Elizabeth **McGeorge**

Oceanographer · Mathematician

elizabeth.mcgeorge@noaa.gov | e-mcgeorge.github.io | e-mcgeorge | e-mcgeorge

Summary

Early-career researcher with a PhD in Mathematics specialising in computational fluid dynamics and inverse problem methods. Experienced in applying mathematical modelling and computational techniques to analyse geophysical fluid flows. Currently focused on utilising Unmanned Surface Vehicles for studying the tropical Pacific and improving our understanding of ocean processes.

Education

Doctor of Philosophy (Mathematics) — *University of Canterbury*

Conferred October 2023 — *2019 – 2023*

- Thesis: Beyond Observations: Recovery of unknown parameters in ice flows using optimization techniques and other tools.

Bachelor of Science (Hons.) (First Class) — *University of Canterbury*

Conferred April 2019 | Major: Mathematics | Grade: 8.75/9.00 — *2015 – 2018*

- With semester abroad to University of British Columbia.

Certificate of Te Reo Māori — *Te Wānanga o Raukawa*

One-year online course in Māori language and culture — *2024*

- Poupou Huia Te Reo 1 and 2: Certificate in tikanga and Māori protocol and language for use in the home and community (Level 4 and 5).

Professional Experience

University of Washington, NOAA Pacific Marine Environment Laboratory — *Seattle, Washington*

Postdoctoral Scholar — *Jan. 2024 – PRESENT*

- Collaboration with Dr. Yolande Serra (UW CICOES), Dr. Meghan Cronin (NOAA PMEL), and Dr. Dongxiao Zhang (UW CICOES/NOAA PMEL).
- Research in near-surface ocean-mixing using saildrone current observations. This work aims to assist in reducing model biases in the eastern tropical Pacific and improving skill in El Niño Southern Oscillation (ENSO) predictions.
- Experience with mentoring interns through the REU program.

University of Canterbury — *Chirstchurch, New Zealand*

Lecturer: 2022 | Teaching Assistant: 2018 – 2022 | Events Staff: 2015 – 2017 — *Feb. 2015 – Dec. 2022*

- Lecturer
  - Taught undergraduate engineering mathematics courses (ENCH298, EMTH119).
  - Delivered lectures on probability theory, linear algebra, differential equations, and applied mathematics.
  - Wrote and marked assignments and exams, and provided regular office hours.
- Teaching Assistant
  - Assisted students in various mathematics courses.
  - Taught in-person and online formats.
  - Experienced in providing one-on-one tutoring and support.

Publications

*Upcoming. †PhD related.

*†2024 E. K. McGeorge, M. Moyers-Gonzalez, M. Sellier, and P. L. Wilson (Sep. 2024). *Recovery of basal slip and ice thickness for ice flow described by the Shallow Ice Approximation using an adjoint-based optimisation method in two-dimensions.* In preparation.

†2022 E. K. McGeorge, M. Moyers-Gonzalez, M. Sellier, and P. L. Wilson (Dec. 2022). *Exact recovery of kiwi-shaped bed topography in a no-slip ice sheet using only surface data.* In: 23rd Australasian Fluid Mechanics Conference Proceedings.

†2022 E. K. McGeorge, M. Moyers-Gonzalez, M. Sellier, and P. L. Wilson (Mar. 2022). *An augmented Lagrangian algorithm for recovery of ice thickness in unidirectional flow using the Shallow Ice Approximation.* In: Applied Mathematical Modelling 107, pp. 650–669.

†2021 E. K. McGeorge, M. Sellier, M. Moyers-Gonzalez, and P. L. Wilson (Jan. 2021). *Bedrock reconstruction from free surface data for unidirectional glacier flow with basal slip*. In: Acta Mechanica 232.1, pp. 305–322.

Conferences and Workshops

Feb 19–23 **Ocean Sciences Meeting** — *New Orleans, LA*

2024 Poster: *Observations of Vertical Velocity in the Ocean Mixed Layer at the Eastern Edge of the Warm Pool With Saildrones.*

Dec 5–8 **Australasian Fluid Mechanics Conference** — *Sydney, Australia*

2022 Conference proceedings: *Beneath the surface: recovery of ice thickness from observations.* Talk: *Recovery of kiwi-shaped features underneath ice-flow using optimal control.*

Jan 26–28 **Fluids in New Zealand** — *Auckland, New Zealand*

2022 Talk: *An augmented Lagrangian algorithm for recovery of ice thickness in unidirectional flow using the Shallow Ice Approximation.*

Nov 14–16 **Inverse Problems and Uncertainty Workshop** *Auckland, New Zealand*
2021 Seminar: *Inverse problems methods for application to grounded ice flows.*

Aug 22–27 **ICTAM 2020+1** *(online) Milan, Italy*
2021 Poster: *Bedrock reconstruction from free surface data for unidirectional glacier flow with basal slip.*

Jan 27–29 **Fluids in New Zealand** *Christchurch, New Zealand*
2021 Talk: *Applications of the open source libraries FEniCS and dolfin-adjoint for optimal control in ice flows.*

Jan 30–31 **Southern Exposure: Antarctic Research** *Christchurch, New Zealand*
2020 Talk: *Representing ice flows in a mathematical model: overview and applications.* This talk was targeted to an audience with little mathematical background.

Jan 30–31 **Fluids in New Zealand** *Auckland, New Zealand*
Talk: *Bedrock reconstruction from free surface data for unidirectional glacier flow with basal slip.*

Nov 25–26 **Materials @ UC: The Story Behind the Research** *Christchurch, New Zealand*
2019 Poster: *Bedrock reconstruction from free surface data for unidirectional glacier flow with basal slip.*

Nov 22–25 **New Zealand Mathematics and Statistics Postgraduate Conference** *Wainui, New Zealand*
2019 Talk: *Mathematics of inverse problems in free-surface flows.*

Service and Outreach

2024 **AGU Fall Meeting Session Convener** *American Geophysical Union*
Primary convener for the session "Coupled Ocean-Atmosphere Processes in the Tropical Pacific: Physical and Biogeochemical Dynamics and Interactions."

2021,2022 **New Zealand Mathematical Society Colloquium** *New Zealand Mathematical Society*
Early career committee member for two years. Update the conference website, organised student accommodation.

2022 **FiNZ Conference Organising Committee** *Fluids in New Zealand*
Early career committee member for organising this annual conference. Planned catering, name badges, conference dinner, student accommodation.

2018,2021 **Math Ambassador** *Maths Craft New Zealand*
Maths Craft uses the medium of craft to introduce adults and children alike to a new and exciting way of engaging with mathematics. As a volunteer, I guided attendees through the activities. When there was interest, further insight into the mathematical nature of the craft was provided.

Field Experience

2024 **NOAA PMEL – PAPA24** *Kodiak, AK*
One-week cruise servicing moorings at Station Papa. Assisted in all aspects of the cruise: ship loading/unloading, mooring instrumentation, mooring deployment/recovery, CTD casts, and data download.

Extracurricular Activities

Sailing Sailed in a 37 ft yacht from New Zealand to Japan. As one half of a double-handed crew, I was in command of the vessel for a total of 12 hours a day, split into 3-hour shifts. To date, I have spent 70 days sailing offshore, including one non-stop passage lasting 32 days. Successfully navigated challenging conditions, including two typhoons, while maintaining vessel safety and crew well-being. Proficient in navigation, weather analysis, and emergency procedures.

- Key Skills:
  - Vessel command: sail change decisions, ship routing, risk analysis, forecast interpretation, paper and electronic chart navigation, satellite communications, AIS monitoring, radio communications, ship provisioning, radar operations, ship systems monitoring
  - Maritime regulations and documentation: logistics planning, customs clearance, bio-security compliance, ship logs.
- Qualifications (course length, expiry):
  - Washington State Boater Education Card (8 hours, no expiry)
  - Maritime Restricted Radio Operators Certificate (1 day, no expiry)
  - Advanced Sea Survival (2 days, no expiry)
  - PADI Dive License (up to 30m, no expiry)
  - Comprehensive First Aid (2 days, expired 2022)
  - Offshore Medical First Aid(1 day, expires 2023)
  - Pre-Hospital Emergency Care (5 days, expired 2022)

Rogaining Enthusiastic rogainer with a passion for combining endurance running with challenging navigation and problem-solving. Enjoy competitive environments that demand both physical stamina and mental acuity.