SAMANTHA R. BALLARD

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LinkedIn
University of Miami
Department of Applied Marine Physics/Ocean Sciences

CURRENT POSITION

University of Miami — Miami, FL
Doctoral Graduate Research Assistant — August 2015- Present

Scientist with experience in algorithm development, satellite data analysis, image processing, computational modeling and data science. Proficient skills utilizing synthetic aperture radar, nautical radar, active and passive remote sensing instruments, air and space-borne radar, satellites, atmospheric and oceanic models, and other instrumentation. Scientific programming and software development knowledge in MATLAB, Python, FORTRAN and IDL. Research interests are in computer vision, remote sensing, modeling, forecasting, data science and machine learning for Earth science (specifically atmosphere and ocean), planetary (space) science, and defense applications.

EDUCATION

University of Miami — Miami, FL
PhD, Applied Marine Physics/Ocean Sciences — **Anticipated Graduation:** Summer 2020

Pennsylvania State University — University Park, PA
BS, Meteorology. Chi Epsilon Pi — May 2015

COMPUTER LANGUAGES

Python, Matlab, FORTRAN, IDL

GRANTS AND AWARDS

3rd Place in Earth Science for NASA Goddard's Summer Intern Poster Competition
NASA Goddard

Dean's Freshman Scholarship
Pennsylvania State University

Chelius Family Scholarship in Meteorology
Pennsylvania State University

Hans A. Panofsky Meteorology Scholarship
Pennsylvania State University

RESEARCH/WORK EXPERIENCE

PhD Graduate Research Assistant Miami, FL
University of Miami, Advisor: Dr. Hans Graber, Dr. Roland Romeiser August 2015 – Present

Coastal Land Air Sea Interaction (CLASI) Experiment Monterey Bay, CA

- Exploring air-sea interactions, turbulence, etc. in the coastal marine atmospheric boundary layer of Monterey Bay, California
- Goal: Combination of in-situ and remote sensing instruments to improve the Navy's Coupled Ocean Atmosphere Mesoscale Predication System (COAMPS) forecast model
- Primary experience with remote sensing satellite-based radar called Synthetic Aperture Radar (SAR) to study wind, waves etc., turbulence and other air-sea interactions
- Additional experience with coastal tower (anemometers), radiosondes, polarimetric cameras, buoys, ship wind and wave measurements, and forecast model
- Scientific analysis involves programming with MATLAB and Python perform mathematical transforms, statistical analysis, data manipulation and analysis, image processing and data visualization, and to develop algorithms to improve forecasting of air-sea parameters with models and satellites
- Improved coastal SAR wind retrieval algorithm
- Experience with atmospheric/oceanic model forecast and satellite data (SAR, NASA/NOAA) evaluation, analysis and depiction
- Mathematical transform analysis from in-situ, satellite and model wind data
- Applications to hurricane forecast research

NASA Goddard Intern
Synthetic Aperture Radar (SAR) Processing Greenbelt, MD
Preliminary P-Band Wind Retrieval Algorithm using EcoSAR June-August 2017

- Developed 1st successful P-Band SAR wind retrieval algorithm developed in Python using NASA's airborne radar, EcoSAR

NASA Advanced Computing for Earth Sciences (ACES) University of Virginia
June 2017

- 2.5 week bootcamp in Python, Fortran, and Super Computing (as well as other computer science topics like visualization, cloud computing, AI/machine learning etc.)

Research Cruise R/V Revelle Koror, Palau
FLEAT (Flow Encountering Abrupt Topography) May 2016

- Measured surface waves and small-scale flow patterns generating over the island-ridge system from ship-mounted X-band radar
- Used Doppler information to compute surface currents and wind speed

National Weather Service Meteorology Intern University Park, PA
National Weather Service (NOAA) January 2015- May 2015

- Used Python and GRADs to create graphics for case studies on winter storms affecting Pennsylvania in Winter, 2015
- Observed and helped with weather/hydrological forecasting shifts and radio/web broadcasts and updates

Solar and Space Physics REU Boulder, CO
University of Colorado Boulder June 2014 –August 2014

- Research with Southwest Research Institute to automatically detect coronal mass ejections and other space weather research
- Programmed using IDL and HI (Heliospheric Imager) data from NASA's STEREO mission
- Created/Enhanced algorithm to automatically detect CMEs

Broadcast Meteorology Intern Baltimore, MD
Fox 45 News May 2013-August 2013

- Worked with morning meteorologist Jonathan Meyers
- Assisted with radio and on-screen forecasts
- Assisted in creation of weather forecasts and updated web information and social media posts
- Created resume reel of on-screen forecasts

TEACHING EXPERIENCE

Lab Coach/ Python Coding Instructor Miami, FL
Integrated Marine Program and College Training (IMPACT) Program Summer 2019

- Lab coach for underprivileged, underrepresented incoming high school senior students
- Students shadowed for 6 weeks during the summer working on a research project
- Designed project based off of PhD research and python
- Taught Intro to Python for data science, scientific programming, machine learning (AI), and data visualization
- Students learned how to code, analyze and visualize scientific air-sea data from buoys, models and satellites
- Utilized NASA satellite data

- Final Presentation: Exploring the Air and Sea in Time and Space Using Buoy, Model and Satellite Data with Python

Math/Science/Test Prep Elementary, Middle School and High School Tutor Miami, FL
Tutorial Resources Fall 2017-Present

Forecasting Teaching Assistant
Weather Forecasting (ATM 243) Miami, FL
University of Miami Spring 2018

Oceanography Teaching Assistant Miami, FL
Physical Oceanography (MSC 301) Fall 2016
University of Miami

Climate Teaching Assistant University Park, PA
Understanding Global Climate Change (METEO 469) Spring 2015
Pennsylvania State University

Advanced Math Tutor (College Level) University Park, PA
Differential Equations (MATH 251) Fall and Spring 2014
Pennsylvania State University

Math Tutor (Elementary School Level) Severn, MD
5th Grade Summer 2014

PUBLICATIONS

S. Ballard, H. Graber,N. Laxague, M. Caruso and R. Romeiser "Advanced Extraction of Turbulent Scales for a New Technique Quantifying Air Sea Interaction Parameters" *Journal of Geophysical Research.* In Preparation

S. Ballard, H. Graber,N. Laxague, M. Caruso and R. Romeiser "Exploring the Relationship Between SAR-Derived Wind Speeds and Surface Roughness Length Over the Ocean through Wavelet Analysis" *2019 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Japan, 2019

S. Ballard, H. Graber, M. Caruso and R. Romeiser "Comparison of X-Band SAR and COAMPS Model Wind Fields and Other Air Sea Interaction Parameters in Monterey Bay," *2018 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Valencia Spain, 2018

S. Ballard, H. Graber, M. Caruso and R. Romeiser (2018), "Coastal Applications of Wind and Wave Retrieval Using Synthetic Aperture Radar", *2018 Ocean Sciences Meeti*ng, Portland, OR, 12-16 Feb.

S. Ballard, H. Graber and M. Caruso, "Coastal surface wind measurements derived from SAR," *2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Fort Worth, TX, 2017, pp. 3629-3631.
doi: 10.1109/IGARSS.2017.8127785

PROFESSIONAL/CONFERENCE PRESENTATIONS

AGU Ocean Sciences Meeting (Oral) San Diego, CA
New Technique for Quantifying Air-Sea Interactions Using High Resolution SAR Imagery Feb 2020

International Geoscience and Remote Sensing Symposium (IGARSS) (Oral) Japan
IEEE Geoscience and Remote Sensing Society July 2019
Exploring the Relationship Between SAR-Derived Wind Speeds and Surface Roughness Length Over the Ocean through Wavelet Analysis

European Space Agency's Living Planet Conference (Oral) Milan, Italy
May 2019
A Wavelet Technique to Derive Turbulent Air-Sea Structures near the coast from High Resolution SAR

American Geophysical Union Annual Meeting (AGU) (Poster) Washington DC
December, 2018
Characterizing Turbulent Air-Sea Interaction Phenomena in Coastal Environments by Wavelet Analysis of SAR-Derived Wind Fields

International Geoscience and Remote Sensing Symposium (IGARSS) Valencia, Spain
IEEE Geoscience and Remote Sensing Society July 2018
Technical Program Chair: Remote Sensing of Coastal Areas II

International Geoscience and Remote Sensing Symposium (IGARSS) (Poster)
IEEE Geoscience and Remote Sensing Society July 2018
Comparison of X-Band SAR and COAMPS Model Wind Fields and Other Air-Sea Interaction Parameters in Monterey Bay

AGU Ocean Sciences Meeting (Poster) Portland, OR
Coastal Applications of Wind and Wave Retrieval Using Synthetic Aperture Radar Feb 2018

AGU Ocean Sciences Meeting (Poster) Portland, OR
A Preliminary P-Band Wind Retrieval Algorithm Using EcoSAR Feb 2018

Naval Research Lab (Oral) Washington, DC
Wind and Wave Retrievals Using Nautical Radar and SAR Sept 2017

NASA Goddard Summer Intern Poster Competition Greenbelt, MD

A Preliminary P-Band Wind Retrieval Algorithm Using EcoSAR August 2017

International Geoscience and Remote Sensing Symposium (Poster) Forth Worth, TX
IEEE Geoscience and Remote Sensing Society July 2017
Coastal Surface Wind Measurements Derived from SAR
September 2017

NASA Goddard Intern Presentation (Oral) Greenbelt, MD
Wind and Wave Retrievals Using SAR July 2017

NOAA National Hurricane Center (Oral) Miami, Fl
SAR Applications in Tropical Cyclones January 2017

OTHER PROFESSIONAL EXPERIENCE

Office of Naval Research Project Meeting Monterey Bay, CA
Presentation of PhD research with CLASI (PhD project) collaborators May, 2018

International Society for Photogrammetry and Remote Sensing (ISPRS) Technical Commission III Symposium Reviewer Beijing, China
Developments, Technologies and Applications in Remote Sensing Jan 2018

Mentoring Physical Oceanography Women to Increase Retention (MPOWIR) Miami,FL
Monthly mentorship group for women in oceanography 2016-Present

Weather Bug Private Sector Mentorship Program MD
American Meteorological Society 2014-2015

Undergraduate Leadership Workshop Boulder, CO
UCAR/NCAR June, 2014

Student Assistant for AMS 94rd annual meeting Atlanta, GA
American Meteorological Society February 2014

Student Assistant for AMS 93rd annual meeting Austin, TX
American Meteorological Society January 2013

Forecasting and Communications Shifts University Park, PA
Campus Weather Service 2012-2013

- Produced and recorded radio and TV broadcasts of Pennsylvania weather forecasts every week

PROFESSIONAL MEMBERSHIPS

Mentoring Physical Oceanography Women to Increase Retention (MPOWIR)
American Meteorological Society (AMS)
Institute of Electrical and Electronics Engineers (IEEE)
American Geophysical Union (AGU)