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. (submitted)* September 2019 - June 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.

Three Rivers Resort, Colorado | *White water raft guide* June 2015 - August 2015

Three Rivers Smokehouse, Colorado | *Waiter* June 2015 - August 2015

Awards and Honors

- SCAR-INSTANT ECR travel grant 2023
- NZAASC student travel grant 2023
- Arnold Heine Antarctic Research Award 2023
- Endowed Development Fund 2022
- NZ Antarctic Science Conference travel grant 2021
- Antarctic New Zealand 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

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

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 (***Upcoming***) **Addressing bathymetry uncertainty beneath the Ross Ice Shelf**, *New Zealand-Australia Antarctic Science Conference, Christchurch, NZ*

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

POSTER PRESENTATIONS

2023 (***Upcoming***) **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 (SCAR-INSTANT), Trieste, Italy*

2022 **Revealing sub-ice shelf sediment basins with airborne magnetics**, *West Antarctic Ice Sheet (WAIS) 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, *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 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