Andrew Wyatt Smith | Curriculum Vitae

15 Francisco Avenue, West Caldwell, NJ 07006 • (404) – 626 – 3389 • andrew.wyatt.smith@gmail.com

Education

Ph.D. Meteorology & Physical Oceanography — *University of Miami – RSMAES, Miami, FL* 01/2017 – 05/2021
Magna Cum Laude

Dissertation: Sea Surface Structure Mediation of Kinetic Energy Transfer and Dissipation
Academic Advisor: Dr. Brian K. Haus
Affiliated Research Laboratory: Alfred C. Glassell, Jr. SUrge STructure Atmosphere INteraction (SUSTAIN) Laboratory (http://sustain.earth.miami.edu/)

M.S. Meteorology & Physical Oceanography — *University of Miami – RSMAS, Miami, FL* 08/2014 – 12/2016
Magna Cum Laude

Thesis: The Role of Air-Sea Interaction in Structure and Intensity Change in Hurricane Ophelia (2005): Coupled modeling and RAINEX observations
Academic Advisor: Dr. Shuyi S. Chen
Affiliated Research Laboratory: Hurricanes and Coupled Atmosphere-Ocean Systems Laboratory

B.S. Earth & Atmospheric Sciences — *Georgia Institute of Technology, Atlanta, GA* 06/2010 – 05/2014
Cum Laude

Research Interests

Air-Sea Interaction
Wave Growth, Processes, and Breaking
Air-Sea Gas Transfer and Bubble Processes
Bubble and Sea Spray Dynamics
Turbulence and Dissipation
Hurricane Boundary Layer Processes

Research Experience

RESEARCH ASSOCIATE — *Imperial College London, London, UK* 09/2021 – 09/2023
Advisor: Dr. Adrian H. Callaghan, Senior Lecturer, Dept. of Civil and Environmental Engineering *Full Time*

Research: Developed, validated, and analyzed the sensitivity of gas transfer rates of carbon dioxide and their parameterizations for use in global climate models using a state of the art spectral wave model and global observations of gas flux from cruises; designed and constructed sub-surface shadowgraph bubble imaging system, basin experiments support frame and rig to image 3D two-phase flow, bubbles, and along-crest heterogeneity associated with breaking laboratory waves.

Projects: Three-dimensional Imaging of breaking wave Two-phase flow and Along-crest heterogeNeity (TITAN; 2023)

GRADUATE RESEARCH ASSISTANT — *University of Miami RSMAES, Miami, FL, USA* 01/2017 – 05/2021
Advisor: Dr. Brian K. Haus, Professor and Chair, Dept. of Ocean Sciences *Full Time*

Research: Used ship-board meteorological tower and wave data from LASER (2016) field campaign and high-wind laboratory wind-wave experiments to capture sea surface structure characteristics, evolution, and breaking and their role and impact in bubble dynamics, turbulence, turbulent kinetic energy, and its dissipation in near-surface boundary layers.

FIELD RESEARCH ASSISTANT — *University of Miami RSMAES, Miami, FL, USA* 03/2017 – 05/2017
Supervisors: Dr. Brian K. Haus; Dr. Daniel F. Carlson (Florida State University) *Full Time*

Research: Trained, transported, and executed deployments of overhead custom-built unmanned aerial systems (drones) for observation and capture of sea surface including object tracking and drifter deployment for investigation of submesoscale processes and transport on the continental shelf during the Submesoscale Processes and Lagrangian Analysis on the SHelf (SPLASH) field campaign (http://carthe.org/splash/)

GRADUATE RESEARCH ASSISTANT — *University of Miami RSMAES, Miami, FL, USA* 08/2014 – 12/2016
Advisor: Dr. Shuyi S. Chen, Professor, Dept. of Ocean Sciences *Full Time*

Research: Investigated air-sea interactions related to structure and intensity changes in Hurricane Ophelia (2005) through processing and analysis of multiple-format airborne and satellite observational data from RAINEX field campaign (2005) and output from coupling experiments using a high-resolution atmosphere-ocean numerical model.

UNDERGRADUATE RESEARCH ASSISTANT — *Georgia Inst. of Tech. – Atlanta, GA, USA* 05/2013 – 06/2014
Advisor: John M. Trostel, Director, GTRI SSRC (https://severestorms.gatech.edu/) *Part Time*

Research: Designed and programmed wireless multi-hop nano-satellite network with circuit boards and paper motes as part of US Air Force University Nanosatellite Program (UNP) Project ANDESITE (2013), using cross-disciplinary knowledge to outfit nanosatellites designed for re-useable in-situ observation of meteorological phenomena with ultra-light weight remote sensors, power source and RF transmission capabilities.

Affiliated Research Laboratory: GTRI Sensors & Electromagnetic Applications Laboratory (https://gtri.gatech.edu/laboratories/sensors-and-electromagnetic-applications-laboratory)

UNDERGRADUATE RESEARCH ASSISTANT — *Georgia Inst. of Tech. – Atlanta, GA, USA* 06/2012 – 06/2014
Advisor: Dr. Emanuele Di Lorenzo, Director & Professor, Ocean Science and Engineering Program *Part Time*

Research: Collaborated with NOAA Alaska Fisheries Science Center fisheries scientists to connect atmosphere-ocean forcing mechanisms and Pacific Decadal Oscillation to recruitment of sablefish in the Gulf of Alaska-Bering Strait region and presented findings at conference to highlight climate indices as ecosystem forecasting indicator useful to annual fisheries stock assessment efforts.

Teaching and Advising Experience

UNDERGRADUATE STUDENT ADVISOR — *Imperial College London – London, UK* 01/2023 – 05/2023
Project: "Behaviour and Stabilization of Rising Bubbles of Various Radius due to Surfactants"

Advising: Constructed and tested bubble tank and frame for experiments on surfactant stabilization of rising bubbles for two undergraduate students; assisted with and advised students in image analysis, high-speed camera setup, and project thesis writing.

LECTURER — *Imperial College London – London, UK* 10/2022 – 01/2023
Course: CIVE 70076 Wave Mechanics

Prepared course materials and presented lectures for students in Master of Science in Civil and Environmental Engineering program; held tutorial and final exam review sessions, wrote, and marked final exam, set-up and supervised in-laboratory practical experiments for the students.

TEACHING ASSISTANT — *Imperial College London – London, UK* 01/2022 – 05/2023
Course: CIVE 97064/70078 Air-Sea Interaction Dynamics

Prepared and supervised laboratory practical experiments for students in Master of Science in Civil and Environmental Engineering program, held office hours review to answer questions on programming, figures, and laboratory deliverables.

LECTURER — *Imperial College London – London, UK* 10/2021 – 12/2022
Course: CIVE 97059 MATLAB Primer

Prepared course materials and presented lectures including targeted computer programming tutorials for undergraduate students in the Civil and Environmental Engineering department.

GRADUATE STUDENT ADVISOR — *Frost Museum of Science – Miami, FL, USA* 06/2019 – 07/2019
Program: Integrated Marine Program and College Training (IMPACT)
Project: "Building for the Future: Coral Reefs, Breakwaters, and Wind-Wave Forces on Homes"
Advising: Educated and advised high school student participants about hurricanes, coastal resiliency, and engineering, and participated in setup and supervision of laboratory experiments in the SUSTAIN facility at the University of Miami during a six-week summer research program, after which the students presented their results at symposium.

GRADUATE TEACHING ASSISTANT — *University of Miami RSMAES, Miami, FL, USA* 01/2018 – 05/2018
Supervisor: Dr. Igor Kamenkovich, Professor, Dept. of Ocean Sciences
Course: MSC/ATM 220 Climate and Global Change

Attended lectures, graded exams and essays, held office hours for 25-30 students weekly and final exam review, presented lecture on hurricanes, storm surge, and climate change during the course.

GRADUATE TEACHING ASSISTANT — *University of Miami RSMAES, Miami, FL, USA* 01/2016 – 05/2016
Supervisor: Dr. Shuyi S. Chen, Professor, Dept. of Ocean Sciences
Course: MSC 372 Special Topics in Marine Science

Organized student-driven discussion sessions for undergraduate special topics course on societal impact of hurricanes. Presented lecture on hurricane impacts associated with global sea level rise.

UNDERGRADUATE TEACHING ASSISTANT — *Georgia Inst. of Tech. – Atlanta, GA, USA* 08/2012 – 12/2012
Supervisor: Dr. Oleksandr (Alex) Karabanov, Professor, Dept. of Earth and Atmospheric Sciences
Course: EAS 1600 Introduction to Environmental Science

Supervised weekly laboratory experiments for introductory environmental science course, including preparation and use of lab equipment, as necessary. Graded pre-lab assessments, lab reports, and exams. Held regular office hours and exam preparation sessions.

Publications

Smith, A. W., Callaghan, A. H., & Bidlot, J.-R. (2023). Development , validation , and sensitivity analysis of CO 2 air-sea gas transfer velocity and its parameterizations with a spectral wave model. *Journal of Geophysical Research: Oceans*, (in prep.).

Tan, P., Smith, A. W., Curcic, M., & Haus, B. K. (2023). Laboratory wave and stress measurements quantify the aerodynamic sheltering in extreme winds. *Journal of Geophysical Research: Oceans*, *128*, 1–39. https://doi.org/10.1029/2022JC019505

Stanley, R. H. R., Kinjo, L., Smith, A. W., Aldrett, D., Alt, H., Kopp, E., Krevanko, C., Cahill, K., & Haus, B. K. (2022). Gas Fluxes and Steady State Saturation Anomalies at Very High Wind Speeds. *Journal of Geophysical Research: Oceans*, 1–19. https://doi.org/10.1029/2021jc018387

Smith, A.W., Haus, B.K., and Stanley, R.H.R. (2022). "Bubble-turbulence dynamics and dissipation beneath laboratory breaking waves". *Journal of Physical Oceanography, 52*(1), 2159-2181. https://doi.org/10.1175/JPO-D-21-0209.1

Smith, A.W. (2021). "Sea surface structure mediation of kinetic energy transfer and dissipation." *Dissertation*. University of Miami.

Krall, K. E., Smith, A. W., Takagaki, N., & Jähne, B. (2019). "Air – sea gas exchange at wind speeds up to 85 m s^{-1}". *Ocean Science*, *15*, 1783–1799.

Mehta, S., Ortiz-Suslow, D. G., Smith, A. W., & Haus, B. K. (2019). "A laboratory investigation of spume generation in high winds for fresh and seawater". *Journal of Geophysical Research: Atmospheres*, 124, 11297– 11312. https://doi.org/10.1029/2019JD030928

Smith, A. W., Haus, B. K., & Zhang, J. A. (2019). "Stability and sea state as limiting conditions for TKE dissipation and dissipative heating". *Journal of Atmospheric Sciences*, *76*, 689–706.

Smith, A.W. (2016). "The Role of Air-Sea Interaction in Structure and Intensity Change in Hurricane Ophelia (2005): Coupled Modeling and RAINEX Observations." *Thesis*. University of Miami.

Presentations

Smith, A.W., Callaghan, A.H., and Bidlot, J.-R. (2023). "Development, validation, and sensitivity analysis of circumglobal CO_2 air-sea gas transfer velocity and its parameterizations with a spectral wave model". 2023 *End of NERC Grant Meeting* (Oral).	09/2023 London, UK
Chasapis, K., Smith, A.W., and Callaghan, A.H. (2023). "Mapping air entrainment and bubbles under a short-crested breaking wave – TITAN (2023)". 2023 *End of NERC Grant Meeting* (Oral).	09/2023 London, UK
Smith, A.W., Callaghan, A.H., and Bidlot, J.-R. (2022). "Parameterizing CO_2 air-sea gas transfer with wave-breaking energy dissipation rate, sea state, and wind speed". *HMS Challenger* 150^{th} *Anniversary Conference* (Oral).	09/2022 London, UK
Smith, A.W., Callaghan, A.H., and Bidlot, J.-R. (2022). "Parameterizing CO_2 air-sea gas transfer with wave-breaking energy dissipation rate, sea state, and wind speed". 2022 *EGU General Assembly* (Oral).	05/2022 Vienna, AT
Smith, A.W., Callaghan, A.H., and Bidlot, J.-R. (2022). "On the parameterization of air-sea gas transfer of CO_2 via wave breaking energy dissipation rate". 8^{th} *International Symposium on Gas Transfer at Water Surfaces* (Oral).	05/2022 Plymouth, UK
Smith, A.W., Stanley, R.H.R., and Haus, B.K. (2021). "Wave-scaled bubble size distribution parameterization and linkages to sub-surface turbulence and dissipation beneath hurricane force winds". *AMS* 22^{nd} *Conference on Air-Sea Interaction* (Oral).	01/2021 Virtual
Smith, A.W., Haus, B.K., and Stanley, R.H.R. (2020). "Entrained bubble populations and their influence on the turbulence, dissipation, and stress beneath breaking and non-breaking waves". *AGU Ocean Sciences Meeting* (Oral).	02/2020 San Diego, CA, USA
Stanley, R.H.R., Kinjo, L., Smith, A.W., Alt, H.R., Krevanko, C.F.N., Aldrett, D., Kopp, E.B., and Haus, B.K. (2020). "Noble gas fluxes reveal links between air-sea gas exchange, bubbles, and the structure of the air-sea interface at high wind speeds". *AGU Ocean Sciences Meeting* (Oral).	02/2020 San Diego, CA, USA
Veras Guimaraes, P., Filipot, J.F., Haus, B.K., Dai, H., Curcic, M., Smith, A.W., Mouche, A., and Chapron, B. (2020). "Wave breaking and surface roughness at high wind speeds". *WISE* (Abstract).	01/2020
Smith, A.W., Haus, B.K., and Zhang, J.A. (2018). "On the implications of dissipative heating for air-sea exchanges". *AGU Ocean Sciences Meeting* (Poster).	02/2018 Portland, OR, USA
Mehta, S., Ortiz-Suslow, D.G., Haus, B.K., and Smith, A.W. (2018). "A comparison of fresh and saline spume droplet production in high wind conditions". *AGU Ocean Sciences Meeting* (Oral).	02/2018 Portland, OR, USA

Krevanko, C.F.N., Lambert, E., Laxague, N.J.M., Alt, H.R., Guigand, C., Smith, A.W., Haus, B.K., and Stanley, R.H.R. (2018). "Improving models for air-sea gas exchange using measurements of noble gas ratios in the SUSTAIN wind-wave tank". *AGU Ocean Sciences Meeting* (Poster). — 02/2018, San Diego, CA, USA

Alt, H.R., Krevanko, C.F.N., Lambert, E., Laxague, N.J.M., Guigand, C., Smith, A.W., Haus, B.K., and Stanley, R.H.R. (2018). "Examining the effect of gas exchange on dissolved oxygen concentration at varying wind, wave, and temperature conditions in the SUSTAIN wind-wave tank". *AGU Ocean Sciences Meeting* (Poster). — 02/2018, San Diego, CA, USA

Mehta, S., Laxague, N.J.M., Haus, B.K., Smith, A.W., Ozgokmen, T.M., Pol, J.V., and Pol, A.V. (2018). "Measurement of wave spectra and Stokes drift using a low-cost miniature Lagrangian wave buoy: observations from SPLASH (2017)". *Gulf of Mexico Oil Spill & Ecosystem Sciences* (GOMOSES) *Conference* (Poster). — 02/2018, New Orleans, LA, USA

Smith, A.W., and Chen, S.S. (2015). "Hurricane-induced ocean cooling on storm structure and intensity in a coupled WRF-HYCOM model". *16th Annual WRF Users' Workshop* (Poster). — 06/2015, Boulder, CO, USA

Smith, A.W., Mendez, J., Trostel, J.M., and Dufek, J. (2014). "Low-cost Lagrangian environmental wireless sensor system". *AMS 94th Annual Meeting* (Oral). — 02/2014, Atlanta, GA, USA

Smith, A.W., Shotwell, S.K., and Di Lorenzo, E. (2012). "Alaskan sablefish recruitment linked to ocean eddies". *GLOBEC/PICES/ICES Workshop on Forecasting Ecosystem Indicators with Process-based Models* (Oral). — 09/2012, Friday Harbor, WA, USA

Skills

Programming and Computer Languages: MATLAB, Python, SQL, R, LINUX/UNIX

Software: Microsoft Office Suite, iWork Suite, SolidWorks CAD, ArcGIS Pro, UltiMaker Cura for 3D printing, National Instruments LabVIEW, Waves Acquisition Stereo System (WASS), Campbell Scientific LoggerNet, Norpix StreamPix

Numerical Models: ECMWF Wave Model (ecWAM), Weather Research & Forecasting (WRF), HYbrid Coordinate Ocean Model (HYCOM), University of Miami Wave Model (UMWM; Donelan et al. 2012), Unified Wave Interface Coupled Model (UWIN-CM; Curcic et al. 2016)

Other Proficiencies: Laboratory experiments in wind-wave basins; wiring, scripting, and use of data acquisition systems, sonic anemometers, conductive wave wires, high speed cameras, stereo-video imaging for 3D wave reconstruction, hot-film anemometry, shadowgraph sub-surface imaging

Certifications and Specializations

IBM DATA SCIENCE PROFESSIONAL — *IBM – Armonk, NY* — 02/2024
Professional certificate in data science tools, methodology, and application via Python, R, and SQL for data analysis, visualization, database management, and machine learning

GEOGRAPHIC INFORMATION SYSTEMS — *University of California Davis – Davis, CA* — 02/2024
Specialization in GIS including geospatial analysis for hydrography, land use planning, conservation planning, public health, emergency management, market analysis, and supply chain management

Awards and Honors

EAGLE SCOUT — *Boy Scouts of America – Atlanta, GA* — 09/2009
3rd Generation Recipient and Boy Scouts of America's Highest Honor

Professional Affiliations

Member, European Geophysical Union (EGU) — 2021 – Present
Member, American Geophysical Union (AGU) — 2014 – Present
Member, American Meteorological Society (AMS) — 2013 – Present