

# Nash Ward

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## Education

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<b>University of Utah</b> <i>Mathematics B.S., Summa Cum Laude</i>	08/2020 – 05/2024 <i>Salt Lake City, UT, USA</i>
<b>University of Washington</b> <i>Applied Mathematics PhD</i>	09/2024 – PRESENT <i>Seattle, WA, USA</i>

## Research Experience

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<b>Mathematics of sea ice</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• Explored fractal properties of the brine phase of sea ice</li><li>• Discovered dependence of fractal characteristics upon porosity within brine phase</li><li>• Created the first fractal model of the microstructure of the brine phase of sea ice</li></ul>	09/2020 – 07/2024 <i>Salt Lake City, UT, USA</i>
<b>Investigation on the fractal geometry of the ice pack</b> <i>Wilkes Center for Climate Science and Policy, University of Utah</i> <ul style="list-style-type: none"><li>• Provided first rigorous verification of widespread approximations of fractal properties for marginal ice zone</li><li>• Utilized cutting edge software to experimentally test how different floe distributions and fractal structures affect surface wave propagation properties</li></ul>	01/2023 – 06/2024 <i>Salt Lake City, UT, USA</i>
<b>Exploration of nitrogen bonding geometries</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• Synthesized previously undocumented nitrogen bonds in organic compounds</li></ul>	01/2021 – 08/2021 <i>Salt Lake City, UT, USA</i>
<b>Neutrino detection</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• Generated code to simulate neutrino refraction through polar ice</li><li>• Developed software to identify origin of detected neutrinos</li></ul>	10/2021 – 03/2022 <i>Salt Lake City, UT, USA</i>
<b>Exploration of singularity in Navier-Stokes equation</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• Mentored reading pertaining to the singularity in the Navier-Stokes equation of fluid dynamics</li></ul>	02/2021 – 07/2021 <i>Salt Lake City, UT, USA</i>
<b>Topological Data Analysis (TDA) focused research group</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• An NSF funded research group looking into applications of TDA in mathematical climate research</li></ul>	10/2022 – 05/2023 <i>Salt Lake City, UT, USA</i>
<b>Affects of sediment bands on iceberg deterioration and stability</b> <i>Woods Hole Oceanography Institution</i> <ul style="list-style-type: none"><li>• Discovered a new mechanism through which icebergs can deteriorate and break along sediment bands using theory and laboratory experiments</li><li>• Developed and experimentally verified theory on how sediment distribution throughout a free floating iceberg can alter its stability</li></ul>	05/2023 – 08/2023 <i>Woods Hole, MA, USA</i>
<b>NSF RTG funded Arctic research expedition</b> <i>University of Utah</i> <ul style="list-style-type: none"><li>• Will be collecting sea ice samples and conducting experiments on percolation and fluid flow through the ice pack</li></ul>	05/2024 <i>Utqiagvik, Alaska</i>
<b>Invited Student Researcher</b> <i>Woods Hole Oceanographic Institution</i> <ul style="list-style-type: none"><li>• Conducted water tank experiments to further understanding of iceberg breaking mechanism discovered prior year</li></ul>	07/2024 <i>Woods Hole, MA, USA</i>

## Other Experience

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### Teaching Assistant

08/2021 – 01/2023

University of Utah

Salt Lake City, UT, USA

- Math 2210, Multivariable Calculus, Fall 2021 and Fall 2022

### Learning Assistant

08/2021 – 1/2023

University of Utah

Salt Lake City, UT, USA

- Math 1210, Differential Calculus, Fall 2021
- Phys 2710, Modern Physics, Fall 2022
- Math 2270, Linear Algebra, Spring 2023

### Mathematics Tutor

08/2021 – 05/2024

University of Utah

Salt Lake City, UT, USA

- Tutored students in all undergraduate math courses through the University's math center
- Privately tutored high level math courses such as real analysis

### Guest Student

Summer 2023

WHOI geophysical fluid dynamics program

Woods Hole, MA, USA

- Invited to attend graduate GFD program lectures while working on undergraduate summer fellowship

## Publications

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- [1] N. Ward, C. Cenedese, J. McElwaine, and A. Condron, "Watching ice melt: A laboratory investigation into the effects of sediment on iceberg melt rate," *In Preparation*, 2023.
- [2] N. Ward, A. Dorsky, and K. Golden, "Modelling fractal seas," *In Preparation*, 2023.
- [3] N. Ward, D. Hallman, B. Murphy, J. Reimer, M. Oggier, M. O'Sadnick, E. Cherkashev, and K. Golden, "Thermal evolution of brine fractal geometry in sea ice," *In Preparation*, 2023.

## Presentations

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Ward, et al. (2022, September 10). *Thermal Evolution of Brine Fractal Geometry in Sea Ice* [Talk]. 2022 Wasatch SIAM Student Conference – Nash Ward, Daniel Hallman, Benjamin Murphy, Jody Reimer, Marc Oggier, Megan O'Sadnick, Elena Cherkashev and Kenneth Golden

Ward, et al. (2023, February 17). *Thermal Evolution of Brine Fractal Geometry in Sea Ice* [Talk]. 2023 Utah Conference on Undergraduate Research – Nash Ward, Daniel Hallman, Benjamin Murphy, Jody Reimer, Marc Oggier, Megan O'Sadnick, Elena Cherkashev and Kenneth Golden

Ward, et al. (2023, May 17). *Sea Ice Fractals: Measuring sea ice geometry from millimeters to kilometers* [Poster]. 2023 Annual Wilkes Climate Summit – Nash Ward, Daniel Hallman, Adam Dorsky, Benjamin Murphy, Jody Reimer, Marc Oggier, Megan O'Sadnick, Elena Cherkashev and Kenneth Golden

Ward, Condron, Cenedese; (2023, July 13). *Splitting Icebergs: How sediment affects iceberg melt* [Talk]. 2023 WHOI midsummer progress report – Nash Ward, Alan Condron and Claudia Cenedese

Ward, Cenedese, McElwaine, Condron; (2023, August 10). *SIS: A new iceberg deterioration mechanism* [Poster]. 2023 WHOI Summer Student Fellowship final presentations – Nash Ward, Claudia Cenedese, Jim McElwaine, Alan Condron

Ward; (2023, November 04). *Ice Structures* [Talk]. Applied Math RTG Workshop – Nash Ward

Ward, Cenedese, McElwaine, Condrón; (2023, November 19). *Watching Ice Melt: How sediment affects iceberg melt* [Talk]. APS Division of Fluid Dynamics 2023 – Nash Ward, Claudia Cenedese, Jim McElwaine, Alan Condrón

Ward, Dorsky, Hallman, Golden; (2024, January 4). *Fractal Seas; Measuring sea ice geometry from millimeters to kilometers* [Talk]. Joint Math Meeting, Pi Mu Epsilon Contributed session on Research by Undergraduates, IV – Nash Ward, Adam Dorsky, Daniel Hallman, Kenneth Golden

Ward, Cenedese, McElwaine, Condrón; (2024, November 26). *Deposition patterns of ice rafted debris* [Talk]. APS Division of Fluid Dynamics 2024 – Nash Ward, Claudia Cenedese, Jim McElwaine, Alan Condrón

### *Awards & Honors*

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<b>Utah Flagship Scholarship</b>	
<i>University of Utah</i>	2020 – 2024
<b>Crocker Science Scholar</b>	
<i>University of Utah and Gary and Ann Crocker</i>	2020 – 2022
<b>Science Research Initiative Scholarship</b>	
<i>University of Utah, College of Science</i>	2020 – 2021
<b>Undergraduate Mathematics Research Fellowship</b>	
<i>University of Utah, Department of Mathematics</i>	2021 – 2024
<b>University of Utah Dean's List</b>	
<i>University of Utah</i>	2020/21, 2021/22, 2022/23, 2023/24
<b>Junius John Hayes Endowed Scholarship</b>	
<i>University of Utah, Department of Mathematics</i>	2022
<b>Wilkes Center for Climate Science and Policy Scholar</b>	
<i>University of Utah</i>	2023
<b>Tom and Cathy Saxton Scholarship</b>	
<i>University of Utah</i>	2023
<b>Summer Student Fellow</b>	
<i>Woods Hole Oceanographic Institution</i>	2023
<b>JMM 2024 PME Speaker Award</b>	
<i>Joint Math Meeting</i>	January, 2024
<b>J.L. Gibson Senior Award</b>	
<i>University of Utah, Department of Mathematics</i>	2024
<b>Frederick Wan Fellowship</b>	
<i>University of Washington, Department of Applied Mathematics</i>	2024 – 2027

### *Grants*

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<b>Wilkes Climate Grant</b>	
<i>Wilkes Center for Climate Science and Policy</i>	2022-2023
<b>WHOI APO Travel Grant</b>	
<i>Woods Hole Oceanography Institution</i>	November, 2023
<b>PME Travel Grant</b>	
<i>American Mathematical Society</i>	January, 2024

### *Specialized Skills*

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**MATLAB:** Fluent

**PYTHON:** Fluent

**Mathematica:** Fluent

**L<sup>A</sup>T<sub>E</sub>X:** Fluent

**Adobe Suit:** Proficient

**Microsoft Suit:** Proficient