Carson Riggs Witte

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Education

Columbia University

PhD Ocean and Climate Physics 2025

MA Ocean and Climate Physics 2020

Pomona College

BA Physics with Engineering Concentration 2016

Publications

Witte, C. R., & Zappa, C. J. (2025). The Response of Large Diurnal Warm Layers to Short-Term Variability in Solar and Wind Forcing: Observations and Physical Modeling. *Journal of Physical Oceanography*, *55*(6), 771–786. https://doi.org/10.1175/JPO-D-24-0106.1

Witte, C. R., Subramaniam, A., & Zappa, C. J. (2024). An Improved Bio-Physical Parameterization for Ocean Radiant Heating in Conditions of Near-Surface Stratification. *Journal of Geophysical Research: Oceans, 129(11),* e2024JC021049. https://doi.org/10.1029/2024JC021049

Laxague, N. J. M., Zappa, C. J., Mahoney, A. R., Goodwin, J., Harris, C., Schaeffer, R. E., Schaeffer Sr., R., Betcher, S., Hauser, D. D. W., **Witte, C. R.**, Lindsay, J. M., Subramaniam, A., Turner, K. E., & Whiting, A. (2024). The radiative and geometric properties of melting first-year landfast sea ice in the Arctic. *The Cryosphere*, *18*(7), 3297–3313. https://doi.org/10.5194/tc-18-3297-2024

Witte, C. R., Zappa, C. J., & Edson, J. B. (2023). The Response of Ocean Skin Temperature to Rain: Observations and Implications for Parameterization of Rain-Induced Fluxes. *Journal of Geophysical Research: Oceans*, *128*(1), e2022JC019146. https://doi.org/10.1029/2022JC019146

Lindsay, J. M., Hauser, D. D. W., Mahoney, A. R., Laidre, K. L., Goodwin, J., Harris, C., Schaeffer, R. J., Sr, R. S., Whiting, A. V., Boveng, P. L., Laxague, N. J. M., Betcher, S., Subramaniam, A., **Witte, C. R.**, & Zappa, C. J. (2023). Characteristics of ringed seal Pusa hispida ('natchiq') denning habitat in Kotzebue Sound, Alaska, during a year of limited sea ice and snow. *Marine Ecology Progress Series*, *705*, 1–20. https://doi.org/10.3354/meps14252

Witte, C. R., Zappa, C. J., Mahoney, A. R., Goodwin, J., Harris, C., Schaeffer, R. J., Schaeffer Sr, R., Betcher, S., Hauser, D. D. W., Laxague, N. J. M., Lindsay, J. M., Subramaniam, A., Turner, K. E., & Whiting, A. (2021). The Winter Heat Budget of Sea Ice in Kotzebue Sound: Residual Ocean Heat and the Seasonal Roles of River Outflow. *Journal of Geophysical Research: Oceans*, *126*(9), e2020JC016784. https://doi.org/10.1029/2020JC016784

Hauser, D. D. W., Whiting, A. V., Mahoney, A. R., Goodwin, J., Harris, C., Schaeffer, R. J., Schaeffer, R., Laxague, N. J. M., Subramaniam, A., **Witte, C. R.**, Betcher, S., Lindsay, J. M., & Zappa, C. J. (2021). Co-production of knowledge reveals loss of Indigenous hunting opportunities in the face of accelerating Arctic climate change. *Environmental Research Letters*, *16*(9), 095003. https://doi.org/10.1088/1748-9326/ac1a36

Mahoney, A. R., Turner, K. E., Hauser, D. D. W., Laxague, N. J. M., Lindsay, J. M., Whiting, A. V., **Witte, C. R.**, Goodwin, J., Harris, C., Schaeffer, R. J., Schaeffer, R., Betcher, S., Subramaniam, A., & Zappa, C. J. (2021). Thin ice, deep snow and surface flooding in Kotzebue Sound: Landfast ice mass

balance during two anomalously warm winters and implications for marine mammals and subsistence hunting. *Journal of Glaciology*, 1–15. https://doi.org/10.1017/jog.2021.49

Wurl, O., Landing, W. M., Mustaffa, N. I. H., Ribas-Ribas, M., **Witte, C. R.**, & Zappa, C. J. (2018). The Ocean's Skin Layer in the Tropics. *Journal of Geophysical Research: Oceans, 124*. https://doi.org/10.1029/2018JC014021

Wurl, O., Bird, K., Cunliffe, M., Landing, W. M., Miller, U., Mustaffa, N. I. H., Ribas-Ribas, M., **Witte, C.**, & Zappa, C. J. (2018). Warming and Inhibition of Salinization at the Ocean's Surface by Cyanobacteria. *Geophysical Research Letters*, *45*(9), 4230–4237. https://doi.org/10.1029/2018GL077946

Proposals

[Pending] NSF OCE #25-47503; $1,277,523; co-PI: The Evolution of Diurnal Warm Layers and Its Role in Ocean-Atmosphere Coupling.

Presentations

AGU Ocean Sciences Meeting New Orleans, LA, 18-24 February 2024
POSTER: *In-Situ Observations and Physical Modeling of Diurnal Warm Layers in the Tropical Pacific*

AGU Fall Meeting San Francisco, CA, 11-15 December 2023
TALK: *Observations and Improvements to Bio-Physical Parameterization of Upper Ocean Radiant Heating*

AMS Annual Meeting (23rd Conference on Air-Sea Interaction) Denver, CO, 8-13 January 2023
TALK: *The Response of Ocean Skin Temperature to Rain: Observations and Implications for Parameterization of Rain-Induced Fluxes*

AGU Fall Meeting Chicago, IL, 12-16 December 2022
TALK: *Modulation of Air-Sea Heat Fluxes by Surface Material*

AGU Ocean Sciences Meeting Virtual, 27 February – 4 March 2022
TALK: *Observations and Modeling of the Response of Sea Surface Skin Temperature to Rainfall*

ArcticNet Annual Scientific Meeting Virtual, 6-10 December 2021
TALK: *The Winter Heat Budget of Sea Ice in Kotzebue Sound: Residual Ocean Heat and the Seasonal Roles of River Outflow*

AGU Fall Meeting Virtual, 13-18 December 2020
POSTER: *Observations of the heat budget of thinning coastal Arctic sea ice under the influence of a river outflow*

AGU Ocean Sciences Meeting San Diego, CA, 16-21 February 2020
TALK: *Observations of the heat budget at the ocean-ice interface during an anomalous Arctic winter*

Alaska Forum on the Environment Anchorage, AK, 9-12 February 2020
TALK: *The heat budget of sea ice in Kotzebue Sound*

Work Experience

Postdoctoral Research Scientist: Lamont-Doherty Earth Observatory **2024 – present**

- **Research Cruise, RVIB Araon, Terra Nova Bay, Antarctica (2024)** – Responsible for design and deployment of six moorings to track the formation, sinking, and northward spreading of High-Salinity Shelf Water from Terra Nova Bay to the edge of the continental shelf.

PhD Student: Columbia University (Advisor: Dr. Christopher J. Zappa) **2018 – 2024**

- **Research Cruise, RV Falkor, Equatorial Pacific (2019)** – Multidisciplinary study of the sea surface microlayer to quantify the impact of near-surface material on air-sea fluxes and the surface ocean heat budget. Responsible for shipboard data acquisition (DC fluxes, IR imagery, SST), design and construction of a drifting buoy for upper ocean profiling ('SPIP-2'), and assistance with UAV operations.
- **Ikaaġvik Sikukun, Kotzebue, AK (2-4 weeks every season in 2017-19)** – Co-production of Knowledge with Indigenous Elders in Kotzebue, Alaska to study the changing sea ice conditions in Kotzebue Sound and the Bering Strait region. Responsible for deployment and recovery of ocean & ice-tethered moorings, meteorological stations, on-ice sampling, and UAV operations.
- **Air-Sea Interaction Tower, Woods Hole, MA (Deployment 2019, Recovery 2020)** – Integration of Visible, Infrared, and Polarimetric imaging systems with fiber-optic connection to the mainland for continuous data acquisition throughout a winter season.

Community Science Fellow: AGU Thriving Earth Exchange **2021 – 2024**

- Worked with community leaders in Marion & Horry counties, South Carolina, to provide actionable scientific insight into the causes, consequences, and potential remedies for recent chronic flooding.

Field Engineer: Christopher J. Zappa Lab, Lamont Doherty Earth Observatory **2016 – 2018**

- **Research Cruises, RVIB Araon, Terra Nova Bay, Antarctica (Deploy 2017, Recover 2018)** – year-long deployment of a heavily instrumented oceanographic mooring in the Terra Nova Bay polynya to study High-Salinity Shelf Water formation.
- **Research Cruise, RV Falkor, Timor Sea (6 weeks in 2016)** – Multidisciplinary study of the sea surface microlayer to better understand the interaction between the layer's physical and chemical properties. Shipboard data acquisition systems including DC fluxes, Polarimetric & Infrared imagery, radiometric skin temperature.

Lab Intern: NASA Jet Propulsion Laboratory **2015 – 2016**

- Worked on the design and implementation of a quadrupole ion trap mass spectrometer intended for immediate use onboard the International Space Station, future use on crewed missions to Mars, and missions to Europa and Venus

Research Assistant: Pomona College // Leibniz Universität Hannover **2014 – 2015**

- Worked predicting, measuring, and analyzing the quantum transitions of diatomic molecules using the Fourier Transform Microwave Spectrometer in Hannover.

Project Engineer: Build Group, San Francisco, CA **2013 – 2014**

- Hired as a summer intern, but was given the responsibilities of a full-time Project Engineer (writing contracts, clearing permits, managing subcontractors, weekly job reviews, meetings with the architectural team) and kept onboard during the year to work remotely due to outstanding work.

Relevant Skills

Guest Lecturer, Air-Sea Interaction **2025**
Graduate-Level Course in Columbia University's Department of Earth and Environmental Sciences

Teaching Assistant, Columbia University **Spring & Fall 2020**
Earth's Environmental Systems: Climate Systems (Spring & Fall Semesters)

LDEO Ocean & Climate Physics Seminar Coordinator **2020 – 2021**

Winner of LDEO Research as Art Exhibit 2025
Sculpture of September Arctic Sea Ice Volume Change since 1979

Python, MATLAB, QGIS, Arduino, CAD

Fluent in French

4 years Varsity Soccer at Pomona College
Lunchtime Soccer Coordinator at LDEO