Scott A. Martin

School of Oceanography, University of Washington
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EDUCATION

PhD student in Oceanography 2023-present
PhD expected: 2026
School of Oceanography, University of Washington, Seattle, USA.

Advanced Graduate Data Science Certificate 2021-2023
eScience Institute, University of Washington, Seattle, USA.

M.S. in Oceanography 2021-2023
School of Oceanography, University of Washington, Seattle, USA.

MPhys in Physics (First Class) 2017-2021
Department of Physics, University of Oxford, Oxford, UK.

RESEARCH EXPERIENCE

Graduate Research Assistant 2021-present
School of Oceanography, University of Washington, Seattle, USA.
Advisor: Georgy Manucharyan
Committee: LuAnne Thompson, E. Virginia Armbrust (both UW Oceanography), Patrice Klein (JPL, Caltech), Steven Brunton (UW Mech. Engineering)

I developed a deep learning approach for more accurately estimating global surface ocean currents from sparse satellite observations and I'm using this new global satellite data product to study how mesoscale eddies interact with both submesoscale turbulence and the larger-scale climate system.

MPhys Research Project 2020-2021
Department of Physics, University of Oxford, Oxford, UK.
Advisor: Caroline Terquem

I applied a new theoretical formalism describing the interaction between convection and tides in the convective envelopes of binary stars to predict tidal circularization timescales for late-type binaries that are in good accord with the available observations, thus potentially resolving a longstanding open question in astrophysics. *(Terquem & Martin (2021))*

Summer Undergraduate Research Student Summer 2018
Central Laser Facility, Harwell, UK.
Advisor: David Neely

I developed a MATLAB code for 3D ray tracing of a laser beam as it passes through short-lived plasma guiding structures.

AWARDS & FELLOWSHIPS

Theodore & Marie Sarchin Endowed Fellowship in Oceanography 2021-2024
School of Oceanography, University of Washington.
$17,500 additional graduate support over 3 years.

Johnson Memorial Prize for an MPhys Project in Astrophysics 2021
Department of Physics, University of Oxford.

University College Scholarship 2019, 2020, 2021
University College, Oxford.
Awarded for performance in undergraduate examinations.

Gibbs Prize for the Physics Department Speaking Competition 2019
Department of Physics, University of Oxford.

University College Exhibition 2018
University College, Oxford.
Awarded for performance in undergraduate examinations.

PUBLICATIONS

Martin, S. A., Manucharyan, G. E., & Klein, P. (under review), Deep Learning Improves Global Satellite Observations of Ocean Eddy Dynamics, *Nature Communications (under review)*, ArXiv, Code, Data

Martin, S. A., Manucharyan, G. E., & Klein, P. (2023), Synthesizing Sea Surface Temperature and Satellite Altimetry Observations Using Deep Learning Improves the Accuracy and Resolution of Gridded Sea Surface Height Anomalies, *Journal of Advances in Modelling Earth Systems*, 15, e2022MS003589. Paper, Code

Terquem, C. & **Martin, S.**, (2021). The circularization timescales of late-type binary stars. *Monthly Notices of the Royal Astronomical Society*, 507 (3), 4165-4177. Paper, ArXiv

PRESENTATIONS

Ocean Sciences Meeting 2024 (New Orleans, LA, USA) Feb. 2024
'New Estimation of Global Mesoscale Surface Currents with Enhanced Resolution Through a Deep Learning Synthesis of Satellite Observations'. (poster)

Hewlett Packard Enterprise SmartSim Team (virtual) Sep. 2023
'Estimating surface ocean currents from sparse satellite observations with deep learning'. (invited talk)

Eddy Energy Climate Process Team Meeting (Woods Hole, MA, USA) May 2023
'Deep learning for improved mesoscale surface geostrophic current mapping from satellite altimetry and SST observations'. (talk)

UW Physical Oceanography Seminar (Seattle, WA, USA) Apr. 2023
'Reconstructing surface mesoscale ocean dynamics from sparse satellite observations with deep learning'. (talk) [recording]

IMSI Remote Sensing for Climate Analysis Workshop (virtual) Nov. 2022
'Reconstructing surface mesoscale ocean dynamics from sparse satellite observations with deep learning'. (talk) [recording]

Ocean Surface Topography Science Team Meeting (Venice, Italy) Nov. 2022
'Deep learning for accurate SSH reconstruction from altimetry and SST observations'. (poster)

Data Science in Oceanography Summer School (Seattle, WA, USA) Aug. 2022
'Reconstructing sea surface height from satellite observations with deep learning'. (talk)

SWOT Science Team Meeting (virtual) Jun. 2022
'Using machine learning to interpolate SSH'. (invited talk)

23rd AMS AOFD Conference (Breckenridge, CO, USA) Jun. 2022
'A deep learning approach for reconstructiong mesoscale ocean dynamics from satellite observations'. (poster)

Ocean Sciences Meeting 2022 (virtual) Mar. 2022
'Reconstructing sea surface height from sparse along-track satellite altimeter observations using deep learning: an exploratory study'. (poster)

TEACHING & MENTORING

Research assistants mentored:

Nilesh Sathyanarayanan (Skyline High School) Dec. 2023 - present
Maya Avida (Princeton) Jun. - Aug. 2023
Dylan Epstein-Gross (Princeton) Jun. - Aug. 2023

TA for UW course OCEAN 285: Physics across oceanography Sept. - Dec. 2022

Data Science in Oceanography summer school (UW) Aug. 2022, 2023
Prepared and led a tutorial for undergraduate students on the application of machine learning to problems in ocean science.

CODE SKILLS

Python: Computational fluid dynamics, deep learning (TensorFlow and PyTorch), data analysis, data visualization.

MATLAB: Computational fluid dynamics, data analysis, data visualization.

HPC: NASA Pleiades, PBS, distributed deep learning on GPUs.

Fortran: Ran custom experiments with Modules for Experiments in Stellar Astrophysics (MESA).

C++: Ran custom experiments with FlowSieve.

D3.js: Interactive data visualization (seaTracks: a visualization of simulated surface drifters in the Puget Sound I co-created for a class project).