

## Dustin Carroll

Research Associate, Moss Landing Marine Laboratories

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### RESEARCH INTERESTS

Numerical ocean modeling, coastal and estuarine processes, high-latitude oceanography, ocean-ice interactions, ocean carbon cycling and biogeochemistry, ocean dispersal

### EDUCATION

Ph.D. Earth Sciences, 2017 – University of Oregon, Eugene, OR

M.S in Marine Science, 2009 – California State University Monterey Bay, Marina, CA

B.S in Computer Science, 2004 – Westmont College, Santa Barbara, CA

### PROFESSIONAL EXPERIENCE

Affiliate Scientist, NASA Jet Propulsion Laboratory, 2019–present

Research Associate, Moss Landing Marine Laboratories, 2019–present

Postdoctoral Research Scholar, NASA Jet Propulsion Laboratory, 2017–2019

Research Associate, University of Oregon, 2012–2017

Arctic LTER Research Technician, University of Michigan, 2011–2012

Software Engineer, Moss Landing Marine Laboratories, 2009–2011

Research Assistant, Moss Landing Marine Laboratories, 2007–2009

Intern, Monterey Bay Aquarium Research Institute, 2006

Software Engineer, Applied Technologies Associates, 2005

Chemistry Research Assistant, Westmont College, 2003–2004

### PUBLICATIONS

Willis, J., **Carroll, D.**, Gardner, A., Khazendar, A., Wood, M., Holland, D.M., Holland, D., Fenty, I., Rignot, E., Chauche, N., and Rosing-Asvid, A., Glacier Forecast: Jakobshavn Isbrae Primed for Thinning and Acceleration, *in revision*, Nature Communications: Earth and Environment

Liu, J., Baskarran, L., Bowman, K., Schimel, D., Bloom, A. A., Parazoo, N. C., Oda, T., **Carroll, D.**, Menemenlis, D., Joiner, J., Commancin, R., Daube, B., Gattai, L. V., McKain, K., Miller, J., Stephens, B. B., Sweeney, C., and Wofsy, S, 2020, Carbon Monitoring System Flux Net Biosphere Exchange 2020 (CMS-Flux NBE 2020), Earth System Science Data Discussions, *in revision*, <https://doi.org/10.5194/essd-2020-123>

Breaker, L., and **D. Carroll**, 2020, A closer look at power law scaling applied to sea surface temperature from Scripps Pier using Empirical Mode Decomposition, *in review, Journal of Atmospheric and Oceanic Technology*

**Carroll, D.**, Menemenlis, Adkins, J.F., Bowman, K.W., Brix, H., Dutkiewicz, S., Fenty, I., Gierach, M. M., Hill, C., Jahn, O., Landschützer, P., Lauderdale, J. Liu, J.M., Naviaux, J.D., Manizza, M., Rödenbeck, C., Schimel, D. S., Van der Stocken, T., Zhang, H, Seasonal to Multi-decadal Air-sea CO<sub>2</sub> Fluxes from the Data-constrained ECCO-Darwin Global Ocean Biogeochemistry Model, *Journal of Advances in Modeling Earth Systems*, 12, e2019MS001888, <https://doi.org/10.1029/2019MS001888>

Hopwood, M., **Carroll, D.**, Dunse, T., Hodson, A., Holding, J., Iriarte, J., Ribeiro, S., Achterberg, S., Cantoni, S., Carlson, D., Chierici, M., Clarke, J., Cozzi, S., Fransson, A., Juul-Pedersen, T., Winding, M., and L. Meire, 2019, How does glacier discharge affect marine biogeochemistry and primary production in the Arctic?, *The Cryosphere*, 14, 1347-1383

Hopwood, M.J., **Carroll, D.**, Höfer, J., Meire, L., Le Moigne, F.A.C., Bach, L., Eich, C., Sutherland, D.A., González Estay, H., and E.P. Achterberg, 2019, Highly variable iron content limits iceberg-ocean fertilization and carbon export, *Nature Communications*, 10(1), 1–10

Fried, M.J., **Carroll, D.**, Catania, G.A., Sutherland, D.A., Stearns, L.A., Shroyer, E.L., and J.D. Nash, 2019, Distinct frontal ablation processes drive heterogenous submarine terminus morphology, *Geophysical Research Letters*, 46 (21), 12083–12091

Breaker, L., and **D. Carroll**, 2019, The impact of regime shifts on long-range persistence and the scaling of sea surface temperature off the coast of California, *Journal of Geophysical Research: Oceans*, 24, 3206–3227

Khazendar, A., Fenty, I., **Carroll, D.**, Gardner, A., Fukumori, I., Wang, O., Seroussi, H., Moller, D., Noël, B.Y.P., van den Broeke, M.R., Dinardo, S., and J. Willis, 2019, Interruption of two decades of Jakobshavn Isbrae acceleration and thinning as regional ocean cools, *Nature Geoscience*, 12, 277–283

Van der Stocken, T.\* , **Carroll, D.\***, Menemenlis, D., Simard, M., and N. Koedam (\* co-first author), 2019, Mangrove dispersal and connectivity across the world's oceans, *Proceedings of the National Academy of Sciences*, 116(3), 915–922

**Carroll, D.**, Sutherland, D.A., Curry, B., Shroyer, E.L., Nash, J.D., Catania, G.A., Stearns., L.A., Grist, J.P., Lee, C.M., and L. de Steur, 2018, Sub-annual and seasonal variability of Atlantic-origin waters in two adjacent west Greenland fjords, *Journal of Geophysical Research: Oceans*, 123 (9), 6670–6687

Hopwood, M., **Carroll, D.**, Browning, T., Meire, L., Yool, A., Mortensen, J., and E. Achterberg, 2018, Non-linear response of summertime marine productivity to increased meltwater discharge around Greenland, *Nature Communications*, 9 (1), 3256

Willis, J., **Carroll, D.**, Kohli, G., Khazendar, A., Fenty, I., Rutherford, M., Trenholm, N., and M. Morlighem, 2018, Ocean-ice interactions in Inglefield Gulf: Early results from NASA's Oceans Melting Greenland mission, *Oceanography*, 31(2)

Amundson, J.M. and **D. Carroll**, 2018, Effect of topography on subglacial discharge and submarine melting during tidewater glacier retreat. *Journal of Geophysical Research: Earth Surface*, 123, 66–79

Moon, T., Sutherland, D.A., **Carroll, D.**, Felikson, D., Kehrl, L.M., and F. Straneo, 2017, Subsurface iceberg melt key to Greenland fjord freshwater budget, *Nature Geoscience*, 11, 49–54

**Carroll, D.**, Sutherland, D.A., Shroyer, E.L., Nash, J.D., Catania, G.A., and L.A. Stearns, 2017, Subglacial discharge-driven renewal of tidewater glacier fjords. *Journal of Geophysical Research: Oceans*, 122, 6611–6629

Jackson, R.H., Shroyer, E.L., Nash, J.D., Sutherland, D.A., **Carroll, D.**, Fried, M.J., Catania G.A., Bartholomaeus, T.C., and L.A. Stearns, 2017, Near-glacier surveying of a subglacial discharge plume: implications for plume parameterizations, *Geophysical Research Letters*, 44, 6886–6894

**Carroll, D.**, Sutherland, D.A., Hudson, B., Moon T., Catania, G.A., Shroyer, E.L., Nash, J.D., Bartholomaeus, T.C., Felikson D., Stearns, L.A., Noël, B.Y.P., and M.R. van den Broeke, 2016, The impact of glacier geometry on meltwater plume structure and submarine melt in Greenland fjords, *Geophysical Research Letters*, 43(18), 9739–9748

Breaker, L.C., Loor, H.R., and **D. Carroll**, 2016, Trends in sea surface temperature off the coast of Ecuador and the major processes that contribute to them, *Journal of Marine Systems*, 164, 151–164

Bartholomaeus, T.C., Stearns, L.A., Sutherland, D.A., Shroyer, E.L., Nash, J.D., Walker, R., Catania, G.A., Felikson, D., **Carroll, D.**, Fried, M.J., Noël, B.Y.P., and M.R. van den Broeke, 2016, Contrasts in the response of adjacent fjords and glaciers to ice-sheet surface melt in West Greenland, *Annals of Glaciology*, 57(73), 25–38

**Carroll, D.**, Sutherland, D.A., Shroyer, E.L., Nash, J.D., Catania, G.A., and L.A. Stearns, 2015, Modeling turbulent subglacial meltwater plumes: implications for fjord-scale buoyancy-driven circulation, *Journal of Physical Oceanography*, 45(8), 2169–2185

Breaker, L.C., Murty, T.S., and **D. Carroll**, 2013, A frequency domain approach for predicting the signal strength of tsunamis at coastal tide gauges, *Journal of Coastal Research*, 30(3), 562–574

Breaker, L.C., Murty T.S., **Carroll, D.**, and W.J Teague, 2011, The response of the Monterey Bay to the Great Tohoku Earthquake of 2011, *Science of Tsunami Hazards*, 30(3), 153–163

Cazenave, F., Zook, R., **Carroll, D.**, Flagg, M., and S. Kim, 2011, Development of the ROV SCINI (Submersible Capable of under Ice Navigation and Imaging) and deployment in McMurdo Sound, Antarctica, *Journal of Ocean Technology*, 6(3), 39–57

Breaker, L.C., Murty T.S., Norton J. G., and **D. Carroll**, 2009, Comparing sea level response at Monterey, California from the 1989 Loma Prieta earthquake and the 1964 Great Alaskan Earthquake, *Science of Tsunami Hazards*, 28(5), 255–271

**Carroll, D.**, Broadus, R., Hanson, J., Conant, T., and A.M Nishimura, 2005, Study of the phosphorescent triplet state of 2-Indanone: Use of a microcontroller based photon counter and pulse train generator, *Journal of Undergraduate Chemistry Research*, 1, 85–89

### **INVITED TALKS**

GRISO Greenland Freshwater Flux Workshop, 2018

NASA Jet Propulsion Laboratory, Cryosphere Seminar, 2017

University of Washington, Physical Oceanography Seminar, 2017

University of Otago, Marine Science Seminar, 2016

### **CONFERENCE PRESENTATIONS (\*first-author only)**

Using a Data-assimilative Ocean Biogeochemistry Model (ECCO-Darwin) as a Novel Framework for Evaluating Carbon Mitigation Strategies, Outreach, and Policy, 2020, poster, AGU Ocean Sciences, San Diego, CA

Quantifying the Release, Transport, and Fate of Iceberg Melt in Greenland Fjords, 2020, poster, AGU Ocean Sciences, San Diego, CA

Seasonal to Multi-decadal Air-sea CO<sub>2</sub> Fluxes from the Data-constrained ECCO-Darwin Global Ocean Biogeochemistry Model, 2019, poster, AGU Chapman Conference, La Jolla, CA

Dense overflows drive seasonal renewal of warm fjord waters in Uummannaq Bay, west Greenland, 2018, poster, AGU Ocean Sciences, Portland, OR

Modeling the impact of fjord-glacier geometry on subglacial plume, wind, and tidally-forced circulation in outlet glacier fjords, 2016, poster, AGU Fall Meeting, San Francisco, CA

Using an idealized ocean circulation model to assess the role of fjord-glacier geometry on circulation in tidewater glacier fjords, 2016, talk, IGS symposium on interactions of ice sheets and glaciers with the ocean, La Jolla, CA

The impact of fjord-glacier geometry on circulation and renewal in tidewater glacier fjords, 2016, talk, AGU Ocean Sciences, New Orleans, LA

Modeling subglacial meltwater plumes across Greenland's outlet glaciers: implications for ocean-ice coupling in a warming climate, 2015, talk, AGU Fall Meeting, San Francisco, CA

Numerical simulation and sensitivity analysis of subglacial meltwater plumes: implications for ocean-glacier coupling in Rink Isbrae, west Greenland, 2014, poster, AGU Fall Meeting, San Francisco, CA

Turbulent meltwater plumes: implications for ocean-ice coupling in Rink Isbrae Fjord, west Greenland, 2014, poster, FAMOS meeting, Woods Hole, MA

Using a coupled observational and modeling approach to investigate buoyant plume structure in a Greenlandic outlet glacial fjord, 2014, poster, AGU Ocean Sciences, Honolulu, HI

Oceanic response to buoyancy, wind and tidal forcing in a Greenlandic glacial fjord, 2013, poster, AGU Fall Meeting, San Francisco, CA

### **HONORS / AWARDS**

University of Oregon, Research, Excellence Award, 2016

University of Oregon, Baldwin Scholarship, 2016

University of Oregon, Bayer Scholarship, 2015

University of Oregon, Thayer Scholarship, 2014

American Geophysical Union, Outstanding Student Paper Award, 2013

University of Oregon, Johnston Fellowship, 2012

### **TEACHING EXPERIENCE**

Teaching Assistant, 2014/2017, Oceanography of the Oregon Coast (undergraduate/graduate)

Instructor, 2016, MATLAB for Earth Sciences (undergraduate/graduate)

Teaching Assistant, 2016, Introduction to Physical Oceanography (undergraduate)

Teaching Assistant, 2015, MATLAB for Earth Sciences (undergraduate/graduate)

Teaching Assistant, 2015, Geology of the Pacific Northwest (undergraduate)

Teaching Assistant, 2008, Physical Oceanography (graduate)

Teaching Assistant, 2007, Data Analysis Techniques for Oceanography (graduate)

### **UNDERGRADUATE MENTORSHIP**

Undergraduate mentor (4 students), 2016–2017, University of Oregon Women in Graduate Science Joint Undergrad-Grad Mentorship Program (JUMP)

## **WORKSHOPS AND SCHOOLS**

Speaker, Greenland Freshwater Flux Workshop, 2018, Washington, D.C  
Speaker, Estimating the Circulation and Climate of the Ocean (ECCO) Workshop, 2018, Austin, TX  
Speaker, NASA Oceans Melting Greenland (OMG) Workshop, 2018, La Jolla, CA  
Speaker, Estimating the Circulation and Climate of the Ocean (ECCO) Workshop, 2017, Pasadena, CA  
Speaker, Ice Sheet Model Intercomparison Project Workshop, 2016, San Francisco, CA  
International Summer School in Glaciology, 2016, McCarthy, AK  
Alan Alda Communicating Science Workshop, 2015, Eugene, OR  
Fluid Dynamics Summer School, 2014, Cambridge, UK  
Oceanography Boot Camp, student-led cruise, 2013, Corvallis, OR

## **FIELD EXPERIENCE**

*R/V Adolf Jensen*, 10 days, 2017, hydrographic surveys, mooring operations, and helicopter work in Sermilik fjord, southeast Greenland

*R/V Sanna*, 6 days, 2015, hydrographic surveys and mooring operations in Rink and Kangerlussuup Sermia fjords, west Greenland

*R/V Sanna*, 20 days, 2014, hydrographic surveys and mooring operations in Rink and Kangerlussuup Sermia fjords, west Greenland

*R/V Oceanus*, 4 days, 2014, hydrographic and biochemical survey in Cape Perpetua Marine Reserve, Oregon

*R/V Sanna*, 12 days, 2013, hydrographic surveys and mooring operations in Rink and Kangerlussuup Sermia fjords, west Greenland

*R/V Fox*, 15 days, 2012, hydrographic surveys and mooring operations in Sermilik and Kangerlussuaq fjords, southeast Greenland.

*Toolik Field Station*, summer 2011/2012, deployed and maintained eddy flux towers to measure turbulent greenhouse gas flux in the Alaskan arctic

*Ross Ice Shelf*, Nov–Jan 2010/2011, deployed a through-ice remotely operated vehicle through the Ross Ice Shelf.

*McMurdo Station*, Aug–Nov 2009, deployed a through-ice remotely operated vehicle to study polar Antarctic benthic ecosystems.

Numerous day cruises in California and Oregon: Monterey Canyon (*R/V Point Lobos* and *R/V*

*Shana Rae*, 2005), Elkhorn Slough (*R/V Sheila B.*, 2005–2007), Carmel Bay (*R/V John Martin*, 2007–2008), Monterey Bay (*R/V Point Sur*, 2005–2008), and Coos Bay (*R/V Pluteus*, 2014–2017).

## **PROFESSIONAL SERVICE AND ACTIVITIES**

### **Professional Society:**

Primary chair: AGU Ocean Sciences, *Moving beyond melt: the impact of melting glaciers, icebergs and sea-ice on ocean environments*, 2020, San Diego, CA.

### **Reviewer:**

Annals of Glaciology, Geophysical Research Letters, Journal of Geophysical Research: Oceans/Earth Surface, Journal of Glaciology, Nature Communications, Polar Research

NASA panel reviewer, 2020

### **Professional Society Memberships:**

American Geophysical Union  
The Oceanography Society

## **MEDIA COVERAGE**

Washington Post, *How Greenland's ice is melting from both above and below*, 2016

## **TECHNICAL SKILLS**

**Ocean Modeling:** MIT General Circulation Model (MITgcm), Regional Ocean Modeling System (ROMS), Unix environments, HPC/supercomputing systems, CVS, git

**Programming:** Assembly, C/C++, Fortran, Labview, MATLAB, Java, Python, PHP, SQL

**Instrumentation:** Seabird and RBR CTD, Teledyne RD ADCP, Cambell dataloggers, electronics and circuit design, machining and fabrication, research cruise and small boat experience, mooring deployment and recovery