

# Zach B. Bunnell

[zbunnell@usf.edu](mailto:zbunnell@usf.edu)

---

## EDUCATION

---

**University of South Florida**, College of Marine Science  
Doctor of Philosophy in Marine Science  
Concentration in Chemical Oceanography. GPA: 4.0.  
Major Advisor: Dr. Tim Conway.

St. Petersburg, FL  
August 2022 – present

**University of South Florida**, College of Marine Science  
Master of Science in Marine Science  
Concentration in Chemical Oceanography. GPA: 4.0.  
Thesis: “*Elucidating the Sources Supplying Aerosol Iron, Zinc, and Cadmium to the Surface of the North Pacific Ocean.*”  
Major Advisor: Dr. Tim Conway.

St. Petersburg, FL  
August 2022

**University of Rochester**  
Bachelor of Science in Geological Science  
Concentration in Geochemistry (Minor in Sustainability). GPA: 3.49.  
Research Advisors: Dr. John Kessler and Dr. Marlon Jean.

Rochester, NY  
August 2018

---

## RESEARCH EXPERIENCE

---

**University of South Florida, College of Marine Science (PhD)**

August 2022 – present

Graduate Research Assistant with Dr. Tim Conway

Dissertation Projects:

- Hydrothermal Fe and Zn sources within the South Pacific and North Atlantic oceans.
- Biogeochemistry of polar trace metals along GP17-ANT.

**University of South Florida, College of Marine Science (MS)**

August 2019 – August 2022

Graduate Research Assistant with Dr. Tim Conway

Project: *Elucidating the Sources Supplying Aerosol Iron, Zinc, and Cadmium to the Surface of the North Pacific Ocean*

- Analyzed stable isotope ratios of bulk, soluble iron, zinc, and cadmium in aerosols collected during the 2018 GEOTRACES transect GP15 in the North Pacific Ocean.
- Quantified the fraction of anthropogenically produced iron, zinc, and cadmium aerosols from fossil fuel, biomass, and biofuel combustion that makes up the North Pacific trace metal aerosol budget.
- Samples extracted and purified in ISO Class 6 clean room, and stable isotope ratios measured by Neptune HR-ICP-MS.

**University of Rochester, Early Earth Geochemistry Group**

November 2017 – April 2018

Undergraduate Research Assistant with Dr. Marlon Jean

Project: *Metal Analysis of the Novosibirsk Meteorite and Early Solar System Implications*

- Utilized LA-ICP-MS to analyze metals within the meteorite’s silicate and metal minerals to provide insights on the conditions, processes, and location of origin within the solar system.
- Examined meteorite’s metamorphic characteristics, such as splash-melt regions and melt veins, using a SEM and petrographic microscope.
- Concluded the unique texture and petrography of the meteorite was due to an initial parent-body impact or a splash melt that formed as it fell through Earth’s atmosphere.

## University of Rochester, Ocean Biogeochemistry Group

July – September 2017

Undergraduate Research Assistant with Dr. John Kessler

Project: *Characterizing Ocean Acidification and Atmospheric Emission Caused by Methane Released from Gas Hydrate Systems along the US Atlantic Margin*

- Prepared seawater samples from a CTD using a nitrogenous head-space equilibrium technique.
- Utilized gas chromatography to analyze methane concentrations within seawater samples.
- Obtained water column samples using a CTD and prepared them with Woods Hole's prescribed methodology for radiocarbon dating.

---

## HONORS AND AWARDS

Kent A. Fanning Endowed Memorial Fellowship in Marine Science Recipient (\$10,000)	2021
Paul Getting Endowed Memorial Fellowship in Marine Science Recipient (\$13,000)	2020
UR Earth & Environmental Sciences Lattimore Prize Recipient (\$700)	2018
UR Undergraduate Research Exposition Dean's Medal Recipient	2018
Graduated with Distinction in Geological Science	2018

---

## PEER REVIEWED PUBLICATIONS

4. Tian, H., van Manen, M., **Bunnell, Z. B.**, Reichart, G.J., Conway, T. M., and Middag, R. Isotopic composition of dissolved Fe in the Weddell Sea: fate of sedimentary Fe and evidence for its transport. In prep. for *Earth and Planetary Science Letters* (planned submission Spring 2024).
3. **Bunnell, Z. B.**, Marsay, C. M., Sieber, M., Landing, W. M., Buck, C. S., John, S. G., and Conway, T. M. Tracking anthropogenic and wildfire iron deposition to the Equatorial Pacific Ocean. In prep. for *Geophysical Research Letters* (planned submission Spring 2024).
2. Tian, H., van Manen, M., **Bunnell, Z. B.**, Laan, P., Jung, J., Hoon Lee, S., Kim, T.-W., Aoki, S., Reichart, G.J., Conway, T.M., Middag, R. (2023) Isotopic insights for external iron sources and biogeochemical cycling in the Amundsen Sea Polynyas. *Geochimica Cosmica Acta*.
1. Sieber, M., Lanning, N.T., **Bunnell, Z. B.**, Bian, X., Yang, S. C., Marsay, C. M., Landing, W. M., Buck, C. S., Fitzsimmons, J. N., John, S. G., Conway, T. M. (2023) Biological, physical, and atmospheric controls on the distribution of cadmium and its isotopes in the North Pacific Ocean. *Global Biogeochemical Cycles*.

---

## PRESENTATIONS AND CONTRIBUTED PRESENTATIONS

12. Crusius, J., Premrasmi, T., Holmes, T., Murray, J., **Bunnell, Z.B.**, Conway, T.M., (2024) *Pb and Fe isotopes measured on different aerosol size fractions from the subarctic NE Pacific reveal the lithogenic isotopic signatures for Alaskan glacial dust, and an additional fossil fuel source of Pb*. Ocean Sciences Meeting 2024, New Orleans (2/22/24).
11. Tian, H.-A., van Manen, M., **Bunnell, Z. B.**, Reichart, G.-J., Conway, T. M., and Middag, R. (2024). *Isotopic composition of dissolved Fe in the Weddell Sea: fate of sedimentary Fe and evidence for its transport*. Ocean Sciences Meeting 2024, New Orleans (2/22/24).
10. **Bunnell, Z. B.**, Sieber, M., Marsay, C. M., Buck, C. S., Landing, W. M., John, S. G., and Conway, T. M. (2023) *Tracing anthropogenic iron aerosols delivered to the surface of the North Pacific Ocean*. Poster. Gordon Research Conference, Chemical Oceanography (7/16/2023).
9. Tian, H.-A., van Manen, M., **Bunnell, Z. B.**, Jung, J., Kim, T.-W., Conway, T. M., Middag, R., and Reichart, G.-J. (2023). *Isotopic insights for external iron sources and biogeochemical cycling in the Amundsen Sea Polynyas*. Goldschmidt Conference (7/WHAT/23).
8. Conway, T. M., Boiteau, R. M., Toth, E. R., **Bunnell, Z. B.**, Sieber, M. (2022). *The state of play for using Fe isotopes as source/process tracers in aerosols and the surface ocean & WFS cruise potential*. Talk. West Florida Shelf Planning Workshop. (7/25/2022).
7. Tian, H., van Manen, M., **Bunnell, Z. B.**, Laan, P., Jung, J., Hoon Lee, S., Kim, T.-W., Aoki, S., Reichart,

- G.-J., Conway, T.M., Middag, R. (2022) *Dissolved Fe isotopic compositions in the Amundsen Sea Polynas, Antarctica: insights for external sources and biogeochemical processes*. Poster and Talk. NIOZ Days. (6/1/2022).
6. Tian, H.-A., van Manen, M., **Bunnell, Z. B.**, Jung, J., Hoon Lee, S., Kim, T.-W., Reichart, G.-J., Conway, T. M., and Middag, R. (2022). *Dissolved Fe isotopic compositions in the Amundsen Sea Polynas, Antarctica: insights for external sources and biogeochemical processes*. Poster. NWO Polar Symposium. (5/19/2022).
  5. Tian, H., van Manen, M., **Bunnell, Z. B.**, Laan, P., Jung, J., Hoon Lee, S., Kim, T.-W., Aoki, S., Reichart, G.-J., Conway, T.M., Middag, R. (2022) *Identification of sources of dissolved Fe in the Amundsen Sea, Antarctica: insights from Fe isotopic composition*. Talk. NIOZ OCS Departmental Seminar. (3/8/2022).
  4. **Bunnell, Z. B.**, Sieber, M., Marsay, C. M., Buck, C. S., Landing, W. M., John, S. G., and Conway, T. M. (2022) *Tracing anthropogenic iron aerosols delivered to the surface of the North Pacific Ocean*. Talk. 38<sup>th</sup> Annual USF Graduate Student Symposium. (2/18/2022).
  3. **Bunnell, Z. B.**, Sieber, M., Marsay, C. M., Buck, C. S., Landing, W. M., John, S. G., and Conway, T. M. (2021) *Tracing anthropogenic iron aerosols delivered to the surface of the North Pacific Ocean*. Poster. Iron at the Air-Sea Interface Workshop. (7/28/2021).
  2. Conway, T. M., **Bunnell, Z. B.**, Sieber, M. (2021) *The state of play for using Fe isotopes as source tracers in aerosols and the surface ocean*. Talk. Iron at the Air-Sea Interface Workshop. (7/26/21).
  1. **Bunnell, Z. B.** and Jean, M.M. (2018) *Metal Analysis of the Novosibirsk Meteorite and Early Solar System Implications*. Talk. University of Rochester Undergraduate Research Exposition. (4/20/2018).

---

## PROFESSIONAL MEMBERSHIPS AND SERVICES

---

Ad Hoc Journal Reviewer: <i>Chemical Geology (1)</i> , <i>Earth and Space Chemistry (1)</i>	as of 2/22/24
The Oceanography Society	2019 – present
Sigma Gamma Epsilon Honor Society	2018 – present

---

## SHIPBOARD EXPERIENCE (19 days at sea)

---

R/V Weatherbird II, Gulf of Mexico, USA	Feb. 2 – 6, 2020
– Tested and calibrated USF CMS's new trace-metal clean CTD rosette in the Gulf of Mexico.	
R/V Hugh Sharp, US Atlantic Margin, USA	Aug. 24 – Sep. 7, 2017
– Investigated methane fluxes (via methane hydrates) from surface waters to the atmosphere along the US Atlantic Margin.	

---

## ANALYTICAL TECHNIQUES AND EXPERIENCE

---

Thermo Neptune Multi-Collector-Inductively Coupled Plasma-Mass Spectrometer (MC-ICP-MS)  
 Thermo Element XR High Resolution-Inductively Coupled Plasma-Mass Spectrometer (HR-ICP-MS)  
 ESI seaFAST system (for extraction of seawater trace metals)  
 Clean Lab Experience (ISO 6)  
 Agilent Laser Ablation-Inductively Coupled Plasma-Mass Spectrometer (LA-ICP-MS)  
 Agilent 6850 Gas Chromatograph (GC)  
 Zeiss Auriga Scanning Election Microscopy (SEM)  
 Olympus Polarized Light Microscopy (XPL)

---

## TEACHING/MENTORING EXPERIENCE AND OUTREACH

---

University of South Florida College of Marine Science Chem. Oce. Teaching Assistant	Fall 2023
University of South Florida College of Marine Science Seminar Committee	2020 – 2022
University of South Florida College of Marine Science Student Mentor	2020 – present
University of Rochester Circle K International	2014 – 2018