DOUGLAS LOUIS CAHL

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ACADEMIC APPOINTMENTS

Research Assistant Professor, Mechanical Engineering, University of South Carolina — 2025-present
Integrated Multiphysics & Systems Engineering Laboratory

Post-Doctoral Fellow, Mechanical Engineering, University of South Carolina — 2023-2025
Integrated Multiphysics & Systems Engineering Laboratory

Graduate Teaching Assistant, University of South Carolina — 2014-2021
School of the Earth, Ocean & the Environment

Graduate Research Assistant, University of Maine — 2007-2011
Environmental Radiation Lab (Mentor: C.T. Hess)

Graduate Teaching Assistant, University of Maine — 2007-2011
Department of Physics

Basic Math, Calculus and Physics Tutor, DeVry University — 2005-2007

Cyclotron Student Intern, Rutgers University — 2005-2007

EDUCATION/CERTIFICATIONS

Post-Doctoral Fellowship, Mechanical Engineering, University of South Carolina — 2023-2025
Hardware lead on "Reliable Perception for Unmanned Maritime Systems" project for Office of Naval Research.
Mentor: Yi Wang, PhD (Integrated Multiphysics & Systems Engineering Laboratory)

Ph.D., Geological Sciences, University of South Carolina — 2023
Thesis title: *HF radar: Shining a Light on Ocean Currents*
Mentor: George Voulgaris, PhD

M.S., Physics, University of Maine — 2012
Thesis: *Diffusion Coefficients Calculated Using Cs-137 Profiles Applied to Pb-210 Dating in Lake Core Sediments*

B.S., Physics, Rutgers University — 2005

FAA Remote Pilot License – Certificate number 4452037 — 2020

FAA Private Pilot License – *in progress*, 15 hours completed

GRANT AWARDS & ACTIVITY

Current & Pending:

Other Personnel (FAA licensed drone pilot)
Collaborative Research ($867,987) 2022-*2026*
NSF: Division of Ocean Sciences (OCE)
Dynamics of Cross-Shelf Plumes under Upwelling Wind Conditions. 2148480
(George Voulgaris, Alexander Yankovsky)

Completed:

Winner 2020-2021
2020 Southeast Coastal Ocean Observing Regional Association (SECOORA)
Data Challenge ($3,500)
Southeast Coastal Ocean Observing Regional Association (SECOORA)
Eddy identification, tracking and classification in HF radar surface currents.

Co-Mentor 2017
Magellan Scholar Award ($3,000)
Office of the Vice President for Research at the University of South Carolina
Improving HF radar derived ocean wave spectra using satellites.
(Recipient/Mentee: Jack Gonzales; co-Mentor: George Voulgaris)

Recipient 2014-2015
Support to Promote Advancement of Research and Creativity (SPARC)
Graduate Research Grant ($4,475)
Office of the Vice President for Research at the University of South Carolina
Ocean Surface Current Measurements using HF Radars: Improving accuracy.
(Mentor: George Voulgaris)

PUBLICATIONS

Peer-Refereed Publications (8)
*(Student; *Advisee/mentee)*

1. *Middour, Benjamin, George Voulgaris, and **Douglas Cahl**. "Video Based Estimation of Surface Currents in a Tidal Inlet." *Marine Technology Society Journal* 57, no. 3 (2023): 5-15.
2. **Cahl**, **Douglas,** George Voulgaris, and Lynn Leonard. "A Comparison of Beamforming and Direction Finding Algorithms (Beamscan and MUSIC) on a Linear Array HF Radar in a Medium to Low Wave Energy Environment." *Journal of Atmospheric and Oceanic Technology* 40, no. 2 (2023): 191-218.
3. Yankovsky, Alexander E., Diane B. Fribance, **Douglas Cahl**, and George Voulgaris. "Offshore Spreading of a Supercritical Plume Under Upwelling Wind Forcing: A Case Study of the Winyah Bay Outflow." *Frontiers in Marine Science* 8 (2022): 785967.
4. Alattabi, Zaid R., **Douglas Cahl**, and George Voulgaris. "Swell and wind wave inversion using a single Very High Frequency (VHF) radar." *Journal of Atmospheric and Oceanic Technology* 36, no. 6 (2019): 987-1013.
5. Wu, Xiaodong, **Douglas Cahl**, and George Voulgaris. "Effects of wind stress and surface cooling on cross-shore exchange." *Journal of Physical Oceanography* 48, no. 11 (2018): 2627-2647.
6. Kumar, Nirnimesh, **Douglas Cahl**, Sean C. Crosby, and George Voulgaris. "Bulk versus spectral wave parameters: Implications on stokes drift estimates, regional wave modeling, and HF radars applications." *Journal of Physical Oceanography* 47, no. 6 (2017): 1413-1431.

7. Slemmons, Krista E.H., Jasmine E. Saros, Jeffery R. Stone, Suzanne McGowan, C. T. Hess, and **Douglas Cahl**. "Effects of glacier meltwater on the algal sedimentary record of an alpine lake in the central US Rocky Mountains throughout the late Holocene." *Journal of Paleolimnology* 53, no. 4 (2015): 385-399.
8. Saros, Jasmine E., Jeffery R Stone, Gregory T Pederson, Krista E.H. Slemmons, Trisha Spanbauer, Anna Schliep, **Douglas Cahl**, Craig E Williamson, and Daniel R Engstrom. "Climate-induced changes in lake ecosystem structure inferred from coupled neo-and paleoecological approaches." *Ecology* 93, no. 10 (2012), 2155–2164.

Other Publications (3)

1. Yankovsky, Alexander E., Diane B. Fribance, **Douglas Cahl**, and George Voulgaris. Data for the paper in Front. Mar. Sci. doi: 10.3389/fmars.2021.785967: Zenodo, https://doi:10.5281/zenodo.5796882
2. **Cahl, Douglas** and George Voulgaris. VELSSCPHASE: A code for examining the phase relationships between suspended fine sediment and tidal flows using the Bass et al. (2002) method. Zenodo, doi:10.5281/zenodo.3363922
3. **Cahl, Douglas**. "Drones a Growing Tool for a Myriad of Uses." Interview by Tut Underwood. *South Carolina Public Radio*. April 4, 2017. https://www.southcarolinapublicradio.org/sc-news/2017-04-04/drones-a-growing-tool-for-a-myriad-of-uses.

Manuscripts Under Review, In Revision & In Prep (5)

1. **Cahl**, **Douglas** and George Voulgaris, and Lynn Leonard. (*imminent submission*, manuscript available upon request) "On the Fraction of Stokes Drift Included in Ocean Wave Phase Speed, Measured by HF Radars."
2. **Cahl, Douglas** and George Voulgaris. (*in prep*). "Eddy identification using the winding angle method in the South Atlantic Bight with HF radar surface currents."
3. Colby Weeks, **Cahl**, **Douglas** and Yi Wang (in prep). "Surface current determination from land based forward looking camera systems."
4. Ty Dangerfield, **Cahl, Douglas** and Yi Wang (in prep). "Using commercial marine radars as a tool for automated object annotation for machine learning EO/IR (camera systems) in littoral environments."
5. **Cahl**, **Douglas**, Colby Weeks and Yi Wang (in prep). "Accuracy and uncertainty in surface current estimated from ship based forward looking camera systems."

INVITED TALKS & LECTURES

1. **Cahl, Douglas** and George Voulgaris. "Nearshore Quadcopter Research: Surface Ocean Currents and HF Radar Calibration." In *Drones in the Coastal Zone*. In: *SECOORA 2020 Annual Meeting*, 2020.
2. Voulgaris, George**, Douglas Cahl,** Zaid Alattabi and Jeff Jefferson. "Shining a light (HF radar) on ocean currents in South Carolina." In: *SECOORA 2018 Annual Meeting*.
3. **Cahl, Douglas**. "Physics, HF Radars and Autonomous Vehicles in Oceanography". In: *2016 Physics Colloquium*, University of South Carolina, Columbia, SC. USC. Sept 2016.
4. **Cahl, Douglas** and George Voulgaris. "Modern Measurement Methods in Oceanography". In: *2015 Graduate Student Day*, University of South Carolina, Columbia, SC. USC. April 2015.
5. **Cahl, Douglas** and C.T. Hess. "Diffusion Corrections applied to 210Pb Dating". In: *New England Radiological Health Committee Conferenc*e, Mansfield, MA. NERHC. Oct 2011.

PRESENTATIONS

Refereed Conferences / Published Abstracts
(*Advisee/mentee/student)

1. **Cahl**, **Douglas**, *Christopher T Papageorgiou, George Voulgaris and Yi Wang "Near sea surface current profile measurements using aerial (drone) image sequences." In: *2024 Ocean Sciences Meeting*. 2024

2. * Papageorgiou, Christopher T., George Voulgaris, Alexander Yankovsky and **Douglas Cahl** "Kinematics and mixing processes of a buoyant plume exiting Winyah Bay, SC under upwelling favorable winds." In: *2024 Ocean Sciences Meeting*. 2024
3. Voulgaris, George, *Christopher T Papageorgiou, **Douglas Cahl,** Alexander Yankovsky, *Benjamin Middour and Diane Fribance "RoboCat: An Autonomous Surface Vehicle for Near Surface Mean Flow and Turbulence Measurements in Buoyant Plumes." In: *2024 Ocean Sciences Meeting*. 2024
4. Fribance, Diane, Alexander Yankovsky, **Douglas Cahl** and George Voulgaris "The importance of cross-shelf plumes." In: *2020 Ocean Sciences Meeting*. 2020
5. **Cahl**, **Douglas**, George Voulgaris, and Lynn Leonard. "HF radar surface current estimates using beamforming and direction finding (Beamscan and MUSIC) with a linear array." In *Ocean Sciences Meeting 2020*. 2020.
6. **Cahl**, **Douglas** and George Voulgaris. "Wave Spectra and Ocean Current Measurements from a Multirotor UAV." In *AGU Fall Meeting Abstracts*, vol. 2018, pp. OS21D-1594. 2018.
7. Alattabi, Zaid, **Douglas Cahl**, and George Voulgaris. "A hybrid empirical method for wave spectra inversion from a single VHF Radar Site." In *AGU Fall Meeting 2018*. AGU, 2018.
8. **Cahl**, **Douglas**, George Voulgaris, and Xiaodong Wu. "It's not just noise: Stokes' drift and bias in beam forming HF Radar surface current measurements." In *2018 Ocean Sciences Meeting*. 2018.
9. Alattabi, Zaid, **Douglas Cahl**, and George Voulgaris and Lynn Leonard. "Ocean Wave Spectra Estimates from High Frequency Beam-Forming Radars in the South Atlantic Bight" In *2018 Ocean Sciences Meeting*. 2018.
10. **Cahl, Douglas** and George Voulgaris. "Beam Forming HF Radar Beam Pattern Measurements and Phase Offset Calibration Using a UAV". In: *2016 AGU Fall Meeting, San Francisco, CA*. OS13B-1810. AGU. Dec 2016.
11. Huffman, Bradley, Enrica Viparelli, Paul Ziehl, George Voulgaris, **Douglas Cahl**, and Ioannis Rekleitis. "Rapid Assessment of Bridge Scouring Following Extreme Flood Events". In *SC Floods Conference*, Columbia SC. October 2016.
12. **Cahl**, **Douglas**, George Voulgaris, and Nirnimesh Kumar. "HF Radar Lagrangian trajectory calculations accounting for Stokes Drift and the nonlinear Bragg wave phase speed correction term". In: *2016 ASLO Ocean Sciences Meeting, New Orleans, LA*. EC44B-1247. ASLO. Feb 2016.
13. **Cahl, Douglas**, and George Voulgaris. "HF Radar Sensitivity to Stokes' Drift as a Function of Wave conditions and Operating Frequency". In: *2015 Radiowave Oceanography Workshop (ROW 2015), Woods Hole, MA*. ROW. Nov 2015.
14. **Cahl, Douglas** and George Voulgaris. "Sub-mesoscale Eddies and Their Propagation Paths in Long Bay, SC Observed in HF Radar Surface Currents". In: *2015 AGU Fall Meeting, San Francisco, CA*. OS11A-1987. AGU. Dec 2015.
15. **Cahl, Douglas** and George Voulgaris. "Sub-mesoscale Eddy Detection using HF Radars in the South Atlantic Bight". In: *2014 Radiowave Oceanography Workshop (ROW 2014), Savannah, GA*. May 2014.

Students Conferences

1. *Middour, Ben, George Voulgaris and **Douglas Cahl**. "Video Based Estimation of Surface Currents in a Tidal Inlet." In: *Discover UofSC*. 2022.
2. *Alattabi, Zaid, George Voulgaris, **Douglas Cahl**, and Lynn Leonard. "Evaluation of using high frequency beam-forming radars to extract wave spectra". In: *Discover UofSC*. 2018.
3. *Gonzales, Jack, George Voulgaris, **Douglas Cahl**, and Zaid Alattabi. "Satellite Calibration of HF Radar for wave height extraction." In: *Discover UofSC*. 2018.
4. **Cahl, Douglas** and George Voulgaris. "Creating a low cost surface ocean measurement system using autonomous unmanned aerial vehicles (drones)." In: *Discover UofSC*. 2017.

5. **Cahl, Douglas** and George Voulgaris. "Modern measurement methods in oceanography". In: *Discover UofSC*. 2016.
6. **Cahl, Douglas** and George Voulgaris. "Using HF Radars." In: *Discover UofSC*. 2015.

TECHNOLOGICAL & METHODOLOGICAL EXPERTISE

Programming: https://github.com/dougcahl

Matlab	Advanced (10+ years experience). Dispersion relationship / oceanographic signal processing, GUI programs, custom MEX files, signal analysis (and specifically HF radar signal analysis for ocean currents), time-series analysis, 2D/3D plotting/graphics, custom physics simulations for autopilot (ardupilot) simulation testing, HF radar simulations and analysis. Ocean wave analysis and eddy identification
Python	Connecting to sensors (GPS, soil moisture, PH, temperature, custom built TDS/conductivity sensors, lightweight wave buoys for drones). Signal analysis, vector analysis, plotting, etc.
C/C++	Mostly used for Arduino programming. Used for signal analysis when speed is a priority.
Linux	Bash scripting, cron scheduling, SSH tunnels, Raspberry Pi automation (generations 1-4).

Electronics Skillset

Nvidia Orin	Hardware and software integration for camera and radar systems
Arduino	DIY wave buoy, wireless data transfer, GPS
Raspberry Pi	Data logging, connecting to autonomous vehicles (Ardupilot/Pixhawk/Navio)
Autonomous Vehicles	**Drone (USV) operations**: Built autonomous and radio controlled gas powered kayak (Mokai). Experience in tuning these autonomous systems (Ardurover) that are far out of bounds for the default parameters. Custom built kayak with electric thrusters and omnidirectional electric powered small catamaran as oceanographic research platforms (Ardurover platforms). **Drone (UAV) operations**: Built Quadcopter DIY drones based on the Pixhawk/Arducopter platform with customized mission planning. Experience with DJI phantom series: 2D/3D mapping, surface current calculations using imagery from these systems. Experience flying the Phantom from boats in the ocean. RC airplane flight testing on the Arduplane platform.
Antennas	Custom antenna design/tuning for HF systems
NEC	EZNEC, MMANA-GAL for antenna design
Other	Soldering, simple circuit design, oscilloscope testing, RF tuning/analysis (HF frequencies).

MENTORING, ADVISING & RESEARCH SUPERVISION

Christopher Papageorgiou (Research Associate UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present
Ty Dangerfield (MS student UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present

Colby Weeks (MS student UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present
Steve Howard (UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present
Jackie Wang (UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present
Jacob Vaught (UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2024-present
Sarah John (University of South Carolina, advisement with Dr. Mila Tasseva-Kurktchieva)	2024-present
Scout Mcmahon (University of Montana, advisement with Dr. Mila Tasseva-Kurktchieva from the University of South Carolina)	2024-present
Jacob Whisenant (PhD student UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2023-present
Aiden Kimrey (UofSC, supervision in Integrated Multiphysics & Systems Engineering Laboratory)	2023-present
Christopher Papageorgiou (UofSC, supervision in Coastal Processes and Sediments Dynamics lab)	2022-2023
Ben Middour (UofSC, supervision in Coastal Processes and Sediments Dynamics lab)	2022-2023
Jack Gonzales (UofSC, supervision in Coastal Processes and Sediments Dynamics lab)	2017-2018
Savannah Crow (UofSC, supervised maintaining a hydroponics monitoring system)	2018
Paul Getz (UofSC, supervised building a hydroponics monitoring system)	2017
Annissa Mignardi (UofSC, supervised building a hydroponics monitoring system)	2016-2017
Christopher McKinney (MS student UofSC, supervision in Coastal Processes and Sediments Dynamics lab)	2016

TEACHING

Guest lectures

Neurolinguistics: Physical Acoustics	NEUR 458/585
Oceanographic Time Series Analysis: Empirical Orthogonal Functions	MSCI 783
Physical Oceanography: Coriolis Force	MSCI 314

Graduate Teaching Assistant, University of South Carolina 2014-2021

Marine Science

Undergraduate Courses:

MSCI314 Lab - Online	Physical Oceanography
MSCI314 Lab curator	
MSCI314 Lab	

Graduate Teaching Assistant, University of Maine 2007-2011

Physics

PHY107/108 Recitation/Lab	Technical Physics I/II
PHY111/112 Recitation/Lab	General Physics I/II
PHY121/122 Recitation/Lab	Physics for Eng. & Physical Scientists I/II

Basic Math, Calculus and Physics Tutor, DeVry University 2005-2007

One-on-one tutoring in calculus and physics

Faculty Assistant in Introductory Physics

AFFILIATIONS & PROFESSIONAL SERVICE

Committee service

Unlearning Racism in Geoscience (URGE), Department of Geology, University of South Carolina — 2021

Graduate Student representative on the School of the Earth, Ocean and Environment faculty committee — 2018

Review Service

Ad-Hoc Reviewer, Transactions on Geoscience and Remote Sensing
Ad-Hoc Reviewer, Remote Sensing
Ad-Hoc Reviewer, SECOORA Data Challenge
Ad-Hoc Reviewer, IEEE Journal of Oceanic Engineering
Ad-Hoc Reviewer, Frontiers in Marine Science

Professional Memberships

Member, American Geophysical Union (AGU) — 2015-present
Member, Sigma-Pi-Sigma (ΣΠΣ) Physics Honor Society — 2008-present

AWARDS & HONORS

Second Place-Tie — 2022
, Morning Poster: Engineering and Computing A, Discover USC to Mentee Benjamin Middour

Winner, 2020 SECOORA Data Challenge. — 2020

Honorable Mention — 2022
, Afternoon Poster Presentation: U/P: Biology and Environmental Sciences F Discover USC to Mentee Jack Gonzales

Recipient, Travel Grant, School of the Earth, Ocean and Environment, University of South Carolina, $500. — 2020

Recipient, Travel Grant, School of the Earth, Ocean and Environment, University of South Carolina, $500. — 2019

Recipient, Travel Grant, Graduate School, University of South Carolina, $1,100. — 2015-2016

Recipient, Travel Grant, Department of Geological Sciences, University of South Carolina, $1,500. — 2015-2016

Awardee, Support to Promote Advancement of Research and Creativity (SPARC) Graduate Research Grant, Office of the VP for Research, University of South Carolina, $4,475. — 2015-2016

Fellow, Presidential Fellowship, Graduate School, University of South Carolina, $8,000/yr. — 2013-2016