Silvia Matt

Oceanographer
Naval Research Laboratory
Ocean Sciences Division
Ocean Sensing & Processes Branch
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Education

Ph.D. in Meteorology and Physical Oceanography
University of Miami, Miami, FL, USA 2004 - 2010
Dissertation: "High Resolution Simulation of High Reynolds Number Mixing in a 2D Gravity Current Under Variable Forcing"
Advisors: Dr. Mohamed Iskandarani, Dr. Kevin Leaman

M.Sc. in Meteorology and Physical Oceanography
University of Miami, Miami, FL, USA 2000 - 2004
Thesis: "Transport and Entrainment in the Red Sea Outflow"
Advisor: Dr. William Johns

M.Sc. in Biology (5 year degree; includes a B.Sc. equivalent)
University of Basel, Basel, Switzerland 1993 - 1999
Thesis: "Approaching a Classification of the Eumastacoidea (Orthoptera, Insecta) with Molecular Data"
Advisors: Dr. Hugh Rowell, Dr. Paul Flook

Employment

Oceanographer
Naval Research Laboratory SSC Sept 2014 - present

NRC Research Associate (Postdoc) at
Naval Research Laboratory SSC Sept 2012 - Sept 2014
Supervisor: Dr. Weilin Hou

Research Scientist (Full-time) and Adjunct Faculty
Nova Southeastern University Oceanographic Center June 2010 - July 2012
Supervisor: Dr. Alexander Soloviev
(Leave of absence from this position July 2012 - July 2013)

Research Scientist (Part-time)
Nova Southeastern University Oceanographic Center Aug 2008 - June 2010
Supervisor: Dr. Alexander Soloviev

Consultant
Nova Southeastern University Oceanographic Center August June 2008 - Aug 2008
Supervisor: Dr. Alexander Soloviev

Teaching

Instructor - "The Sea Surface: Biology and Environment",
Nova Southeastern University Oceanographic Center, Graduate Course Winter 2012
Instructor: Dr. Silvia Matt

Instructor - "Bio-Physical Interactions in the Ocean",
Nova Southeastern University Oceanographic Center, Graduate Course Fall 2011
Instructors: Drs. Alexander Soloviev and Silvia Matt

Substitute Lecturer - "Concepts of Physical Oceanography",
Nova Southeastern University Oceanographic Center, Graduate Course during 2009 - 2010
Instructor: Dr. Alexander Soloviev

Peer-reviewed Publications

Dennis Estrada, Weilin Hou, **Silvia Matt**, Bing Ouyang, "Multi-frame image fusion using a machine learning-based weight mask predictor for turbulence-induced image degradation," **J**. Appl. Rem. Sens. 17(1) 016514, 2023. https://doi.org/10.1117/1.JRS.17.016514

S. Avramov-Zamurovic, K. P. Judd, **S. Matt**, R. A. Handler, A. T. Watnik, J. R. Lindle, J. M. Esposito & W. A. Jarrett (2023) Propagating beams carrying orbital angular momentum through simulated optical turbulence generated by Rayleigh–Bénard natural convection, Waves in Random and Complex Media, 2023. DOI: 10.1080/17455030.2023.2223310.

Shi, H, T. Pinto, X. Qi. D. Coleman, **S. Matt**, W. Hou, X. Tan, DYNAMIC MODELING OF VOICE COIL MOTOR-ACTUATED FLEXIBLE MEMBRANES, Proceedings of the ASME 2020 Dynamic Systems and Control Conference (DSCC2020), Pittsburgh, PA, Oct 2020

Matt, S., G. Nootz, S. Hellman W. Hou: Effects of Optical Turbulence and Density Gradients on Particle Image Velocimetry. Nature Scientific Reports 10, 2130, 2020. https://doi.org/10.1038/s41598-020-58077-5

Matt, S., W. Hou, W. Goode, S. Hellman: Introducing SiTTE: A controlled laboratory setting to study

the impact of turbulent fluctuations on light propagation in the underwater environment, Optics Express 25 (5), 5662-5683, 2017.

Nootz, G., **S. Matt**, A. Kanaev, K. P. Judd, and W. Hou: Experimental and numerical study of underwater beam propagation in a Rayleigh–Bénard turbulence tank, Appl. Opt. 56, 6065-6072, 2017.

Kurata, N., K. Vella, A. Soloviev, **S. Matt**, A. Tartar, M. Shivji, W. Perrie: Surfactant-associated bacteria in the near-surface layer of the ocean, Nature Scientific Reports, 6, 19123, 2016. doi:10.1038/srep19123

Soloviev, A.V., **S. Matt**, and A. Fujimura: Three-dimensional dynamics of freshwater lenses in the ocean's near-surface layer, Oceanography 28(1), 142–149, http://dx.doi.org/10.5670/oceanog.2015.14, 2015.

Hamilton, B., C. Dean, N. Kurata, K. Vella, A. Soloviev, A. Tartar, M. Shivji, **S. Matt**, W. Perrie, S. Lehner, B. Zhang: Surfactant associated bacteria in the sea surface microlayer: Case studies in the Straits of Florida and the Gulf of Mexico. Canadian Journal of Remote Sensing, 41(2), 135-143, 2015.

Kanaev, A., W. Hou, S. Restaino, **S. Matt**, S. Gladysz: Restoration of images degraded by underwater turbulence using structure tensor oriented image quality (STOIQ) metric, *Optics Express*, 23, 2015.

Matt, S., W. Hou, S. Woods, W. Goode, E. Jarosz, and A. Weidemann: A Novel Platform to Study the Effect of Small-Scale Turbulent Density Fluctuations on Underwater Imaging in the Ocean, Methods in Oceanography, 11, pp. 39–58, 2014.

Matt, S., A. Fujimura, A. Soloviev, S.H. Rhee, and R. Romeiser, 2014. Fine-Scale Features on the Sea Surface in SAR Satellite Imagery. Part II: Numerical Modeling. *Ocean Science*, 10, 427–438, www.ocean-sci.net/10/427/2014/.

Soloviev, A. V., A. Fujimura, and **S. Matt**, 2012. Air-Sea Interface in Hurricane Conditions. *Journal of Geophysical Research*, 117(C11).

Matt, S., A. Fujimura, A. Soloviev and S.H. Rhee, 2011. Modification of Turbulence at the Air-Sea Interface Due to the Presence of Surfactants and Implications for Gas Exchange. Part II: Numerical Simulations. In: *"GAS TRANSFER AT WATER SURFACES 2010"*, Kyoto University Press, 299-312.

Soloviev, A. V., **S. Matt**, M. Gilman, H. Hühnerfuss, B. Haus, D. Jeong, I. Savelyev and M. Donelan, 2011. Modification of Turbulence at the Air-Sea Interface Due to the Presence of Surfactants and Implications for Gas Exchange. Part I: Laboratory Experiment. In: *"GAS TRANSFER AT WATER SURFACES 2010"*, Kyoto University Press, 285-298.

Matt, S., P. K. Flook and C. H. F. Rowell, 2008. A Partial Molecular Phylogeny of the Eumastacoidea s. lat. (Orthoptera, Caelifera). *Journal of Orthoptera Research*, **17**(1), 43-55.

Matt, S., and W. E. Johns, 2007. Transport and Entrainment in the Red Sea Outflow Plume. *Journal of Physical Oceanography*, **37**(4), 819–836.

Özgökmen, T. M., W. Johns, H. Peters, and **S. Matt**, 2003. Turbulent Mixing in the Red Sea Outflow Plume from a High-Resolution Nonhydrostatic Model. *Journal of Physical Oceanography*, **33**(8), 1846-1869.

Patent

"Apparatus with a controllable surface for underwater boundary flow," **US patent application #16/667,089** (submitted 10/29/2019, awarded). MSU inventors: Xiaobo Tan, Hongyang Shi, Thassyo Pinto, and Demetris Coleman; NRL inventors: Weilin Hou, Silvia **Matt**, Sergio Restaino, Freddie Santiago.

Conference Proceedings

S. Matt, H. Shi, X. Tan, A. Thombs, and W. Hou, "Imitating dolphins: Nature-inspired boundary modulation to reduce frictional drag," 2023 **IEEE Underwater Technology** (UT), Tokyo, Japan, pp. 1-5, 2023. doi: 10.1109/UT49729.2023.10103391.

Avramov-Zamurovic, S., K. P. Judd, **Matt, S.,** R. A. Handler, and A. T. Watnik: "The impact of optical turbulence created by Rayleigh-Bénard convection on vortex structure in beams carrying orbital angular momentum," in Imaging and Applied Optics Congress 2022 (3D, AOA, COSI, ISA, pcAOP), Technical Digest Series (Optica Publishing Group, 2022), paper PW1F.1.

Judd, P., S. Avramov-Zamurovic, **S. Matt**, R. A. Handler, A. T. Watnik, J. R. Lindle, J. Esposito, and W. A. Jarrett: "Propagation of Laser Beams Carrying Orbital Angular Momentum through Simulated Optical Turbulence in Rayleigh-Bénard Convection" – **INVITED PAPER**, Proc. SPIE 11860, Environmental Effects on Light Propagation and Adaptive Systems IV, 2021.

Matt, S., W. Hou, H. Shi, T. Pinto, X. Tan: "Boundary layer turbulence near an actively controlled deformable surface," Proc. SPIE 11752, Ocean Sensing and Monitoring XIII, 1175209, 2021.

Thombs, A., **S. Matt**, W. Hou: "Effects of actuated boundaries on Tollmien-Schlichting waves and developed boundary layer turbulence," Proc. SPIE 11752, Ocean Sensing and Monitoring XIII, 1175208, 2021.

Thombs, A., W. Hou, **S. Matt**, N. Uddin, "Characterizing mixing and stress in a laboratory volume using CFD models," Proc. SPIE 11420, Ocean Sensing and Monitoring XII, 114200V, 2020.

Matt, S., W. Hou, W. Goode: "Characterizing instabilities in the developed and transitional boundary layer," Proc. SPIE 10631, Ocean Sensing and Monitoring X, 106310I, 2018.

Matt, S, G. Nootz, S. Hellman, W. Hou, "The impact of optical turbulence on particle image velocimetry," Proc. SPIE 10186, Ocean Sensing and Monitoring IX, 101860J (22 May 2017); https://doi.org/10.1117/12.2264751

Matt, S., W. Hou, W. Goode, S. Hellman, "Velocity fields and optical turbulence near the boundary in a strongly convective laboratory flow," Proc. SPIE 9827, Ocean Sensing and Monitoring VIII, 98270F (17 May 2016); https://doi.org/10.1117/12.2229800

Liu, G., M. Han, W. Hou**, S. Matt**, W. Goode, "A miniature fiber-optic sensor for high-resolution and high-speed temperature sensing in ocean environment," Proc. SPIE 9459, Ocean Sensing and Monitoring VII, 94590I (19 May 2015); https://doi.org/10.1117/12.2180168

Matt, S., W. Hou, W. Goode, G. Liu, M. Han, A. V. Kanaev, S. Restaino, "A controlled laboratory environment to study EO signal degradation due to underwater turbulence," Proc. SPIE 9459, Ocean Sensing and Monitoring VII, 94590H (19 May 2015); https://doi.org/10.1117/12.2177028

Matt, S., W. Hou, W. Goode, "The impact of turbulent fluctuations on light propagation in a controlled environment," Proc. SPIE 9111, Ocean Sensing and Monitoring VI, 911113, 2014; https://doi.org/10.1117/12.2053062

Matt, S., W. Hou, S. Woods, E. Jarosz, W. Goode, and A. Weidemann. Measurements of Turbulent Dissipation during the Bahamas Optical Turbulence Experiment, *Proceedings of SPIE* Vol. 8724, 872405, 2013.

Soloviev, A., **Matt, S.**, and Avera, W., 2013. Analysis of the Electromagnetic Signatures of Fine-scale Oceanographic Features, *Proceedings of MARELEC 2013*, 16 - 19 July 2013, Hamburg, Germany.

Matt, S., A. Fujimura, A. Soloviev and S.H. Rhee, 2011. Fine-Scale Features on the Sea Surface in SAR Satellite Imagery. Part II: Numerical Modeling. *Proceedings of the Topical Conference "Earth Observation for Ocean-Atmosphere Interactions Science" ESA, SOLAS, EGU joint Conference, 29 November - 2 December 2011, Frascati, Italy*.

A. Soloviev, A., C. Maingot, J. Fenton, **S. Matt,** S. Lehner, D. Velotto, S. Brusch, W. Perrie, B. Zhang, 2011. Fine-Scale Features on the Sea Surface in SAR Satellite Imagery. Part I: Simultaneous In-Situ Measurements. *Proceedings of the Topical Conference "Earth Observation for Ocean-Atmosphere Interactions Science" ESA, SOLAS, EGU joint Conference, 29 November - 2 December 2011, Frascati, Italy*.

Fujimura, A., **S. Matt**, A. Soloviev, C. Maingot, and S. H. Rhee, 2011. The Impact of Thermal Stratification and Wind Stress on Sea Surface Features in SAR Imagery. *2011 IEEE International Geoscience and Remote Sensing Symposium (IGARSS),* 25 - 29 July 2011, Vancouver, Canada.

Maingot, C., A. Soloviev, M. Gilman, **S. Matt**, J. Fenton, S. Lehner, D.Velotto, S. Brusch, W. Perrie, and B. Zhang, 2011. Observation of Natural and Artificial Features on the Sea Surface from SAR Satellite Imagery with In-Situ Measurements. *2011 IEEE International Geoscience and Remote Sensing Symposium (IGARSS),* 25 - 29 July 2011, Vancouver, Canada.

Maingot, C., A. Soloviev, **S. Matt**, M. Gilman, J. Fenton, D.Velotto, S. Brusch, and S. Lehner, 2010. Sonar Measurements in the Gulf Stream front on the Southeast Florida Shelf Coordinated with TerraSAR-X Satellite Overpasses, *17th Conf. on Air Sea Interaction*, 27 - 30 September 2010, Annapolis, MD, USA.

Soloviev, A., C. Maingot, A. Fujimura, J. Fenton, M. Gilman, **S. Matt**, S. Lehner, D. Velotto, S. Brusch, 2010. Fine Structure of the Upper Ocean from High-Resolution TerraSar-X Imagery and In-Situ Measurements. *2010 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 25 - 30 July 2010, Honolulu, HI , USA, 1944-1947.

Matt, S., M. Iskandarani, and K.D. Leaman, 2009. The Impact of Temporal Variability in Forcing on a 2D Gravity Current from a High-Order Nonhydrostatic Spectral Element Model. *The International Conference MSS-09 "Mode Conversion, Coherent Structures and Turbulence, 23 - 25 November 2009", Conference Proceedings*, URSS, Moscow, 249-254.

Service

NSF Review Panelist May 2022, March 2024

NASA Ocean Salinity Science Team Review Panel Feb 2014

NSF and ONR Proposal Reviewer

Reviewer *Journal of Geophysical Research, Applied Ocean Research, International Journal of Naval Architecture and Ocean Engineering*

Student mentor SEAP, NREIP, SSEP since 2013
