sean Vitousek** and Patrick L Barnard. A nonlinear, implicit one-line model to predict long-term shoreline change. *Coastal Sediments*, 2015.
- Charles H Fletcher, Bradley M Romine, Ayesha S Genz, Matthew M Barbee, Matthew Dyer, Tiffany R Anderson, S Chyn Lim, **Sean Vitousek**, Chris Bochicchio, and Bruce M Richmond. National assessment of shoreline change: Historical shoreline changes in the Hawaiian islands. *US Geological Survey Open-File Report*, 1051, 2011.
- Bradley M Romine, Charles H Fletcher, Ayesha S Genz, Matthew M Barbee, Matthew Dyer, Tiffany R Anderson, S Chyn Lim, **Sean Vitousek**, Christopher Bochicchio, and Bruce M Richmond. National assessment of shoreline change: A GIS compilation of vector shorelines and associated shoreline change

data for the sandy shorelines of Kauai, Oahu, and Maui; Hawai'i. *US Geological Survey Open-File Report*, 1009, 2011.

- **Sean Vitousek**, Matt Barbee, Charles H. Fletcher, Bruce. M. Richmond, and Ayesha S. Genz. Puukohola Heiau National Historic Site and Kaloko-Honokohau Historical Park, Big Island of Hawai'i: Coastal hazard analysis report. *Natural Resource Technical Report NPS/NRPC/NRTR/GRD2010/387*, 2010.
- Charles H Fletcher, Chris Bochicchio, Chris L Conger, Mary S Engels, Eden J Feirstein, Neil Frazer, Craig R Glenn, Richard W Grigg, Eric E Grossman, Jodi N Harney, et al. Geology of Hawai'i reefs. *Coral Reefs of the USA*, pages 435–487, 2008.
- **Sean Vitousek**, Charles H Fletcher, and Matthew M Barbee. A practical approach to mapping extreme wave inundation: Consequences of sea-level rise and erosion. *Proceedings of Solutions to Coastal Disasters, Oahu, Hawaii*, pages 13–16, 2008.
- **Sean Vitousek**, Charles H Fletcher, Mark A Merrifield, Geno Pawlak, and Curt D Storlazzi. Model scenarios of shoreline change at Kaanapali Beach, Maui, Hawai'i: Seasonal and extreme events. *Coastal Sediments*, 7, 2007.
- John J. Valenza, **Sean Vitousek**, and George W. Scherer. Expansion of hardened cement paste in saline solution. In P. Acker G.Pijaudier-Cabot, B. Grard, editor, *Creep, Shrinkage and Durability of Concrete and Concrete Structures*, pages 207–212. Hermes, London, 2005.

SELECTED PRESENTATIONS

- **Sean Vitousek**, Patrick Barnard, Patrick Limber, Li Erikson, and Blake Cole. The Coastal Storm Modeling System (CoSMoS) to predict flooding, shoreline erosion, and cliff failure in Southern California. Engineering Mechanics Institute, June 2017. San Diego, CA.
- **Sean Vitousek**, Patrick Barnard, Patrick Limber, Li Erikson, and Blake Cole. Predicting long-term shoreline response to climate change in Southern California. GSA Cordilleran Section, May 2017. Honolulu, HI.
- **Sean Vitousek**, Patrick Barnard, and Li Erikson. Development and application of a long-term shoreline change model for assessing climate change impacts. Ocean Sciences, February 2016. New Orleans, LA.
- **Sean Vitousek**, Oliver Fringer, and Yun Zhang. A model to simulate nonhydrostatic internal gravity waves in the ocean. AGU Fall Meeting, December 2015. San Francisco, CA (invited).
- **Sean Vitousek** and Patrick L Barnard. A nonlinear, implicit one-line model to predict long-term shoreline change. Coastal Sediments, May 2015. San Diego, CA (poster).
- **Sean Vitousek**. Towards internal wave resolving simulations of the ocean. Physical Oceanography Dissertation Symposium (PODS), October 2014. Lihue, HI.
- **Sean Vitousek** and O.B. Fringer. A nonhydrostatic isopycnal-coordinate ocean model. Ocean Sciences, February 2014. Honolulu, HI.
- **Sean Vitousek** and O.B. Fringer. A nonhydrostatic isopycnal-coordinate ocean model. CSGF Annual Conference, July 2013. Washington DC.
- **Sean Vitousek** and O.B. Fringer. A nonhydrostatic isopycnal model for simulation of internal gravity waves. Gordon Research Conference, June 2013. Biddeford, ME (poster).
- **Sean Vitousek**. A nonhydrostatic, isopycnal coordinate ocean model. SCREAM seminar series, April 2013. Stanford, CA (invited).

- **Sean Vitousek** and O.B. Fringer. Grid resolution requirements in nonhydrostatic internal wave modeling. SIAM CSE, February 2013. Boston, MA (invited).
- **Sean Vitousek** and O.B. Fringer. Numerical diffusion and dispersion in nonhydrostatic internal wave modeling. IMUM, August 2012. Delft, Holland.
- **Sean Vitousek** and O.B. Fringer. Modeling internal waves in the South China Sea. CSGF Annual Conference, July 2012. Washington DC (poster).
- **Sean Vitousek** and O.B. Fringer. Modeling internal waves in the South China Sea. Gene Golub SIAM summer school, July 2012. Monterey Bay, CA (poster).
- **Sean Vitousek**. Modeling oceanic internal waves: Why we should care about nonhydrostatic effects. Spring seminar series, Geoscience Department, SFSU, March 2012. San Francisco, CA (invited).
- **Sean Vitousek** and O.B. Fringer. Grid resolution requirements in internal wave modeling. IWISE meeting, March 2012. Kaohsiung, Taiwan.
- **Sean Vitousek** and O.B. Fringer. Grid resolution requirements in modeling internal waves. Ocean Sciences, February 2012. Salt Lake City, UT.
- **Sean Vitousek** and O.B. Fringer. Nonhydrostatic equations in ocean modeling. ICIAM Waves conference, July 2011. Vancouver, BC (invited).
- **Sean Vitousek** and O.B. Fringer. Towards Navier-Stokes simulations of the ocean. CSGF Annual Conference, July 2011. Washington DC (poster).
- **Sean Vitousek** and O.B. Fringer. Physical vs. numerical dispersion in nonhydrostatic ocean modeling. EGU General Assembly, EGU2011-385., April 2011. Vienna, Austria.
- **Sean Vitousek** and O.B. Fringer. A call for increased resolution: Physical vs. numerical dispersion in ocean modeling. CSGF Annual Conference, July 2010. Washington DC (poster).
- **Sean Vitousek**, Charles H. Fletcher, and Curt Storlazzi. Modeling alongshore propagating tides and currents around West Maui, Hawai'i and implications for transport using Delft3d. AGU Fall meeting. OC11C-1524., December 2006. San Francisco, CA (poster).
- **Sean Vitousek**, Charles H. Fletcher, Mark A Merrifield, and Geno Pawlak. Shoreline change in response to extreme tides and along-shore forcing modeled by Delft3d. Shoreline Change Conference, May 2006. Charleston, SC.
- **Sean Vitousek**, John J. Valenza, and George W. Scherer. Crystallization damage from ice and salt. 107th Annual Meeting of the American Ceramic Society, Cements Division, April 2005. Baltimore, MD.

TEACHING EXPERIENCE

CME 494: Introduction to Matlab University of Illinois - Chicago, Fall 2017
Instructor

CME 211: Fluid Mechanics and Hydraulics University of Illinois - Chicago, Spring 2017, Fall 2017
Instructor

CME 494: Intermediate Fluid Mechanics University of Illinois - Chicago, Fall 2016
Instructor

CEE 262C: Modeling environmental flows Stanford University, Spring 2014
Instructor

CEE 262A: Hydrodynamics Stanford University, Fall 2011
Teaching Assistant *Prof. Oliver Fringer*

SERVICE

Ad hoc reviewer for Ocean Modelling, Journal of Fluid Mechanics, Ocean Dynamics, Applied Ocean Research, Ocean Engineering, Journal of Geophysical Research - Earth Surface, Natural Hazards, Experiments in Fluids, Water, Sea Grant, NSF, Regional Environmental Change, Journal of Marine Systems

EXPERIENCE

Summer Research Practicum Lawrence Berkeley National Lab, Summer 2011
Applied Numerical Algorithms Group *Supervisor: Phil Collela*

Conducted research and softward development on Adaptive Mesh Refinement (AMR) models of the incompressible Navier-Stokes equations as part of CSGF practicum.

ACTIVITIES

Princeton University Varsity Volleyball 2001-2005

Awarded Morgan McKenzie Volleyball award for Most Outstanding Player 2005
Academic All-Ivy Team, EIVA All-Academic Team selection

TRAINING

Modeling Software	Training courses in Delft3D, SWAN, XBeach, COAWST/ROMS
Field Observation	RTK GPS, survey stations, terrain LIDAR, structure-from-motion
Vehicle Training	DOI Off-road vehicle and ATV training, Small boat training
Programming Languages	C/C++, MATLAB
High Performance Computing	MPI/CUDA, PETSc
Text processing	LaTeX, Microsoft Office Suite
Graphics	Adobe Suite
GIS	arcGIS

REFERENCES

Dr. Patrick Barnard
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U.S. Geological Survey
Pacific Coastal and Marine Science Center
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Santa Cruz, CA, USA 95060
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Professor, Associate Dean for Academic Affairs
Department of Geology & Geophysics
University of Hawaii
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