Scott A. Martin

School of Oceanography, University of Washington
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EDUCATION

Ph.D., School of Oceanography, University of Washington — Expected 2026

M.S., School of Oceanography, University of Washington — 2023
Thesis: Reconstructing surface mesoscale ocean dynamics from sparse satellite observations with deep learning.
Selected Coursework: Fluid Dynamics, GFD I&II, Physics of Ocean Circulation, Advanced Methods for ODEs.

M.Phys. *(First Class, top-10 in cohort)*, Department of Physics, University of Oxford — 2021
Thesis: Dissipation of tides in the convective envelope of stars.
Selected Coursework: Fluid Dynamics, GFD, Climate Dynamics, ODEs, PDEs, Complex Analysis, Linear Algebra, Lagrangian & Hamiltonian Mech., Thermodynamics, Stat. Mech.

ADVANCED CERTIFICATES

Advanced Graduate Data Science Certificate — 2023
eScience Institute, University of Washington
Coursework: Machine Learning, Introduction to Mathematical Statistics, Data Visualization.

RESEARCH EXPERIENCE

Graduate Research Assistant — 2021-present
School of Oceanography, University of Washington, Seattle, USA.
Advisors: Georgy Manucharyan, Patrice Klein (JPL, Caltech)
Research Directions: Mesoscale Eddy Dynamics, (Sub-)mesoscale Scale Interactions, Deep Learning, Satellite Oceanography.

M.Phys. Research Project — 2020-2021
Department of Physics, University of Oxford, Oxford, UK.
Advisor: Caroline Terquem
Research Directions: Tidal Dissipation, Circularization of Binary Star Systems.

Summer Undergraduate Research Student — 2018
Central Laser Facility, Harwell, UK.
Advisor: David Neely
Research Topic: Developed a 3D ray-tracing code in MATLAB.

AWARDS & FELLOWSHIPS

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

Johnson Memorial Prize for an M.Phys. 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, *Geophysical Research Letters (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

Atmospheric & Oceanic Fluid Dynamics (Burlington, USA) Jun. 2024
'Observational Evidence for a Strongly Seasonal Mesoscale Kinetic Energy Cascade in the Global Surface Ocean'. (talk) [recording (1:00:37)]

UW CS4Env Symposium (Seattle, USA) May 2024
'New Estimation of Global Mesoscale Surface Currents with Enhanced Resolution Through a Deep Learning Synthesis of Satellite Observations'. (poster)

Ocean Sciences Meeting 2024 (New Orleans, 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 (Woods Hole, USA) May 2023
'Deep learning for improved mesoscale surface geostrophic current mapping from satellite altimetry and SST observations'. (talk)

UW CS4Env Symposium (Seattle, USA) May 2023
'Deep learning for accurate SSH reconstruction from altimetry and SST observations'. (poster)

UW Physical Oceanography Seminar (Seattle, 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 (Venice, Italy) Nov. 2022
'Deep learning for accurate SSH reconstruction from altimetry and SST observations'. (poster)

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

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

Atmospheric & Oceanic Fluid Dynamics (Breckenridge, 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)

MENTORING

Roy An (UW) Apr. 2023 - present
Characterizing submesoscale frontal dynamics with SST observations.

Nilesh Sathyanarayanan (Skyline High School) Dec. 2023 - present
Physics-informed neural networks applied to QG turbulence.

Maya Avida (Princeton) Jun. - Aug. 2023
Forecasting mesoscale ocean dynamics using deep learning.

Dylan Epstein-Gross (Princeton) Jun. - Aug. 2023
Reconstructing cloud-free SST using deep learning.

TEACHING

TA for classes at University of Washington
OCEAN 285: Physics Across Oceanography Sept. - Dec. 2024
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.

SERVICE

Peer Reviewer for Academic Journals
Reviewed articles for: Journal of Advances in Modeling Earth Systems, Earth & Space Science, & Advances in Space Research.

ML for Physical Oceanography Journal Club Jul. 2024 - present
Co-founded (with Prof. J. Xavier Prochaska (UC Santa Cruz)) a virtual journal club bringing together researchers from across the USA and internationally [link].

School of Oceanography DEI Committee (UW) Feb. 2024 - present
Working on developing school-wide standards and resources for more equitable hiring procedures for undergraduate RAs and TAs.

School of Oceanography Faculty Meeting Scribe (UW) Jun. 2023 - present

OUTREACH

Data Science in Oceanography Summer School (UW) Aug. 2022, 2023
Helped organize summer school aimed at preparing and inspiring undergraduate students (especially from under-represented groups) for graduate school in oceanography. Responsibilities included: reviewing applications, planning school schedule & curriculum, participating in Q&A's on graduate school admissions.

Aquatic Sciences Open House (UW) May 2022
Demonstrated GFD experiments for K-12 students.

Univ Ambassadors (University College, Oxford) 2017-2021
Gave college tours and participated in admissions Q&A's for visiting high school students from socio-economically underprivileged post codes.

CODE SKILLS

Python

Computational fluid dynamics, deep learning (TensorFlow, PyTorch, NVIDIA Modulus), geospatial data analysis (Xarray, Dask, Zarr, & other Pangeo tools).

HPC

NASA Pleiades, PBS, distributed deep learning on GPUs.

MATLAB

Computational fluid dynamics, data analysis, data visualization.

D3.js

Interactive data visualization (seaTracks: a visualization of simulated surface drifters in the Puget Sound I developed for a class project).

Fortran

Created custom experiments with Modules for Experiments in Stellar Astrophysics (MESA).

C++

Created custom experiments with FlowSieve.