

Curriculum vitae
JOHN P. CRIMALDI

EDUCATION

- Ph.D. **Stanford University**, Civil and Environmental Engineering, 1998
Turbulence structure of velocity and scalar fields over a bed of model bivalves
Advisor: Jeffrey R. Koseff
- M.S. **Stanford University**, Environmental Fluid Mechanics and Hydrology, 1992
- B.S.E. **Princeton University**, Mechanical and Aerospace Engineering, 1987

POSITIONS HELD

- 2015 - **Professor**, *University of Colorado at Boulder*
- 2013 - **Associate Chair for Graduate Education**, CEAE, *University of Colorado*
- 2007 - 2015 **Associate Professor**, *University of Colorado at Boulder*
- 2000 - 2007 **Assistant Professor**, *University of Colorado at Boulder*
- 1999 - 1999 **Lecturer**, *Stanford University*
- 1998 - 1999 **Postdoctoral Researcher**, (Advisor: Jeffrey R. Koseff) *Stanford University*
- 1992 - 1998 **Graduate Research Assistant**, *Stanford University*
- 1987 - 1991 **Engineer**, *Northrop Aircraft Company*, Pico Rivera, California

AWARDS AND HONORS

- Dean's Faculty Fellow*: College of Engineering & Applied Science, 2020-2021
- Fellow*: American Society of Limnology and Oceanography, 2019 - present
- Service Award*: Department of Civil, Environmental & Architectural Engineering, 2019
- Research Development Award*: Department of Civil, Environmental & Architectural Engineering, 2016
- Affiliated Faculty*: Dept. of Applied Mathematics, University of Colorado Boulder, 2010-present
- Faculty Research Fellow*: University of Colorado, 2008-2009
- CAREER Award*: National Science Foundation, Biological Oceanography Program, 2004-2009
- Young Researcher Award*: Department of Civil, Environmental & Architectural Engineering, 2004
- Charles Hutchinson Teaching Award*: College of Engineering, University of Colorado, 2003
- Department Teaching Award*: Civil, Environmental & Environmental Engineering, 2002
- Junior Faculty Development Award*: University of Colorado, 2001
- Graduate Fellowship*: Achievement Rewards for College Scientists Foundation, 1995-1996
- Graduate Fellowship*: Office of Naval Research, 1991-1994
- Donald J. Dyke Award for Excellence in Undergraduate Research*: Princeton University, 1987

RESEARCH

PEER-REVIEWED JOURNAL PAPERS

* denotes papers with a student or postdoctoral co-author

- *42. Roth, E.J., Neupauer, R.M., Mays, D.C., Sather, L.J., and J.P. Crimaldi. "Wall Effect Mitigation Techniques for Experiments With Planar Walls," *Transport in Porous Media* **132**:423-441, 2020
- *42. Gumaste, A., Coronas-Samano, G., Hengenius, J., Axman, R., Connor, E.G., Baker, K.L., Ermentrout, B., Crimaldi, J.P. and J.V. Verhagen. "A Comparison Between Mouse, in Silico, and Robot Odor Plume Navigation Reveals Advantages of Mouse Odor Tracking," *eNeuro* **7**, no. 1, 2020
- *41. True, A. and **J.P. Crimaldi**, "High dynamic range PIV analysis of low Reynolds number inhalant flows," *Physics of Fluids* **31**, 103605, 2019
- *40. Victor, J.D., Boie, S.D., Connor, E.G., **Crimaldi, J.P.**, Ermentrout, G.B., and K.I. Nagel, "Olfactory navigation and the receptor nonlinearity," *Journal of Neuroscience* **39** (19) 3713-3727, 2019
- *39. Boie, S.D., Connor E.G., McHugh M.K., Nagel K.I., Ermentrout G.B., **Crimaldi J.P.**, & J.D. Victor, "Information-theoretic analysis of realistic odor plumes: What cues are useful for determining location?" *PLoS Computational Biology* **14**(7): e1006275, 2018
- *38. Alvarez-Salvado, E. Licata, A., Connor, E.G., McHugh, M.K., King, B., Stavropoulos, N., **Crimaldi, J.P.** and K.I. Nagel, "Elementary sensory-motor transformation underlying olfactory navigation in walking flies," *eLife* **7**:e37815, 2018.
- *37. *Connor, E.G., *McHugh, M.K. & **J.P. Crimaldi**, "Quantification of airborne odor plumes using planar laser-induced fluorescence" *Experiments in Fluids* **59**:137, 2018
- *36. *True, A.C. and **J.P. Crimaldi**. Hydrodynamics of Viscous Inhalant Flows. *Physical Review E* **95**, no. 5, 2017.
- *35. *Pratt, K.R., True, A. and **J.P. Crimaldi**. Turbulent Clustering of Initially Well-mixed Buoyant Particles on a Free-surface by Lagrangian Coherent Structures. *Physics of Fluids* **29**, no. 7, 2017.
- *34. *Shoaei, F. and **J.P. Crimaldi**. Effect of Instantaneous Stirring Process on Mixing Between Initially Distant Scalars in Turbulent Obstacle Wakes. *Experiments in Fluids* **58**, no. 4, 2017.
- *33. *Bell, A.F. and **J.P. Crimaldi**. Effect of steady and unsteady shear on chemoattractant plume formation around an egg: implications for rates of fertilization for motile sperm. *Journal of Marine Systems* **148**, 236-248, 2015.
- *32. *Pratt, K.R., Meiss, J.D. and **J.P. Crimaldi**. Reaction Enhancement of Initially Distant Scalars by Lagrangian Coherent Structures. *Physics of Fluids* **27**, no. 3, 035106, 2015.
- *31. Soltys, M A, and **J.P. Crimaldi**. Joint Probabilities and Mixing of Isolated Scalars Emitted From Parallel Jets. *Journal of Fluid Mechanics* **769**, 130-153, 2015.
- *30. **Crimaldi, J.P.** and *T.R. Kawakami. Reaction enhancement in an unsteady obstacle wake: Implications for broadcast spawning and other mixing-limited processes in marine environments. *Journal of Marine Systems* **114**,130-137, 2015.

- *29. **Crimaldi, J.P.** and R.A. Zimmer. The physics of broadcast spawning in benthic invertebrates. *Annual Review of Marine Science* **6**, 141-165, 2014. (Invited review article)
- *28. **Crimaldi, J.P.** and *T.R. Kawakami. Reaction of initially distant scalars in a cylinder wake. *Physics of Fluids* **25**, 053604, 1-16, 2013.
- *27. Koehl, M.A.R., **Crimaldi, J.P.**, and *D.E. Dombroski. Wind chop and ship wakes determine hydrodynamic stresses on larvae settling on different microhabitats in fouling communities. *Marine Ecology Progress Series* **479**, 47-62, 2013.
- *26. *Cullis, J. D. S., **Crimaldi, J. P.** and D. M. McKnight. Hydrodynamic shear removal of the nuisance stalk-forming diatom *Didymosphenia geminata*. *Limnology & Oceanography: Fluids & Environments* **3**, 256-26, 2013.
25. **Crimaldi, J.P.** The role of structured stirring and mixing on gamete dispersal and aggregation in broadcast spawning. *The Journal of Experimental Biology* **215**, 1031-1039, 2012. (Invited review, Cover article)
- *24. *Pontius, F.W., **Crimaldi, J.P.** and G.L. Amy. Virus passage through compromised low-pressure membranes: A particle tracking model. *Journal of Membrane Science* **379**, 249-259, 2011.
- *23. *Soltys, M.A. and **J.P. Crimaldi**. Scalar interactions between parallel jets measured using a two-channel PLIF technique. *Experiments in Fluids* **50**, 1625-1632, 2011.
- *22. *Larsen, L.G., Aiken, G.R., Harvey, J.W., Noe, G.B. and **J.P. Crimaldi**. Using fluorescence spectroscopy to trace seasonal DOM dynamics, disturbance effects, and hydrologic transport in the Florida everglades. *Journal of Geophysical Research - Biogeosciences* **11**, G03001, 1-15, 2010.
- *21. *Larsen, L.G., Harvey, J.W. and **J.P. Crimaldi**. Morphologic and transport properties of natural organic floc. *Water Resources Research* **45**, W01410, 1-13, 2009.
- *20. *Larsen, L.G., Harvey, J.W., Noe, G.B. and **J.P. Crimaldi**. Predicting organic floc transport dynamics in shallow aquatic ecosystems: Insights from the field, the laboratory, and numerical modeling. *Water Resources Research* **45**, W0141, 1-13, 2009.
- *19. *Larsen, L.G., Harvey, J.W. and **J.P. Crimaldi**. Predicting bed shear stress and its role in sediment dynamics and restoration potential of the everglades and other vegetated flow systems. *Ecological Engineering* **35**, 1773-1785, 2009.
- *18. **Crimaldi, J.P.**, *Cadwell, J.R. and J.B. Weiss. Reaction enhancement of isolated scalars by vortex stirring. *Physics of Fluids* **20**, 073605, 1-10, 2008.
17. **Crimaldi, J.P.** Planar laser induced fluorescence in aqueous flows. *Experiments in Fluids* **44**, 851–863, 2008. (Invited Review Article)
- *16. *Dombroski, D.E. and **J.P. Crimaldi**. The accuracy of acoustic Doppler velocimetry (ADV) measurements in turbulent boundary layer flows. *Limnology and Oceanography: Methods* **5**, 23-33, 2007.
- *15. *Larsen, L.G., J.W. Harvey and **J.P. Crimaldi**, A delicate balance: Feedback between landscape morphology, water flow, vegetation dynamics, and sediment transport in a low-gradient, lotic peatland ecosystem, *Ecological Monographs* **77**, 591-614, 2007.

14. **Crimaldi, J.P.**, J.R. Koseff and S.G. Monismith, "Structure of mass and momentum fields over a model aggregation of benthic filter feeders," *Biogeosciences* **4**, 493-532, 2007.
13. **Crimaldi, J.P.** and J.R. Koseff. Structure of turbulent plumes from a momentumless source in a smooth bed. *Environmental Fluid Mechanics* **6**, 573-592, 2006.
- *12. *Larsen, L.G. and **J.P. Crimaldi**. The effect of photobleaching on PLIF. *Experiments in Fluids* **41**, 803-812, 2006.
11. **Crimaldi, J.P.**, Koseff, J.R. and S.G. Monismith. A mixing-length formulation for the turbulent Prandtl number in wall-bounded flows with bed roughness and elevated scalar sources. *Physics of Fluids* **18**, 095102, 2006.
- *10. **Crimaldi, J.P.**, *Hartford, J.R. and J.B. Weiss. Reaction enhancement of point sources due to vortex stirring. *Physical Review E* **74**, 016307, 1-4, 2006.
- *9. **Crimaldi, J.P.** and *H.S. Browning. A proposed mechanism for turbulent enhancement of broadcast spawning efficiency. *Journal of Marine Systems* **49**, 3-18, 2004.
8. Moore, P.A. and **J.P. Crimaldi**. Odor landscapes and animal behavior: tracking odor plumes in different physical worlds. *Journal of Marine Systems* **49**, 55-64, 2004.
7. **Crimaldi, J.P.**, Thompson, J.K. and J.R. Koseff. Hydrodynamics of larval settlement: the structure of turbulent stress events at model recruitment sites. *Limnology and Oceanography* **47**, 1137-1151, 2002.
6. **Crimaldi, J.P.**, Wiley, M.B. and J.R. Koseff. The relationship between mean and instantaneous structure in turbulent passive scalar plumes. *Journal of Turbulence* **3**, 014, 1-24, 2002. (This article was also selected by editors of the Institute of Physics Publishing to appear in the *IOP Select* collection.)
5. **Crimaldi, J.P.**, Koehl, M.A.R. and J.R. Koseff. Effects of the resolution and kinematics of olfactory appendages on the interception of chemical signals in a turbulent odor plume. *Environmental Fluid Mechanics* **2**, 35-63, 2002.
4. Koehl, M. A. R., Koseff, J. R., **Crimaldi, J.P.**, McCay, M.G., Cooper, T., Wiley, M. B. and P. A. Moore. Lobster Sniffing: Antennule Design and Hydrodynamic Filtering of Information in an Odor Plume. *Science* **294**, 1948-1951, 2001.
3. **Crimaldi, J.P.** and J.R. Koseff. High-resolution measurements of the spatial and temporal scalar structure of a turbulent plume. *Experiments in Fluids* **31**, 90-102, 2001.
2. **Crimaldi, J.P.** The effect of photobleaching and velocity fluctuations on single-point LIF measurements. *Experiments in Fluids* **23**, 325-330, 1997.
1. **Crimaldi, J.P.**, Britt, R.T. and W.P. Rodden. Response of the B-2 aircraft to nonuniform spanwise turbulence. *Journal of Aircraft* **30**, 652-659, 1993.

INVITED TALKS

"Hydrodynamics of inhalant flow at intermediate Reynolds numbers: implications for feeding, sensing, and respiration" Bulletin of the American Physical Society, Division of Fluid Dynamics, Denver, CO, November 19-21, 2017.

"Olfactory Navigation: Structure of Odor Plumes in the Natural Environment," Insect Navigation Meeting, Mathematical Sciences Research Institute Workshop Series, Janelia Research Laboratory, Ashburn, VA, Dec. 7, 2016.

"Instantaneous stirring processes in turbulent and structured flows: Implications for mixing and reactions in ecological systems," Physical-biological interactions from the individual organism to the global scale, Inter-University Institute for marine sciences in Eilat (IUI), Israel, October 6-10, 2013. (Keynote talk)

"Hooking up: The role of fluid stirring and chemotaxis in external fertilization strategies," Hopkins Marine Station (Stanford University), Pacific Grove, CA, March 9, 2012.

"The role of turbulence and structured stirring on fertilization success in broadcast spawners," Physical Micro-Environments Modulating Biological Interactions in the Ocean, Aspen Center For Physics Winter Conference, January 16 - January 22, 2011.

"The role of structured stirring and mixing on gamete dispersal and aggregation in broadcast spawning," Biophysics, Bioenergetics, and the Mechanistic Approach to Ecology, Journal of Experimental Biology Symposium, Cambridge, UK, March 14-18, 2011.

"Coral Fertilization as a Model System for Reactive Stirring and Mixing in Structured Flows," Fluid Mechanics Seminar Series, Stanford University, January 4, 2011.

"The Role of Structured Stirring on Reaction Rates in Complex Fluid Flows," Environmental Fluid Mechanics Seminar Series, Massachusetts Institute of Technology, Cambridge MA, October 6, 2011.

"Experimental and numerical studies of reactive mixing in an ecological context," U.S. Bureau of Reclamation, July 30th, 2009.

"Turbulent transport of chemical plumes," Origins and Evolution of Chemoreception Catalysis Meeting, National Evolutionary Synthesis Center, Durham, NC, June 3-6, 2007.

"Stirring and Mixing of Reactive Scalars in the Context of Coral Spawning," Department of Applied Math, University of Colorado, April 20th, 2006.

"Stirring and mixing of multiple scalars: The role of turbulence in broadcast spawning by benthic invertebrates," Georgia Institute of Technology, April 28th, 2005.

"Interaction between turbulence and biology: Numerical and experimental investigations from an engineering perspective," University of Michigan Biological Station Seminar Series. Pelston, Michigan. June 24, 2004.

"Experimental and numerical modeling of physical-biological processes," BIOFLOW Workshop 2, Rostock University, Rostock, Germany, September 8-11, 2003.

"Using lobsters to find landmines: information content in turbulent plumes," Colorado School of Mines, September 2000.

SELECT PRESENTATIONS AT NATIONAL AND INTERNATIONAL CONFERENCES

* denotes presentations with a student co-author

*Connor, E.G., True, A. Holland, M. and **J.P. Crimaldi**, "Fluid Exchange dynamics during respiratory-type flows. Oral Presentation," Bulletin of the American Physical Society, Division of Fluid Mechanics, Seattle, WA, November 23, 2019

*Connor, E.G., "Convective Exchange During Respiratory-type Flows," Hydrologic Sciences and Water Resources Seminar Series. Boulder, CO, October 2, 2019.

Hurst, A.A., Anderson, R.S., and **J.P. Crimaldi**, "Knick zone formation and migration by plucking of blocks *at edges of steps," American Geophysical Union Fall Meeting, December 9-13, 2019

*Sather, L.J., Roth, E.J., **Crimaldi, J.P.**, Neupauer, R.M. and D.C. Mays, "How Plume Interfaces, Velocity Fields, and Heterogeneity Structures Interact to Enhance Mixing and Reaction," American Geophysical Union Fall Meeting, December 9-13, 2019

*Neupauer, R.M., Roth, E.J., Reising, L., **Crimaldi, J.P.** and DC Mays, "Spreading, Mixing, and Reaction in Periodic Radial Subsurface Flow," American Geophysical Union Fall Meeting, December 9-13, 2019

*Roth, E.J., Neupauer, R.M., Reising, L., **Crimaldi, J.P.** and D.C. Mays, "Validation of Wall Effect Mitigation Techniques for Porous Media Experiments," American Geophysical Union Fall Meeting, December 9-13, 2019

*Neupauer, R.M., Reising, L.J., Roth, E.J., **Crimaldi, J.P.** and D.C. Mays, "Laboratory and Numerical Investigation of Active Spreading, Mixing, and Reaction in Porous Media," MODFLOW and More 2019, Golden, CO, June, 2019

*Neupauer, R.M., Reising, L.J., Mays, D.C., **Crimaldi, J.P.** and E.J. Roth, "Using Passive Spreading by Aquifer Heterogeneity to Inform the Design of Active Spreading Systems for In Situ Groundwater Remediation," 2019 World Environmental and Water Resources Congress, American Society of Civil Engineers, Pittsburgh, PA, May 2019

*Wheeler, J., True, A., **Crimaldi, J.P.**, & R. Stocker, "Phytoplankton motility and behavioral switching in turbulence," Microscale Ocean Biophysics Meeting, Whistler, Canada, January 11-16, 2019

Izydorczak M., Gumaste A., Baker K.L., **Crimaldi J.P.**, Nagel, K., Verhagen J.V., "Mouse detection of fluctuating odors based on intermittency," Society for Neuroscience (SfN) meeting, Chicago, Ill., USA, November 2019

Gumaste A., Baker K.L., **Crimaldi J.P.**, Nagel, K., Verhagen J.V., "Mouse detection of fluctuating odors based on intermittency," European Chemoreception Research Organization (ECRO) meeting, Trieste, Italy, September 2019

*Reising, L.J., Neupauer, R.M., Mays, D.C., **Crimaldi, J.P.**, & E.J. Roth, "Effects of active and passive spreading on mixing and reaction during groundwater remediation by engineered injection and extraction," American Geophysical Union Fall Meeting, December 10-14, 2018

*Hurst, A.A., Anderson, R.S., and **J.P. Crimaldi**, "River channel lowering by upstream migration of bedrock steps," presented at 2018 Fall Meeting, AGU, Washington, D.C., Dec. 10-14, 2018.

*Roth, E.J., **Crimaldi, J.P.**, Mays, D.C., Neupauer, R.M., & L.J. Reising, "Novel Experimental Methods to Replicate Solute Transport using Laser-Induced Fluorescence in Refractive Index Matched Porous Media," American Geophysical Union Fall Meeting, December 10-14, 2018

*Gumaste, A, Baker, K, Connor, E, **Crimaldi, J.P.**, Nagel, K, Verhagen, J, "Mouse detection of fluctuating odors based on odor plume properties," Society for Neuroscience Annual Meeting, San Diego, CA. November 3-7, 2018

Hengenius, J., Papale, A. E. , Liu, A., **Crimaldi, J.P.**, Urban, N.N., and G.B. Ermentrout, "The behavior of biologically-inspired olfactory navigation algorithms in realistic turbulent odor environments," Society for Neuroscience Annual Meeting, San Diego, CA. November 3-7, 2018.

*Connor, E.G. and **J.P. Crimaldi**, "Experimental Investigations of Airborne Odor Plumes," Bulletin of the American Physical Society, Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, Georgia, November 18-20, 2018

*Victor, J.D, Boie, S.D, Connor, E.G., **Crimaldi, J.P.**, Ermentrout, G.B, and K.I. Nagel, "Optimal encoding of odor concentration for olfactory navigation is approximated by the Hill nonlinearity," Society for Neuroscience Annual Meeting, November 3-7, 2018.

*Alvarez-Salvado, E. Licata, A., Connor, E., McHugh, M., King, B., Stavropoulos, N., **Crimaldi, J.P.**, Nagel, K.I., "Algorithms and Circuits for Olfactory Navigation.," KITP Workshop on Sensory Navigation. Santa Barbara, CA. 2018 (INVITED TALK)

*Jinn, J., Connor, E., **Crimaldi, J.P.** & Jacobs, L.F., "Making Sense of Scents". California Rescue Dog Association Annual Meeting, San Luis Obispo, CA, July 14, 2018 (INVITED SPEAKER)

*Jinn, J., Connor, E., **Crimaldi, J.P.** & Jacobs, L.F., "Olfactory Navigation in Trained Search Dogs: How Natural Meteorological Conditions Influence Search Strategy." 126th Annual Meeting of the American Psychological Association, San Francisco, August 10, 2018 (INVITED SPEAKER)

*Baker, K.L., Gumaste, A., Morse, T., Coronas-Samano, G., McHugh, M., **Crimaldi, J.P.**, & J.V. Verhagen, "Assessment of mouse navigation in a virtual reality odor environment," Association for Chemoreception Sciences. Bonita Springs, FL 2018

Coronas-Samano G., Gumaste A., Axman R., Hengenius J., Ermentrout B., **Crimaldi J.P.**, & J.V. Verhagen, "Odor plume source navigation algorithms evaluated in an Arduino robot using pair of spatially separated sensors," Society for Neuroscience (SfN) meeting. San Diego, CA 2018

*True, A.C. and **J.P. Crimaldi**, "Multi-time lag type PIV analysis of low Reynolds number inhalant flows" Bulletin of the American Physical Society, Division of Fluid Mechanics, Denver, CO, November 19-21, 2017

*Connor, E., True, A.C. and **J.P. Crimaldi**, " Hydrodynamics of Low Reynolds Respiratory-type Flows" Bulletin of the American Physical Society, Division of Fluid Mechanics, Denver, CO, November 19-21, 2017

*True, A.C. and **J.P. Crimaldi**, "Three-dimensional laser-induced fluorescence measurements of turbulent chemical plumes" Bulletin of the American Physical Society, Division of Fluid Mechanics, Denver, CO, November 19-21, 2017

*Roth, E.J., Mays, D.C., Neupauer, R and **J.P. Crimaldi**, "Quantification and Control of Wall Effects in Porous Media Experiments," American Geophysical Union Fall Meeting, New Orleans, December 11-15, 2017

Boie, S.D., **J.P. Crimaldi**, Ermentrout, G.B., McHugh, M., Nagel, K.I., and Victor, J.D. "Olfactory navigation: information theoretic scene analysis motivating a history-based algorithm." Computational and Systems Neuroscience Meeting, Salt Lake City, Utah, February 2017

*Boie, S.D., Connor, E., McHugh, M., **J.P. Crimaldi**, Nagel, K.I., Ermentrout, G.B., Victor, J.D. "Information-theoretic analysis of natural olfactory landscapes". Society for Neuroscience Annual Meeting, Washington DC, November 11-15, 2017

*Gumaste, A., Baker, K., Coronas-Samano, G., McHugh, M., **J.P. Crimaldi**, Verhagen, J., "Mouse navigation in a complex odor environment," Society for Neuroscience Annual Meeting, Washington DC, November 11-15, 2017

*Baker, K., Gumaste, A., Morse, T., Coronas-Samano, G., McHugh, M., **J.P. Crimaldi**, Verhagen, J., "Assessment of Mouse Navigation in a Virtual Reality Odor Environment," Society for Neuroscience Annual Meeting, Washington DC, November 11-15, 2017

*Álvarez-Salvado, E., McHugh, M., **J.P. Crimaldi**, Nagel, K., "Algorithms underlying olfactory navigation in walking fruit flies," Society for Neuroscience Annual Meeting, Washington DC, November 11-15, 2017

J.P. Crimaldi, Dynamics of Motile Phytoplankton in Turbulence, Microorganisms in Turbulent Flows, Leiden, Netherlands, Feb 8-12, 2016

*Winters, M.A., True, A.C., and **J.P. Crimaldi**. The Hydrodynamics of Cyclic Inhalant-Exhalant Flows. Poster presented at the 2016 Society for Advancement of Chicanos/Hispanics and Native Americans in Science National Conference, October 13-15, 2016. Long Beach, CA.

*True A.C., Winters M.A., and **J.P. Crimaldi**, "Hydrodynamics of Low Re Inhalant-Exhalant Flows." Microscale Ocean Biophysics Meeting, Eilat, Israel, 2016.

*True A.C. and **J.P. Crimaldi**, "Laser-based investigations in biophysical problem,." Microscale Ocean Biophysics Meeting, Eilat, Israel, 2016.

*Roth, E.J., Mays, D.C., and **J.P. Crimaldi**, "Mixing Experiments in Refractive-Index-Matched Porous Media" American Geophysical Union Fall Meeting, San Francisco, CA, December 16, 2016.

*True A.C. and **J.P. Crimaldi**, "Fluid Mechanics of Inhalant Siphon Flows." AGU/ASLO Ocean Sciences Meeting, New Orleans, 2016.

Du Clos K., **J.P. Crimaldi**. "Particle Image Velocimetry (PIV) Measurements of Suspension-Feeding Velocities." AGU/ASLO Ocean Sciences Meeting, New Orleans, 2016.

J.P. Crimaldi, "Dynamics of motile phytoplankton in turbulence: Laboratory investigation of microscale patchiness." AGU/ASLO Ocean Sciences Meeting, New Orleans, 2016

*Pratt K., **J.P. Crimaldi** "Impacts of Non-Divergence-Free Flows on the Coalescence of Initially Distant Buoyant Scalars on a Turbulent Free Surface." AGU/ASLO Ocean Sciences Meeting, New Orleans, 2016.

*Pratt, K. and **J.P. Crimaldi**, "Lagrangian Coherent Structures as predictors for fertilization hotspots in broadcast spawning," Workshop on Microscale Ocean Biophysics, Aspen Center for Physics, Aspen, CO, January 11-15, 2015. (AWARDED BEST STUDENT POSTER)

*True, A. and **J.P. Crimaldi**, "Laboratory investigations of turbulence-induced microscale phytoplankton patchiness," Workshop on Microscale Ocean Biophysics, Aspen Center for Physics, Aspen, CO, January 11-15, 2015.

J.P. Crimaldi, "Turbulent aggregation: implications for microscale marine ecology," Workshop on Microscale Ocean Biophysics, Aspen Center for Physics, Aspen, CO, January 11-15, 2015.

*Pratt, K. and **J.P. Crimaldi**, "Lagrangian Coherent Structures are templates for reactions between initially distant scalars," *Bulletin of the American Physical Society*, Volume 59, Number 20, San Francisco, CA, November 23-25, 2014.

*Shoaei, F. and **J.P. Crimaldi**, "The effect of viscosity and non-Newtonian rheology on reaction enhancement between two initially distant scalars," *Bulletin of the American Physical Society*, Volume 59, Number 20, San Francisco, CA, November 23-25, 2014.

Du Clos, K.T., Jumars, P.A. and **J.P. Crimaldi**, "Modeling the flow fields around active filter feeders," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Honolulu, Hawaii, February 23-28, 2014.

Crimaldi, J.P., *Soltys, M.A., *Bell, A., *Shoaei, F., *Pratt, K., "Multiscale investigations of stirring and mixing processes in broadcast spawning by benthic invertebrates," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Honolulu, Hawaii, February 23-28, 2014.

*Shoaei, F., **Crimaldi, J.P.**, "Experimental investigation of the effect of unsteady obstacle wakes on stirring and mixing of gamete filaments," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Honolulu, Hawaii, February 23-28, 2014.

*Soltys, M.A., Shoaei, F. and **Crimaldi, J.P.**, "Turbulent generation of scalar covariance between two initially distant scalars: implications for enhanced mixing and reaction," *Bulletin of the American Physical Society*, Volume 58, Number 18, Pittsburgh, PA, November 25th, 2013.

*Soltys, M.A. and **J.P. Crimaldi**, "Interactions between turbulent mixing and coral reproduction," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

Crimaldi, J.P. and *A.F. Bell, "Hooking up: The role of fluid stirring and chemotaxis in external fertilization strategies," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

*Kawakami, T.R. and **J.P. Crimaldi**, "The role of obstacle wakes in enhancing gamete coalescence in broadcast spawning," American Society of Limnology and Oceanography - Ocean Sciences Meeting, Salt Lake City, Utah, February 20-24, 2012.

Crimaldi, J.P., "Structured mixing in obstacle wakes: Implications for broadcast spawning," Ocean Sciences Meeting, Portland, Oregon, February 22-26, 2010.

*Cadwell, J., Keller, K., and **J.P. Crimaldi**, "Physical Mechanisms that Govern Broadcast Spawning Fertilization Success," Ocean Sciences Meeting, in Portland, Oregon, February 22-26, 2010.

Keller, K., *Cadwell, J., and **J.P. Crimaldi**, "Broadcast Spawning: Effects of Biological Processes on Fertilization Efficiency in Vortex Flows," Ocean Sciences Meeting, in Portland, Oregon, February 22-26, 2010.

Crimaldi, J.P., *Cadwell, J. and Weiss, J., "Broadcast spawning: A new class of reaction-mixing problems," *Transport and Mixing in Complex and Turbulent Flows*, The Institute for Mathematics and its Applications, April 15, 2010.

Crimaldi, J.P. and *M. A. Soltys. A two-color planar laser induced fluorescence technique for two-scalar mixing and reaction experiments," *Proceedings of the 6th International Symposium on Turbulence, Heat and Mass Transfer*, Rome, Italy, September 14-18, 2009.

Koehl, M.A.R., **Crimaldi, J.P.**, *Dombroski, D.E., and M.G. Hadfield. Effects of benthic community topography on water flow, dispersal of chemical cues, and hydrodynamic stresses on settling larvae. *Integrative and Comparative Biology*, Volume 49, E92-92, February 2009.

*Larsen, L.G., J.W. Harvey, and **J.P. Crimaldi**, "Hydroecological feedbacks promote flow-parallel patterning in the Everglades and low-gradient floodplains," American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2008.

*Dombroski, D.E. and **J.P. Crimaldi**, "Hydrodynamics and chemical coupling: ecology of the aquatic benthic environment," Ecological Dissertations in the Aquatic Sciences (Eco-DAS) Symposium, Honolulu, HI, October 11-16, 2008.

*Larsen, L.G., J.W. Harvey, G.B. Noe, and **J.P. Crimaldi**. Entrainment, settling, and aggregation of organic wetland floc and implications for landscape development. American Society of Limnology and Oceanography, Saint Johns, Newfoundland, June 8-13, 2008.

*Larsen, L.G., J.W. Harvey, and **J.P. Crimaldi**, "Wetland Vegetation, Surface Water Stage, and Pulsed Discharge as Controls on Bed Shear Stress and Sediment Transport in the Context of Everglades Restoration," American Geophysical Union Fall Meeting, San Francisco, December 10-14, 2007.

Weiss, J.B., *J.R. Hartford and **J.P. Crimaldi**, "Reaction Enhancement of Point Sources from Vortex Stirring," SIAM Dynamical Systems Meeting, June 2007

Koehl, M., **J.P. Crimaldi**, *D.E. Dombroski, T. Cooper, "Effects of community structure, water currents and waves on larval settlement into benthic habitats," American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 4-9, 2007.

*Larsen, L. G., G.R. Aiken, J.W. Harvey, G.B. Noe, and **J.P. Crimaldi**, "Inferences about small-scale microbial dynamics, transport processes, and hydrologic mixing from dissolved organic matter quality in the Florida Everglades," American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 4-9, 2007. (ASLO Award of Recognition)

*Novembre, N. J., **J.P. Crimaldi**, "Turbulent stirring and mixing: a laboratory study investigating stirring and mixing of two scalars by a single ideal vortex," American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 4-9, 2007.

*Hartford, J. R., **J.P. Crimaldi**, and J. B. Weiss, "Broadcast spawning: effects of turbulent processes on fertilization efficiency," American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 4-9, 2007.

*Dombroski, D. E., **J.P. Crimaldi**, "High resolution 3-D PLIF in the turbulent boundary layer of a laboratory flume," American Society of Limnology and Oceanography, Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 4-9, 2007.

*Dombroski, D.E. and **J.P. Crimaldi**, "The accuracy of acoustic Doppler velocimetry (ADV) measurements in turbulent boundary layer flows," Hydraulics Measurement & Experimental Methods, Lake Place, NY, September 10-12, 2007.

*Larsen, L.G., G. R. Aiken, J. W. Harvey, G. B. Noe, and **J. P. Crimaldi**, 2007. "Resolution of small-scale changes in organic matter source and redox state in the Florida Everglades with fluorescence spectroscopy," Gordon Research Conference on Catchment Science: Interactions of Hydrology, Biology, and Geochemistry, 8-13 July, New London, NH.

*Larsen, L.G., G. R. Aiken, J. W. Harvey, G. B. Noe, and **J. P. Crimaldi**, 2007. Organic matter processing and transport in the Everglades: Landscape maintenance, degradation, and implications for restoration. Fannie and John Hertz Foundation Symposium, 16-18 March, San Jose, CA.

*Larsen, L.G., G. R. Aiken, J. W. Harvey, G. B. Noe, and **J. P. Crimaldi**, 2007. Inferences about small-scale microbial dynamics, transport processes, and hydrologic mixing from dissolved organic matter quality in the Florida Everglades. American Society of Limnology and Oceanography Aquatic Sciences Meeting, 4-9 February, Santa Fe, NM.

*Hartford, J.R. and **J.P. Crimaldi**, "Broadcast spawning: Effects of vortex stirring on fertilization efficiency," American Society of Limnology and Oceanography Summer Meeting, June 4-9, 2006, Victoria, Canada.

Crimaldi, J.P., *Hartford J.R., and J. Weiss, "Dynamics of multiple point-source reactive scalars in simple vortex flows," US National Congress of Theoretical and Applied Mechanics, June 25-30, 2006, Boulder, CO.

*Hartford, J.R. and **J.P. Crimaldi**, "Effect of vortex stirring on fertilization efficiency in marine invertebrates," US National Congress of Theoretical and Applied Mechanics, June 25-30, 2006, Boulder, CO.

*Larsen, L.G., J.W. Harvey, and **J.P. Crimaldi**, "Feedbacks between differential peat accretion and anabranching river mechanics in the ridge and slough landscape," Greater Everglades Restoration Conference, 2006.

Crimaldi, J.P., J. Koseff, and S. Monismith, "Turbulent flow over an aggregation of benthic filter-feeders," Geophysics Research Abstracts, Vol. 8, 02068, 2006, European Geosciences Union, Vienna, Austria.

*Larsen, L.G., J.W. Harvey, and **J.P. Crimaldi**, "Feedback mechanisms driving landscape heterogeneity and geometry in a low-gradient, pulsed flow peatland," American Geophysical Union Joint Assembly Meeting, Baltimore, MD, 2006.

*Larsen, L.G., Harvey, J.W. and **J.P. Crimaldi**, "Ecohydrological feedbacks controlling microtopography, vegetation diversity, and landscape pattern in low-gradient, lotic peatlands," Geological Society of America (GSA) Annual Meeting and Exposition, October 22-25 2006, Philadelphia, PA.

*Dombroski, D.E. and **J.P. Crimaldi**, "A 3-D system to explore crayfish navigation in response to instantaneous turbulent plume structure." American Society of Limnology and Oceanography - Aquatic Sciences Meeting, February 20-25, 2005, Salt Lake City.

Crimaldi, J.P., *L.G. Larsen, and *J.R. Hartford, "Broadcast Spawning: The role of instantaneous physical and biological processes governing fertilization efficiency." American Society of Limnology and Oceanography - Aquatic Sciences Meeting, February 20-25, 2005, Salt Lake City.

*Hartford, J.R. and **J.P. Crimaldi** "Broadcast Spawning: Numerical simulations of turbulent processes associated with fertilization efficiency." American Society of Limnology and Oceanography - Aquatic Sciences Meeting, February 20-25, 2005, Salt Lake City.

*Larsen, L.G. and **J.P. Crimaldi** "The role of instantaneous turbulent processes in broadcast spawning: An experimental approach." American Society of Limnology and Oceanography - Aquatic Sciences Meeting, February 20-25, 2005, Salt Lake City.

*Bardliving, C. and **J.P. Crimaldi**, "Development of digital camera tracking system and analysis of crayfish locomotion in a flume." Summer Multicultural Access to Research Training (SMART) Research Symposium, Boston, MA. Aug. 10, 2005.

*Larsen, L.G. and **J.P. Crimaldi**, "The impact of photobleaching on planar laser-induced fluorescence." Hertz Foundation Symposium, San Jose, CA, March 19, 2005.

*Pontius, F.W., Amy, G., Rajagopalan, B., Huffman, D., **Crimaldi, J.P.** Predictive modeling of virus rejection by low-pressure membranes. American Water Works Association Water Quality Technology Conference, Quebec City, Canada, Nov. 6-10, 2005.

*Larsen, L.G. and **J.P. Crimaldi**. The potential role of secondary circulation, nutrient transport, and peat accretion in wavelength evolution of the ridge and slough landscape, Everglades, FL. *EOS Trans. AGU*, 86(18), Abstract NB33C-04, 2005.

Crimaldi, J.P. and D.W. Knight. A laser-based flow visualization system for fluid mechanics instruction. *Proceedings of the American Society of Engineering Education Conference*, Portland, Oregon, 2005.

Crimaldi, J. P.; *Browning, H. S., "Turbulent enhancement of broadcast spawning efficiency," American Society of Limnology and Oceanography /The Oceanography Society Ocean Research Conference, Honolulu, Hawaii, February 15-20, 2004.

Koehl, M. A.; Koseff, J. R.; Reidenbach, M. A.; Strother, J. A.; **Crimaldi, J. P.**; Wiley, M. B.; Hadfield, M. G. "How animals of different sizes encounter chemical cues in turbulent ambient water flow", American Society of Limnology and Oceanography /The Oceanography Society Ocean Research Conference, Honolulu, Hawaii, February 15-20, 2004.

Crimaldi, J.P., "An interactive water flume with laser-based flow visualization for improving undergraduate understanding of fluid mechanics," Invention and Impact: Building Excellence in Undergraduate Science, Technology, Engineering and Mathematics Education. Sponsored by AAAS and NSF. Washington, D.C., April 16-18, 2004.

Koehl, M.A.R., Koseff, J.R., **Crimaldi, J.P.** and M.B. Wiley. Hydrodynamics of sniffing by lobsters. *Integrative and Comparative Biology*, Volume 43(6), p. 1017, December 2003.

Crimaldi, J.P., "The role of instantaneous turbulent processes on broadcast spawning," 2002 Ocean Sciences Meeting, American Society of Limnology and Oceanography, Honolulu, Hawaii, February 11-15, 2002.

Crimaldi, J.P. and J.R. Koseff. The structure of passive scalar plumes in turbulent boundary layers. *Proceedings of the 2nd International Symposium on Turbulence and Shear Flow Phenomena*, Volume I, pp. 115-120. Stockholm, Sweden, June 27-29, 2001.

Crimaldi, J.P., J.R. Koseff, and M.A.R. Koehl, "The effect of sensor morphology and kinematics on perception," Making Connections in the 21st Century, 2001 ASLO Aquatic Sciences Meeting, Albuquerque, New Mexico, February 12-16, 2001.

Crimaldi, J.P., M. W. Wiley, and J.R. Koseff. A laboratory investigation of the structure of turbulent odor plumes, *Proceedings of the Second International Symposium on the Mechanics of Plants, Animals, and Their Environments*, United Engineering Foundation, Castelvecchio Pascoli, Italy, June 15, 2000.

Crimaldi, J.P., *Wiley, M.B., and Koseff, J.R., " Design and quantification of a laboratory odor plume for use in biological studies of chemical sensing and tracking algorithms", *Limnology and Oceanography: Navigating into the Next Century*, American Society of Limnology and Oceanography Aquatic Sciences Meeting, Santa Fe, New Mexico, February 1-5, 1999.

Crimaldi, J.P. and J.R. Koseff. Nonintrusive measurements of turbulent scalar fluxes using a combined LDA/LIF probe. *Proceedings of the 12th Engineering Mechanics Conference*, ASCE, San Diego, CA, May 17-20, 1998.

Crimaldi, J.P. and J.R. Koseff. Turbulent scalar flux measurements over model bivalves. *Proceedings of the 27th Congress of the International Association for Hydraulic Research*, ASCE, San Francisco, CA. *Environmental and Coastal Hydraulics: Protecting the aquatic habitat*, *Proceedings of Theme B, Volume 27*, p. 161-167, 1997.

Crimaldi, J.P., J.K. Thompson, J.R. Koseff, and S.G. Monismith. The role of hydrodynamics in the recruitment of benthic fauna, 25th Benthic Ecology Meeting, Portland, ME, April 3-6 1997.

Crimaldi, J.P., Thompson, J. K., Koseff, J. R., and Monismith, S. G., "Hydrodynamics of recruitment in benthic fauna", 1996 Ocean Sciences Meeting, Paper OS22K-06, EOS, Vol. 76 No. 3, January 16, 1996.

SELECTED LOCAL TALKS

* denotes talks with a student co-author

True A.C., and **J.P. Crimaldi**, "Ecologically-motivated problems in fluid dynamics: Studies in phytoplankton-turbulence interactions and the hydrodynamics of inhalant flows," HWR&EFM Seminar Series, CEAE, University of Colorado Boulder, 2016.

J.P. Crimaldi, "Olfactory Navigation: Structure of Odor Plumes in the Natural Environment," HWR&EFM Seminar Series, University of Colorado, Fall, 2016.

J.P. Crimaldi, "Olfactory Navigation: Dynamic Computing in the Natural Environment," CEAS College Faculty Meeting, University of Colorado, Fall, 2016.

Pratt, K.R. and **J.P. Crimaldi**, "Turbulence, Lagrangian Coherent Structures, and the Formation/Evolution of Life", HWR&EFM Seminar Series, University of Colorado, March 16, 2016

Pratt, K.R. and **J.P. Crimaldi**. "Coalescence, clustering, and chaotic stirring: The role of Lagrangian coherent structures in the mixing and unmixing of scalars." Boulder Fluid and Thermal Science Seminar Series, University of Colorado, October 11, 2016

*Shoeai, F. and **J.P. Crimaldi**, "The effect of an unsteady obstacle wake on reaction enhancement between two initially distant scalars," Boulder Fluid Mechanics Seminar, University of Colorado, September 2nd, 2014.

*Soltys, M. and **J.P. Crimaldi**, "The Effect of Structured Stirring and Mixing on Scalar Covariance of Initially Distant Scalars." Dynamics/Complex Systems Seminar, Department of Applied Mathematics, University of Colorado, September 15th, 2013.

Crimaldi, J.P. "Physical-biological coupling in marine flows: A multiscale approach," Boulder Fluid Mechanics Seminar, University of Colorado, December 10th, 2013.

*Soltys, M.A. and **J.P. Crimaldi**, "Interactions Between Isolated Scalars in Turbulent Flows," Boulder Fluid Dynamics Seminar, University of Colorado, June 25th, 2013

*A.F. Bell and **J.P. Crimaldi**, "The development of chemoattractant plumes in complex flows and the role of chemotactic strategies employed by sperm to navigate the plumes to fertilize an egg," HWR&EFM Seminar Series, University of Colorado, February 20, 2013.

Crimaldi, J.P. "Coral Fertilization as a Model System for Reactive Stirring and Mixing in Structured Flows," Applied Math Colloquium, University of Colorado, September 3, 2010

Crimaldi, J.P. "Coral Fertilization as a Model System for Reactive Stirring and Mixing in Structured Flows," HWR&EFM Seminar Series, University of Colorado, September 9, 2010

*Soltys, M.A., **Crimaldi, J.P.**, Interactions Between Turbulent Mixing and Broadcast Spawning. Annual Student Research Symposium, Boulder, Colorado, April 1st, 2010.

*Dombroski, D.E. and **J.P. Crimaldi**, "3D planar laser induced fluorescence for study of plume structure & dynamics," University of Colorado Hydrologic Sciences Symposium, Boulder, Colorado, April 11-12, 2008.

RESEARCH FUNDING

Note: Educational funding listed separately in Teaching section

From Odor to Action: Discovering Principles of Olfactory-Guided Natural Behavior

Funding Source: National Science Foundation NeuroNex Program

Principal Investigator: J. Crimaldi

Co-PIs: N. Urban, E. Hong, B. Smith

Amount: ~\$25.0M (in award stage)

Dates: 9/1/2020 - 8/31/2025

Shedding light on brain circuits mediating navigation of the odor plume in a natural environment

Funding Source: National Institute of Health

Principal Investigator: Diego Restrepo

Co-PIs: E. Gibson, A. Person, J. Gopinath, V. Bright, I. Kymissis, J. Crimaldi

Amount: \$3.0M

Dates: 5/1/2020 - 4/30/2023

JPC portion of funding: \$527,000

Collaborative Research: NCS-FR: Shedding light on brain circuits mediating navigation of the odor plume in a natural environment

Funding Source: National Science Foundation Frontiers Program

Principal Investigator: Diego Restrepo

Co-PIs: E. Gibson, A. Person, J. Gopinath, V. Bright, J. Crimaldi

Amount: \$3.0M

Dates: 9/15/2019 - 9/14/2022

JPC portion of funding: \$410,000

A Testing Environment for Autonomous Localization of Aquatic Odor Plumes

Funding Source: CU CEAS Autonomous Systems ASIRT

Principal Investigator: John Crimaldi

Amount: \$10,540

Dates: 1/1/2019 - 6/31/2020

Collaborative Research: Olfactory Navigation: Dynamic Computing in the Natural Environment

Funding Source: White House Brain Initiative, funded via National Science Foundation

Principal Investigator: John Crimaldi

Co-PIs: N. Urban, J. Verhagen, L. Jacobs, B. Ermentrout, J. Victor, K. Nagel

Amount: \$6.4M

Dates: 11/1/2015 - 10/31/2018

JPC portion of funding: \$1.0M

Collaborative Research: Coupled Numerical and Laboratory Investigations of Chaotic Advection to Enhance Spreading and Reaction in Three-Dimensional, Heterogeneous Porous Media

Funding Source: National Science Foundation: Hydrologic Sciences

Principal Investigator: Roseanna Neupauer
Co-PI: John Crimaldi
Amount: \$493,443
Dates: 9/1/2014 - 8/31/2017
JPC portion of funding: \$270,182

Turbulence-induced microscale patchiness in phytoplankton populations

Funding Source: CU Innovative Seed Grant Program (IGP)
Principal Investigator: John Crimaldi
Amount: \$48,700
Dates: 7/1/2014 - 12/31/2015

Collaborative Research: A framework to characterize inhalant siphon flows of aquatic benthos

Funding Source: National Science Foundation: Biological Oceanography
Principal Investigator: John Crimaldi
Amount: \$291,720
Dates: 6/1/2013 - 5/31/2016

Coral Fertilization as a Model System for Reactive Stirring and Mixing in Free-surface Turbulent Flows

Funding Source: National Science Foundation: Physics of Living Systems
Principal Investigator: John Crimaldi
Amount: \$319,839
Dates: 7/15/2012 - 7/14/2015

Physical-Biological Interactions in the Fertilization Ecology of Broadcast Spawners: The Role of Gamete Traits and Turbulence Structure

Funding Source: National Science Foundation: Biological Oceanography
Principal Investigator: John Crimaldi
Amount: \$449,984
Dates: 8/1/2009 - 7/31/2013

A Biorobotic Autonomous Underwater Vehicle for Underwater Sensing

Funding Source: CRCW Grant in Aid
Principal Investigator: John Crimaldi
Amount: \$3,784
Dates: 2008-2009

The Role of Flocculent Organic Sediment Transport as a Feedback Mechanism that Controls Landscape Dynamics and Restoration Success in the Everglades

Funding Source: National Science Foundation: Hydrologic Sciences
Principal Investigator: John Crimaldi
Total Award: \$209,933
Dates: 3/2007 – 2/2010

CAREER: The role of turbulence structure in Broadcast Spawning: Exploring Physical-Biological Relationships Through an Integrated Research and Education Program

Funding Source: National Science Foundation CAREER Award: Biological Oceanography
Principal Investigator: John Crimaldi
Amount: \$720,454 (\$675,454 NSF + \$45,000 University Matching)
Dates: 6/2004 – 5/2009

Chemical Orientation in Turbulent Environments above Natural Stream Substrates: The Role of Bed Roughness and Turbulence Structure on Search Mechanisms

Funding Source: National Science Foundation: Integrative Biology and Neuroscience
Principal Investigator: John Crimaldi
Amount: \$385,000 (\$367,000 NSF + \$18,000 University matching)
Dates: 7/2002 – 6/2005

The role of fluid turbulence in the reproductive success of broadcast-spawning invertebrates

Funding Source: Junior Faculty Development Award
Principal Investigator: John Crimaldi
Amount: \$5000
Dates: 2001-2002

Analysis of Spatial and Temporal Structure in Turbulent Odor Plumes

Funding Source: Office of Naval Research: Chemical Plume Tracing Program
Principal Investigator: John Crimaldi
Amount: \$73,594
Dates: 6/2000 – 5/2002

* through August 2014

TEACHING

COURSES TAUGHT AND DEVELOPED

* denotes a new course developed

CVEN3313	<i>Theoretical Fluid Mechanics</i>	S00-S03, F03, S06, S11, S13, S17, S19
CVEN5313*	<i>Environmental Fluid Mechanics</i>	F01-F07, F09-F13, F15-F19
CVEN5343*	<i>Transport and Dispersion</i>	S03-S07, S10, S12, S14, S16, S18, S20
CVEN5343*	<i>Open Channel Hydraulics</i>	F00-F01
CVEN6833*	<i>Adv. Env. Fluid Mechanics</i>	S05

ELECTRONIC COURSE MATERIALS PREPARED

In lieu of using a text book, complete typeset course materials were prepared for CVEN5313 *Environmental Fluid Mechanics* and CVEN5343 *Transport and Dispersion in Surface Water*. These materials include lecture slides, student notes, and supplementary materials.

ADVISING AND MENTORING

POSTDOCTORAL RESEARCHERS

* indicates primary advisor

* Aaron True, Advised 2014-2017.

DOCTOR OF PHILOSOPHY

* indicates primary advisor

Aaron Hurst, Advised 2018-present

*Erin Connor, Advised 2016-present. Ph.D. expected 2019

*Eric Roth, Advised 2015-2018. "*Experimental Investigation of Scalar Spreading by Engineered Injection and Extraction in Porous Media*," Ph.D. 2018

*Kenneth Pratt, Advised 2012-2017. "*Coalescence, clustering, and chaotic stirring: The role of Lagrangian coherent structures in the mixing and unmixing*," Ph.D. 2016

*Farrokh Shoeai, Advised 2010-2015. "*Physical-Biological Interactions in the Fertilization Ecology of Broadcast Spawners*," Ph.D. 2015

*Michael Soltys, Advised 2007-2013. "*Experimental investigations on the role of structure in turbulent mixing of initially isolated scalars*," Ph.D. 2013

*Daniel E. Dombroski, Advised 2003-2009. "*Laboratory measurements of scalar and momentum structure in turbulent aquatic benthic boundary layers*," Ph.D. 2009

*Jillian R. Cadwell (Hartford), Advised 2003-2008. "*Stirring and mixing of initially distinct reactive scalars in the context of broadcast spawning*," Ph.D. 2008

*Laurel Griggs Larsen, Advised 2003-2008. "*Hydroecological Feedback Processes Governing Self-Organization of the Everglades Ridge and Slough Landscape*," Ph.D. 2008

*Frederick W. Pontius, Advised 2002-2006. “*Numerical simulations of the effect of membrane integrity on virus filtration,*” Ph.D. 2006 (co-advised with Gary Amy)

Jason W. Kean, Advised 2002-2003. Ph.D. 2003 (co-advised with Diane McKnight)

MASTER OF SCIENCE (THESIS OPTION)

* indicates primary advisor

* Melanie Holland, Advised 2018-present

*Maggie McHugh, Advised 2015-2017. “Laboratory investigations of gaseous plume structure using planar laser-induced fluorescence,” M.S. 2017

* Allison F. Bell, Advised 2011-2013. “*The development of chemoattractant plumes in complex flows and the role of the chemotactic strategies employed by sperm to navigate the plumes to fertilize an egg,*” M.S. 2013

*Tanaya R. Kawakami, Advised 2010-2012. “*Reaction between initially distant scalars in a cylinder Wake,*” M.S. 2012

*Nicole Novembre, Advised 2004-2007. “*Turbulent stirring and mixing: Laboratory study investigating stirring and mixing of two scalars by a single ideal vortex,*” M.S. 2007

*Patricia Quigley, Advised 2006-2009 “*Aggregation behavior of Lagrangian tracers in two-dimensional flows with non-divergence-free behavior,*” M.S. 2009

*Erin M. Carlson, Advised 2002-2003. “*An evaluation of acoustic-Doppler velocimetry in laboratory flumes and natural streams,*” M.S. 2003

*Jonathan H.L. Heyl, Advised 2002-2003. “*Influences of confluence mixing on metal oxide deposition in an acid mine drainage stream,*” M.S. 2003 (co-advised with Diane McKnight)

*Hillary S. Browning, Advised 2001-2003. “*Numerical simulations of broadcast spawning in turbulent flows,*” M.S. 2003.

UNDERGRADUATE STUDENTS PERFORMING RESEARCH

* indicates primary advisor

*Maria Winters, Advised 2016

*Miguel Calpe (student from Catalonia), Advised December 2014-present
Balsells International Mobility Program
Research Topic: *Phytoplankton motility and aggregation in isotropic turbulence*

*Lincoln Grody (student at University of Colorado), Advised January-August 2013
Research Topic: *Index-of-refraction matching for PIV measurements*

*Allie Banks, Advised Spring 2011
BOLD Center YOU'RE@CU undergraduate research experience program

Research Topic: *Spectral properties of candidate dyes for a novel 2C-PLIF system*

*Cameron Bardliving (student at Univ. of Maryland, Baltimore County), Advised Summer 2005
Summer Multicultural Access to Research Training (SMART) Program
Research Topic: *An autonomous tracking system based on digital video input*

*Alexandra Kordick (student at The University of Colorado), Advised Summer 2005
Research Topic: *Development of multimedia fluid mechanics content for instructional use*

*Jamie Fleischfresser (student at Massachusetts Institute of Technology), Advised Summer 2004
NSF Research Experience for Undergraduates Program
Research Topic: *Comparison of acoustic vs. laser-based techniques in turbulent flows*

*Aliza M. Cohen (student at Cornell University), Advised Summer 2002
NSF Research Experience for Undergraduates Program
Research Topic: *Metal deposition in acid rock drainage streams*

*Dan Dombroski (student at Cornell University), Advised Summer 2001
NSF Research Experience for Undergraduates Program
Research Topic: *Acoustic-Doppler velocimetry in a laboratory flume.*

STUDENT AWARDS

Carol B. Lynch Science Fellowship to Erin Connor, 2019

Chancellor's Fellowship to Erin Connor, 2016

Best Poster Award to Maria Winters at the Society for Advancement of Chicanos/Hispanics and Native Americans in Science National Conference, October 13-15, 2016

Best Poster Award to Kenny Pratt at the Workshop on Microscale Ocean Biophysics, Aspen Center for Physics, Aspen, CO, January 11-15, 2015

Outstanding Dissertation Award to Mike Soltys for the top-ranked Ph.D. dissertation in CEAE, 2014

Best Dissertation Award to Laurel Griggs Larsen for the top-ranked dissertation in the College of Engineering and Applied Science, 2008

Chancellor's Fellowship to Laurel Griggs Larsen, 2003

Hertz Foundation Fellowship to Laurel Griggs Larsen, 2003-2008

EDUCATION FUNDING

Upgrades to a Flow Visualization Flume for Enhanced Teaching and Learning

Funding Source: Engineering Excellence Fund

Principal Investigator: John Crimaldi

Amount: \$7,412

Dates: 2013 - 2014

A Vortex Simulator for Studying Fluid Stirring and Mixing

Funding Source: Engineering Excellence Fund
Principal Investigator: John Crimaldi
Amount: \$14,250
Dates: 4/2005 – 3/2006

A Laminar Flow Facility with Laser-Based Visualization for Enhancing Undergraduate Fluid Mechanics Instruction

Funding Source: National Science Foundation
Principal Investigator: John Crimaldi
Amount: \$72,400 (\$57k NSF + \$10k University Matching + \$5.24k NSF Supplement)
Dates: 1/2004 – 12/2007

A Laminar Flow Visualization Facility

Funding Source: Engineering Excellence Fund
Principal Investigator: John Crimaldi
Amount: \$13,350
Dates: 4/2004 – 3/2005

A Digital Flow Visualization System for Fluid Mechanics Instruction

Funding Source: Engineering Excellence Fund, University of Colorado
Principal Investigator: John Crimaldi
Amount: \$17,876 (\$12,876 EEF + \$5,000 University Matching)
Dates: 4/2003 – 3/2004

An Interactive Flume with Laser-based Flow Visualization for Improving Fluid Mechanics Instruction

Funding Source: National Science Foundation
Principal Investigator: John Crimaldi
Amount: \$47,020 (\$23,510 NSF + \$23,510 University Matching)
Dates: 1/2002 – 12/2003

Integration of Computerized Flow Instrumentation into the Fluid Mechanics Teaching Curriculum

Funding Source: Engineering Excellence Fund
Principal Investigator: John Crimaldi
Amount: \$24,823
Award Period: 4/2000 – 3/2001

SERVICE AND PROFESSIONAL ACTIVITIES

NATIONAL

Associate Editor, *Limnology and Oceanography: Methods*, 2008-present.

Organizing Committee for American Physical Society Division of Fluid Dynamics Meeting, November 19th-21st, Denver, Colorado, 2017.

Session Co-Convener, Young Investigator Workshop, American Physical Society Division for Fluid Dynamics, November 19th, Denver, Colorado, 2017.

Session Organizer and Chair, "Ecological Fluid Mechanics: Interactions among Organisms and Their Fluid Environment," AGU/ASLO Ocean Sciences Meeting, New Orleans, February 2016.

Session Organizer and Chair, "Consequences of fluid stirring and mixing: from organisms to ecosystems," American Society for Limnology and Oceanography, Ocean Sciences meeting, Honolulu, Hawaii, February 24-28, 2014.

Technical Advisor for exhibit on chemical plume tracking, London Science Museum, 2011

Panelist for NSF CAREER grant proposal reviews, Ocean Sciences Division, Washington, D.C., November 2009.

Invited participant in the NSF sponsored NESCent Meeting, "Origins and Evolution of Chemoreception," Raleigh, North Carolina, June 4-6, 2007.

Session Organizer and Chair, "Stirring and Mixing in Biological and Ecological Systems," American Society of Limnology and Oceanography, Santa Fe, New Mexico, February 2007.

Panelist for NSF CAREER grant proposal reviews, Ocean Sciences Division, Washington, D.C., November 2006.

Organizing Committee, 15th U.S. National Congress of Theoretical and Applied Mechanics: Mechanics in Emerging Technologies, June 25-30, 2006, Boulder, CO.

Invited participant in the NSF sponsored water workshop, "Water: Challenges at the Intersection of Human and Natural Systems," Pacific Northwest National Laboratory in Richland, Washington, September 16-17, 2004.

Session Organizer and Chair, "Biological Adaptations to Turbulent Flow." American Society of Limnology and Oceanography/TOS Ocean Research Conference, Honolulu, Hawaii, February 17, 2004.

Participant and Committee Chair at the NSF/ASLO workshop on "Emerging Issues for Limnology: The Study of Inland Waters," December 1-4, 2002.

UNIVERSITY OF COLORADO

Campus Ethics Committee, CEAS Representative 2011-2014

COLLEGE OF ENGINEERING AND APPLIED SCIENCES

Graduate Education Council, 2013-present
Engineering Excellence Fund, Faculty Advisor, 2010-2014
Dean's Blue Ribbon Committee on Graduate Programs, 2012
Steering Committee, Integrated Teaching and Learning Graduate STEM Program, 2011-2012
Faculty Leadership Advancement Group (FLAG), 2006-2009
Director's Advisory Committee for the CU Boulder Environmental Program, 2006-2009
Member of Selection Committee for the Charles Hutchinson Memorial Teaching Award, 2004
Participant in Retreat on Education Initiatives, 2002
Laboratory demonstrations for outreach and recruitment, 2002-present

- Engineering Sampler
- Admitted Student Day
- Women in Engineering Program
- College of Engineering Open House
- High School Honors Institute
- Boettcher Finalists Day
- Minorities Explore Engineering Days
- Girls Explore Engineering Days
- ASPIRE Summer Bridge Programs
- GEEN 1500
- Explore Engineering Day for Women
- College Senior Day

DEPT. OF CIVIL, ENVIRONMENTAL & ARCHITECTURAL ENGINEERING

Faculty Search Committee, 2020
Executive Committee, Fall 2018
Primary Unit Evaluation Committee (PUEC) 2017, 2018, 2019
Personnel Committee, 2015-present
Associate Chair for Graduate Education, 2013-present
Facilitator for selection of Department Chair, 2013
Chair of Graduate Committee, 2013-present
College Outstanding Dissertation Award Committee, 2010
Chair of Awards Committee, 2009-2013
Graduate Committee, 2001-present
Search Committee, Environmental Group faculty search, 2004
Search Committee, Water Resources Group faculty search, 2004
Chi Epsilon (undergraduate Civil Engineering Honor Society) Faculty Advisor, 2001-2004
Facilities Committee, 2000-2002
Faculty Meeting Secretary, Fall, 2000

PEER REVIEWER FOR PUBLICATIONS IN THE FOLLOWING JOURNALS:

Environmental Fluid Mechanics
Environmental Science and Technology

Estuaries and Coasts
Experimental Thermal and Fluid Science
Experiments in Fluids
Journal of Marine Systems
Journal of Sea Research
Limnology and Oceanography
Marine Ecology Progress Series
Physics of Fluids
Proceedings of the National Academy of Science
Royal Society Proceedings
Water Resources Research

PEER REVIEWER FOR GRANT PROPOSALS SUBMITTED TO THE FOLLOWING AGENCIES:

CALFED

National Science Foundation: Biological Oceanography Program
National Science Foundation: Integrated Research Challenges in Environmental Biology
National Science Foundation: Physical Oceanography Program
National Science Foundation: Physics of Living Systems
Maryland Sea Grant
Qatar National Research Fund

PROFESSIONAL DEVELOPMENT

Teaching with Technology Faculty Seminar Program, Fall semester, 2011 (invited participant)

ASSOCIATIONS

American Geophysical Union
American Physical Society
American Society for Limnology and Oceanography (Fellow)
American Society for Engineering Education
Sigma Xi Research Society