# Matthew D. Tankersley

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Objective: A recent Ph.D. graduate specialized in airborne geophysical analysis and inversion applied to the cryosphere, with a dedication to conducting open-source and reproducible science.

## Education

**Geophysics | *Ph.D.*** September 2019 - October 2023

Airborne geophysical investigation beneath Antarctica's Ross Ice Shelf
Antarctic Research Center, Victoria University of Wellington, New Zealand

**Geology | *Bachelor of Arts (with distinction)*** August 2014 - May 2018

distinction in Geology (GPA 3.7) and a minor in Physics (GPA 3.9)
Thesis: "Aerogeophysical analysis of crustal structures under the Ross Ice Shelf"
Colorado College, Colorado Springs, USA

## Work Experience

**Victoria University of Wellington | *Teaching assistant*** Febuary 2021 - June 2022

- Developed coursework for and led laboratory and fieldwork portions of 3rd-year undergraduate courses **Applied Geophysics** and **Field Geophysics**.

**Colorado College | *Paraprofessional of Geology*** August 2018 - June 2019

- Planned, led and evaluated laboratory portions of undergraduate geology courses.
- Organized logistics for up to week-long field trips for 20+ students.

**Lamont-Doherty Earth Observatory | *Summer Intern*** June 2017 - August 2017

- Analyzed correlations between properties of Greenland glacial earthquakes (magnitudes and force azimuths) with seasonality and calving front positions; utilizing **Python**, **Generic Mapping Tools**, and **Landsat imagery**.
- Worked with Dr. Kira Olsen and Dr. Meredith Nettles.

**USGS | *Summer Intern*** June 2016 - August 2016

- Collected ground-based **gravity and magnetic** data and conducted geologic mapping to aid in a geothermal play fairway analysis of the Pacific Northwest of the USA.
- In conjunction with Colorado College, the USGS, and Washington State DNR.

## Awards and Honors

- Best poster at SCAR-INSTANT 2023 Conference 2023
- 2nd best poster at NZ-Australia Antarctic Science Conference 2023
- SCAR-INSTANT ECR travel grant 2023
- NZ-Australia Antarctic Science Conference student travel grant 2023
- Arnold Heine Antarctic Research Award 2023
- Endowed Development Fund 2022
- NZ Antarctic Science Conference travel grant 2021
- Antarctica NZ Doctoral Scholarship 2020-2022
- Antarctic Science Platform PhD Scholarship 2020-2023
- Estwing Outstanding Senior Geologist Award 2018
- William A. Fischer Family Scholarship 2018
- Witter Family Fund 2017
- Patricia Buster Research Scholarship Fund 2016
- Dean's list, Colorado College (4 semesters) 2014-2018

## Publications

PEER-REVIEWED SCIENTIFIC ARTICLES

2022 **Basement topography and sediment thickness beneath Antarctica's Ross Ice Shelf**, *Geophysical Research Letters*
Matthew Tankersley, Huw Horgan, Christine Siddoway, Fabio Caratori Tontini, and Kirsty Tinto.
doi: 10.1029/2021GL097371
5 citations

2019 **Ross Ice Shelf response to climate driven by the tectonic imprint on seafloor bathymetry**, *Nature Geoscience*
Kirsty Tinto, Laurence Padman, Christine Siddoway, Scott Springer, ... Matthew Tankersley
doi: 10.1038/s41561-019-0370-2
104 citations

IN-PREP SCIENTIFIC ARTICLES

2023 **Gravity inversion: a tool for bathymetry modelling**,
Matthew Tankersley, Huw Horgan, and Fabio Caratori Tontini.

2023 **Bathymetry depths and uncertainties beneath Antarctica's Ross Ice Shelf**,
Matthew Tankersley, Huw Horgan, and Fabio Caratori Tontini.

## Presentations

ORAL PRESENTATIONS

2023 **Progress towards an open-source geometric gravity inversion with stochastic uncertainty estimates**, *AGU Fall Meeting, San Francisco, CA, USA*

**Addressing bathymetry uncertainty beneath the Ross Ice Shelf**, *New Zealand-Australia Antarctic Science Conference, Christchurch, NZ*
Slides: `https://doi.org/10.6084/m9.figshare.24412021.v1`

2021 **Sediment thickness and basement depths beneath the Ross Ice Shelf from aeromagnetic data**, *New Zealand Antarctic Science Conference, Christchurch, NZ*

POSTER PRESENTATIONS

2023 **Gravity inversion as a method to recover sub-ice shelf bathymetry; applied to the Ross Ice Shelf**, *Scientific Committee on Antarctic Research, Instabilities & Thresholds in Antarctica, Trieste, Italy*
Poster: `https://doi.org/10.6084/m9.figshare.24117420.v2`

**Antarctic-Plots: a Python package to help conduct Antarctic research**,
*1) Scientific Committee on Antarctic Research, Instabilities & Thresholds in Antarctica, Trieste, Italy*
***Awarded best poster***
*2) New Zealand-Australia Antarctic Science Conference, Christchurch, NZ*
***Awarded 2nd best poster***
*3) AGU Fall Meeting, San Francisco, CA, USA*
Posters: `https://doi.org/10.6084/m9.figshare.21183931`

2022 **Revealing sub-ice shelf sediment basins with airborne magnetics**, *West Antarctic Ice Sheet Conference and Workshop, Estes Park, CO, USA*
Poster: `https://doi.org/10.6084/m9.figshare.21172042.v2`

**Antarctic-Plots: a Python package to help download, visualize, and present Antarctic datasets**,
*1) West Antarctic Ice Sheet Conference and Workshop, Estes Park, CO, USA*
*2) The Future of Geodetic-Geophysical Observational Networks in Antarctica Workshop (SCAR-INSTANT), Fort Collins, CO, USA*
Poster: `https://doi.org/10.6084/m9.figshare.21183931.v3`

2021 **New contribution to Ross Ice Shelf (Antarctica) boundary conditions: basement depths and sediment thickness determined from aeromagnetic data**, *AGU, virtual participation, presented by Christine Siddoway*
Abstract: `https://agu.confex.com/agu/fm21/meetingapp.cgi/Paper/988486`

2020 **Broad basement structures under Antarctica's Ross Ice Shelf revealed from aeromagnetic data**, *AGU, virtual participation*
Abstract: `https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/714573`

**Constrained geopotential modelling of the ocean cavity and geology beneath the Ross Ice Shelf**, *Geoscience Societ of New Zealand annual conference, Christchurch, NZ*
Abstract: `https://agu.confex.com/agu/fm20/meetingapp.cgi/Paper/714573`

2018 **Aerogeophysical analysis of crustal structures under the Ross Ice Shelf**, *AGU, Washington D.C., USA*
Abstract: `https://agu.confex.com/agu/fm18/meetingapp.cgi/Paper/442287`

## Field work

**Geophysical field assistant | *Antarctica - Kamb Ice Stream*** November 2019 - December 2019
- Worked within a team of 5 stationed in a remote field camp on the Ross Ice Shelf conducting an **active source seismic survey** and a **gravity survey**.
- Included training and extensive use of snowmobiles, Hagglund tracked vehicles, transport, wiring, and detonation of explosive charges, operation of a hot water drill for emplacing charges at a 20m depth, and deploying a 1 km array of geophones.
- Other duties included **planning and executing the gravity survey**, GNSS surveying the gravity and seismic stations, and setting up and maintaining camp infrastructure.

**Geophysical field assistant | *Antarctica - Discovery Deep*** December 2021 - Febuary 2022
- Similar to above but in a field camp consisting of just our team of 5. Additional survey methods included seismic surveying with a streamer of geophones and surface detonation of det-cord.
- Shared all duties of our self-contained camp (cooking, cleaning, camp safety etc.).

**Marine Seismic Assistant | *RV Tangaroa - TAN2006*** July 2020 - August 2020
- Worked aboard the RV Tangaroa conducting a **marine seismic** and **multibeam bathymetry** survey of the Chatham Rise, New Zealand.
- Duties included monitoring seismic data collection and pre-processing of multibeam bathymetry data.

**Geologic Fieldwork | *Western USA*** 2014 - 2018
- Over 100 days of geologic fieldwork throughout the Western USA during my undergraduate degree. This included geologic and structural mapping, stratigraphic profiles, and soil and rock sample collection.

## Open-source Software Development

Since 2023 **Invert4Geom: 3D geometric gravity inversions**
Founder and core-maintainer
`https://invert4geom.readthedocs.io/`

Since 2022 **Fatiando a Terra: Open source tools for geophysics**
Contributor
`https://www.fatiando.org`

Since 2022 **Antarctic-Plots: Functions to automate Antarctic data visualization**
Founder and core-maintainer
`https://antarctic-plots.readthedocs.io/en/latest/`

## Technical Skills

**Programming** Python, GMT
**Python packages** Pandas, Xarray, NumPy, SciPy, Dask, PyGMT, Matplotlib, Plotly, Pooch, Verde, Harmonica, Optuna, GeoPandas, Shapely
**Markup** Markdown, LaTeX, Curvenote

**OS** Linux, Windows
**Other tools** Geosoft Oasis Montaj, Jupyter Notebooks, git, GitHub, VS Code, Binder, ReadTheDocs, QGIS, LibreOffice Suite, Microsoft Office Suite

## Reviewer

New Zealand Journal of Geology and Geophysics

## Qualifications

**First Aid Level 1** St John, Wellington, Nov 2022
**Backcountry Avalanche Course** New Zealand Snow Safety Institute, Sep 2021
**Basic Snowcraft Course** New Zealand Alpine Club, Aug 2021
**Wilderness First Aid Course** National Outdoor Leadership School, 2019
**AIARE 1 Avalanche Safety Course** Colorado College, 2018

## Recreational Interests

**Outdoor recreation** Mountaineering, backcountry skiing, rock climbing, hiking, mountain biking
**International travel** Having lived in 6 countries across 5 continents, I have a keen interest in international cultures and easily adapt to new locations.