

# Theodore MacMillan

Palo Alto, CA | (908) 868-3712 | tmacmill@stanford.edu | theodoremacmillan.github.io

## Education

|  |                         |
|--|-------------------------|
| <b>Stanford University</b> , Stanford, CA        | Fall 2021 – Present     |
| Ph.D. Candidate, Environmental Engineering       |                         |
| Minor: Computer Science                          |                         |
| GPA: 4.11 / 4.30                                 |                         |
| <b>University of Notre Dame</b> , Notre Dame, IN | Fall 2017 – Spring 2021 |
| B.S. in Mechanical Engineering                   |                         |
| GPA: 3.99 / 4.00                                 |                         |

## Research Experience

|   |                         |
|---|-------------------------|
| <b>Stanford University — Environmental Complexity Lab</b>   | Fall 2021 – Present     |
| Graduate Researcher   |                         |
| <ul style="list-style-type: none"><li>Mechanistic interpretability for data-driven weather models [1]</li><li>Theory of correlations in randomly filtered time series [2]</li><li>Representations of coherent structures in geophysical turbulence [4, 6]</li></ul> |                         |
| <b>University of Notre Dame — Richter Lab</b>   | Fall 2018 – Spring 2021 |
| Undergraduate Researcher  |                         |
| <ul style="list-style-type: none"><li>Simulations of turbulence, cloud microphysics, and cloud formation in marine boundary layers [5]</li></ul>  |                         |

## Industry & Consulting Experience

|   |                           |
|---|---------------------------|
| <b>Cascade Trading</b>  | Spring 2024 – Winter 2025 |
| Machine Learning Consultant   |                           |
| <ul style="list-style-type: none"><li>Developed physics-informed ML models for wind and solar power forecasting</li><li>Engineered cloud-based data pipelines for ingesting weather forecasts, backtesting trading strategies, and online deployment of predictive models</li></ul> |                           |

## Selected Publications

1. MacMillan, T., Ouellette, N.T. (2025). *Towards mechanistic understanding in a data-driven weather model: internal activations reveal interpretable physical features*. arXiv.
2. MacMillan, T., Hilditch, J., Ouellette, N.T. (2025). *Expected correlation in time-series analysis*. Physical Review E (Editors' Suggestion).
3. MacMillan, T., Ouellette, N.T. (2024). *Spectral energy transfer on complex networks*. Scientific Reports.
4. MacMillan, T., Ouellette, N.T. (2022). *Lagrangian scale decomposition via the graph Fourier transform*. Physical Review Fluids.
5. MacMillan, T., Shaw, R., Cantrell, W., Richter, D.H. (2022). *Direct numerical simulation of turbulence and microphysics in the Pi Chamber*. Physical Review Fluids.
6. MacMillan, T., Ouellette, N.T., Richter, D.H. (2020). *Detection of evolving Lagrangian coherent structures*. Physical Review Fluids.

## **Technical Skills**

---

**Programming & ML:** Python (PyTorch, Jax, PySpark, xarray), Matlab, SQL

**Visualization:** Matplotlib, Plotly, Cartopy

**Cloud & Tools:** Google Cloud Platform

## **Honors and Awards**

---

- |  |                |
|--|----------------|
| • Stanford Graduate Fellowship                             | 2021 – Present |
| • National Science Foundation Graduate Research Fellowship | 2021 – Present |
| • Barry Goldwater Scholarship                              | 2020           |