

# Ryan K. Cassotto, Ph.D.

[ryancassotto@gmail.com](mailto:ryancassotto@gmail.com) • [www.rkcassotto.com](http://www.rkcassotto.com) • ORCID ID: 0000-0003-3206-6744

## ACADEMIC PREPARATION

<b>Earth and Environmental Sciences (Ph.D.)</b>	<b>2017</b>
University of New Hampshire, Durham, NH <i>"Unraveling short-term variations in tidewater glacier flow: Insights from terrestrial radar interferometric studies"</i>	
<b>Earth Science: Geology (M.S.)</b>	<b>2011</b>
University of New Hampshire, Durham, NH <i>"Implications of changing winter fjord ice mélanges for Greenland outlet glacier dynamics"</i>	
<b>Electronic Engineering Technology (B.S.)</b>	<b>1999</b>
University of Hartford, Hartford, CT	

## ACADEMIC RESEARCH POSITIONS

Research Scientist II, University of Colorado, Boulder, CO	2023 - Present
Research Scientist I, University of Colorado, Boulder, CO	2020 - 2023
Post-Doctoral Research Associate, University of Colorado, Boulder, CO	2018 - 2020
NASA Earth and Space Science Fellow, University of New Hampshire	2014 – 2017
New Hampshire Space Grant Fellow, University of New Hampshire	2013 – 2014
Research Assistant, University of New Hampshire	2011 – 2013
Teaching Assistant, University of New Hampshire	2009 – 2011

## PROFESSIONAL EXPERIENCE

<b>University of Colorado, Boulder, CO</b>	<b>2018 - present</b>
<i>Cooperative Institute for Research in Environmental Sciences (CIRES)</i>	
<ul style="list-style-type: none"><li>• Manage (Principal Investigator) a new NASA Cryosphere project to create a 30-year record of regional 3D glacier surface velocities throughout Alaska.</li><li>• Co-PI and lead efforts to use SAR for near-real time fire mapping on a NASA Applied Sciences project.</li><li>• Co-PI on an NSF GOLD project to transform FieldSafe and deliver it to the broader geoscience community.</li><li>• Coordinate landslide and tsunami vulnerability mapping efforts for a recently funded NSF NNA project to investigate how climate-induced natural hazards in Greenland impact its residents.</li><li>• PI on a CIRES Innovative Research Project (IRP) to apply Ku-Band TRI to snow surface conditions.</li><li>• Leading efforts on a second IRP project to build and deploy low-cost GNSS-R sensors on a Colorado landslide.</li><li>• Provided 16 guest lectures for various courses in the Departments of Geography and Geological Sciences.</li><li>• Teaching Faculty member of 2022 Juneau Icefield Research Project.</li><li>• Submitted 15 research proposals to external funding agencies (NASA, NSF).</li><li>• Completed Synthetic Aperture Radar (SAR) integration for an Intelligence Advanced Research Projects Activity (IAPRA) to combine SAR and Optical remote sensing observations for surface change detection.</li><li>• Developed a technique to derive building heights from Sentinel-1 SAR Layover.</li><li>• Developing a polarized SAR technique for the study of ice mélange and proglacial fjord conditions.</li><li>• Performed remote sensing study on the impacts of a perennial firn aquifer on ice dynamics in southeast Greenland using satellite remote sensing observations.</li><li>• Conducted landslide investigations and provided remote sensing expertise for a NASA Interdisciplinary Research in Earth Science project to evaluate how climate change facilitates cascading natural hazards.</li></ul>	

- Generated mosaics of very high resolution (2-m) digital elevation models (DEMs) derived from optical satellite imagery to characterize the impacts of sea level rise on coastal cities.
- Chaired and launched new CIRES Mentorship Program that partners junior researchers and staff with senior personnel to enhance diversity and inclusion, encourage collaborations, and improve employee morale.
- Served on CIRES Members' Council (CMC) since 2019; current CIRES Executive Meeting CMC Representative.
- Co-developed and current instructor for FieldSafe, an online-hybrid workshop to promote safe, diverse, and inclusive field teams for CIRES 800 employees.

**University of New Hampshire, Durham, NH**

**2008 - 2017**

- Applied new terrestrial radar interferometry technology to study ice dynamics along fast flowing (50 m d<sup>-1</sup>) Greenland tidewater glaciers and map aseismic slip (10 mm yr<sup>-1</sup>) along a California earthen dam.
- Combined passive (optical, thermal microwave) and active (radar) measurements with photogrammetry observations to characterize geophysical surface deformation.
- Developed a novel algorithm to use daily MODIS thermal infrared observations to assess variations in proglacial winter ice mélange in Greenland fjords.
- Earned a prestigious NASA Earth and Space Science Fellowship for a research project applying terrestrial radar interferometry to study tidewater glacier dynamics.

**L-3 Communications Systems West, Salt Lake City, UT**

**2003 - 2007**

*Electromagnetic Compatibility (EMC) Engineer*

- Provided concept-through-delivery systems engineering support of DoD satellite communication systems.
- Guided projects through the EMC certification process and supported multi-agency test efforts of Unmanned Aerial Vehicles (UAV) at a government test facility.
- Established effective working relationships across departments and liaised between engineering, manufacturing, and government contractors to resolve issues and ensure customer satisfaction.
- Advised engineering and manufacturing personnel on proper EMC design and mitigation techniques.
- Collaborated with RF, electrical, and mechanical engineers during instrument design.
- Supervised and Team Lead for the cable design engineering team.

**Quantum Bridge Communications, Andover, MA**

**2000-2001**

*Compliance Engineer*

- Successfully attained regulatory compliance approvals for two families of optical networking equipment, including multiple generations of hardware development.
- Prepared test plans and component documentation for agency reviewers.
- Advised senior management on compliance issues and certification progress.

**Curtis-Straus LLC, Littleton, MA**

**1999-2003**

*Electromagnetic Compatibility Test Engineer*

- Performed electromagnetic emissions testing during the regulatory approvals process (FCC, CE, UL).
- Diagnosed EMC failures and implemented solutions for telecommunication and biomedical devices.
- Established exceptional rapport with clientele, earning preferred Engineer status for off-site testing.

---

**PUBLICATIONS**

- 2021 **Cassotto, R.K.,** J. Burton, J.M. Amundson, M. Fahnestock, & M. Truffer. Granular decoherence precedes ice mélange failure and glacier calving at Jakobshavn Isbræ. *Nature Geoscience.*, <https://doi.org/10.1038/s41561-021-00754-9>

- Samsonov, S., K. Tiampo, & **R. Cassotto**. Measuring the state and temporal evolution of glaciers in Alaska and Yukon using synthetic-aperture-radar-derived (SAR-derived) 3D time series of glacier surface flow. *The Cryosphere*, <https://doi.org/10.5194/tc-15-4221-2021>
- Samsonov, S., K. Tiampo, & **R. Cassotto**. SAR-derived flow velocity and its link to glacier surface elevation change and mass balance. *Remote Sensing of Environment*. (258) <https://doi.org/10.1016/j.rse.2021.112343>
- 2019 **Cassotto, R.K.**, M. Fahnestock, J.M. Amundson, M. Truffer, M. Boettcher, S. de la Pena, I. Howat. Non-linear glacier response to calving events, Jakobshavn Isbræ. *Journal of Glaciology*. 65(249), 39-54 <https://doi.org/10.1017/jog.2018.90>
- Willis, MJ; W.D. Barnhart, **R. Cassotto**, J. Klassen, J. Corcoran, T. Host, B. Huberty, K. Pelletier, & J.F. Knight. *CalIDEM: Ridgecrest, CA Region 2m Digital Surface Elevation Model*. <https://doi.org/10.5069/G998854C>
- 2018 Burton, J.C., J. Amundson, **R. Cassotto**, C.C. Kuo, M. Dennin. Quantifying flow and stress in ice mélange, the world's largest granular material, *Proceedings of the National Academy of Sciences*. 115(20), 4105-5110. <https://doi.org/10.1073/pnas.1715136115>
- 2017 Werner, C., B. Baker, **R. Cassotto**, C. Magnard, U. Wegmuller, and M. Fahnestock. Measurement of fault creep using multi-aspect terrestrial radar interferometry at Coyote Dam. *Proceedings from the 2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*. <https://doi.org/10.1109/IGARSS.2017.8127110>
- Voytenko, D., T. H. Dixon, D. M. Holland, **R. Cassotto**, I. M. Howat, M. Fahnestock, M. Truffer, and S. de la Peña. Acquisition of a 3 min, two-dimensional glacier velocity field with terrestrial radar interferometry, *Journal of Glaciology*, 63(240), 629–636, <https://doi.org/10.1017/jog.2017.28>
- Motyka, R.J., **R. Cassotto**, M. Truffer, K.K. Kjeldsen, D. van As, N.J. Korsgaard, M. Fahnestock, I. Howat, P.L. Langen, J. Mortensen, K. Lennert, and S. Rysgaard. Asynchronous behavior of outlet glaciers feeding Godthabsfjord (Nuup Kangerlua) and the triggering of Narsap Sermia's retreat in SW Greenland. *Journal of Glaciology*, 63(238). <https://doi.org/10.1017/jog.2016.138>
- 2015 Peters, I.R., J.M. Amundson, **R.K. Cassotto**, M. Fahnestock, K.N. Darnell, M. Truffer, and W.W. Zhang. Dynamic jamming of iceberg-choked fjords, *Geophysical Research Letters*, 42. <http://doi.org/10.1002/2014GL062715>
- Cassotto, R.K.**, M. Fahnestock, J.M. Amundson, M. Truffer, and I. Joughin. Seasonal and interannual variations in ice mélange rigidity and its impact on terminus stability, Jakobshavn Isbræ, Greenland, *Journal of Glaciology*, 61(225). <https://doi.org/10.3189/2015JoG13J235>
- 2012 Podrasky, D., M. Truffer, M. Fahnestock, J. Amundson, **R. Cassotto**, and I. Joughin. Outlet glacier response to forcing over hourly to interannual timescales, Jakobshavn Isbræ, Greenland. *Journal of Glaciology*, 58(212), 1212 - 1226. <https://doi.org/10.3189/2012JoG12J065>

#### MANUSCRIPTS IN PREPARATION

**Cassotto, R. K.** and L. Pitcher. Terrestrial radar interferometric and LIDAR study of winter snow condition variability in Little Cottonwood Canyon, UT

**Cassotto, R.K.** and K. Tiampo, Building height elevation changes from C-band SAR Layover

**Cassotto, R. K.**, J.T. Minear, S. Lundell, K. Tiampo, M. Willis, and B. Livneh. The evolution of post-wildfire landslide susceptibility in the Western United States

**Cassotto, R. K.**, M.J. Willis, Køge Bugt: Evidence for firn aquifer impacting Greenland's dynamic ice mass loss.

**Cassotto, R. K.**, M.A. Fahnestock, S.A. O’Neel, L. Sass, and R.W. McNabb. Large response to precipitation and tidal forcing at Columbia Glacier – evidence for late summer changes in basal water system.

#### **GUEST LECTURES**

---

*“Map Interpretation of the Landscape”* for Mapping a Changing World, Boulder, CO. Nov 2020 – 2023.

*“Remote Sensing, Satellite and Image Maps”* for Mapping a Changing World, Boulder, CO. Sep 2020 - 2023

*“Terrestrial Radar Interferometry”* for InSAR Processing and Interpretation. Boulder, CO. Oct 2020, 2023.

*“Paleoclimate”* for Our Deadly Planet, Boulder, CO. Dec 2019

*“Mass Extinctions”* for Our Deadly Planet, Boulder, CO. Sep 2019.

*“Ice Flow and Calving Front Dynamics”* for The Cryosphere: Ice and Icy Environments. Boulder, CO. Feb 2019.

*“The Cryosphere”* for Planet Earth, Boulder, CO. Feb 2019.

*“Mountain Building and Geodesy”* for Introduction to Geology, Boulder, CO. Mar 2018.

#### **PRESENTATIONS**

---

**Cassotto, R.K.** Radar & Remote Sensing of Glaciers, CIRES Science@Home Seminar, Nov 10, 2020

**Cassotto, R.K.**, J. Burton, J. Amundson, M. Fahnestock, M. Truffer. The influence of granular ice mélange on iceberg calving. National Snow and Ice Data Center (NSIDC), Boulder, CO. Nov 6, 2019 (Invited)

**Cassotto, R.K.** M.J. Willis, M. MacFerrin. C.Miège, M. Bevis. Semi-periodic Dynamic *“Thickening”* of a Tidewater Glacier in Køge Bugt, Greenland, National Center for Atmospheric Research, Boulder, CO. Feb 4, 2019 (Invited)

**Cassotto, R.K.** M.J. Willis, M. Bevis, M. MacFerrin. Semi-periodic Dynamic *“Thickening”* of a Tidewater Glacier in Køge Bugt, Greenland, Abstract C14A-04, AGU Fall Meeting, Washington D.C.. Dec 10, 2018

**Cassotto, R.K.**, M.A. Fahnestock, J.M. Amundson, M. Truffer, and M.S. Boettcher. The correlation between calving size and glacier speed – or lack thereof. NASA Program for Arctic Research and Climate Assessment (PARCA), Goddard Space Flight Center, Greenbelt, MD. Jan 24, 2017

**Cassotto, R.K.**, J. M. Amundson, M.A. Fahnestock, M. Truffer, J. Burton, C. Kuo, M. Dennin, and M.S. Boettcher. Evolution of Ice Mélange Motion During Periods of Terminus Quiescence, Abstract C51A-0650, AGU Fall Meeting, San Francisco, CA. Dec 2016

**Cassotto, R.K.**, M.A. Fahnestock, J.M. Amundson, M. Truffer, and S. O’Neel. Variations at the ice–ocean boundary: insights from terrestrial radar interferometric studies of tidewater glaciers, Abstract 74A2110, IGS Symposium, San Diego, CA. Jul 2016

**Cassotto, R.K.**, M.A. Fahnestock, S. O’Neel, L. Sass, R.W. McNabb, and W.T. Pfeffer. Large response to precipitation and tidal forcing at Columbia Glacier imaged with terrestrial radar interferometry, Abstract C43B-0808, AGU Fall Meeting, San Francisco, CA (Outstanding Student Presenter Award). Dec 2015

**Cassotto, R.K.**, M. Fahnestock, J.M. Amundson, and M. Truffer. Glacier-Ocean Interactions on Short Timescales: Can observations of tidal and calving impacts on near-terminus ice flow inform us about controls on terminus stability? International Workshop on Understanding the Response of Greenland’s Marine Terminating Glaciers to Oceanic and Atmospheric Forcing. Beverly, MA. Jun 2013

**Cassotto, R.K.** M.A. Fahnestock, M. Truffer, R.J. Motyka, D. Podrasky, and P. Dryer. Observations of a Greenland Tidewater Outlet Glacier Behavior Using a Ground Based Radar Interferometer. International Symposium on Glaciers and Ice Sheets in a Warming Climate, University of Alaska, Fairbanks, AK. Jun 2012

**Cassotto, R.K.**, M.A. Fahnestock, J.M. Amundson, M. Truffer, and I. Joughin. Implications of changing winter fjord ice mélanges for Greenland outlet glacier dynamics. NASA Program for Arctic Research and Climate Assessment (PARCA), Goddard Space Flight Center, Greenbelt, MD. Jan 2012

**Cassotto, R.K.**, M.A. Fahnestock, and J.M. Amundson. Implications of Greenland Fjord Ice Stability on Terminus Retreat from the MODIS Thermal Record. International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean, Scripps Institute of Oceanography, San Diego, CA. Jun 2011

#### **AWARDS**

CIRES Outstanding Performance Award	2020
University of New Hampshire Graduate Student Research/Scholarship/Creativity Award	2017
Outstanding Student Paper Award (OSPA), AGU Fall Meeting	2015

#### **SKILLS**

- Satellite (Optical, Thermal Microwave, Radar, Lidar) Remote Sensing and Image Processing
- Terrestrial Radar Interferometry
- SAR Software: Gamma Remote Sensing, ISCE, SNAP
- Quantum GIS (QGIS)
- Programming Languages: MATLAB (expert), Python (intermediate), shell scripting
- Proficient with Microsoft Office Suite (Word, Excel, PowerPoint, Outlook calendar, OneDrive, Project)
- Virtual Meeting Platforms: Zoom, Google Meets
- Google Suite (Docs, Sheets, Drive)

#### **SYNERGISTIC ACTIVITIES**

<b>Service to CIRES / NOAA</b>	2019 – present
<i>CIRES Members' Council Representative, CIRES Mentoring Program Chairperson, Executive Council Rep.</i>	
<b>Peer Review Panels</b>	2019 – present
<i>NASA, NSF</i>	
<b>Outreach Engagements</b>	2018 – 2019
<i>National Ocean Sciences Bowl 'Trout Bowl' Keynote Speaker</i>	
<i>Guest Geologist / Glaciologist, Red Hawk Elementary Science Night</i>	
<i>Lens on Climate Change Guest Speaker</i>	
<b>Mentorship</b>	2014 – present
<i>CIRES early-career scientist, CIRES PhD students, UNH Geophysics students</i>	
<b>Manuscript Peer Reviewer</b>	2014 – present
<i>Journal of Glaciology, Geophysical Research Letters, Remote Sensing of Environment</i>	

#### **PROFESSIONAL AFFILIATIONS**

- American Geophysical Union (AGU)
- International Glaciological Society (IGS)
- American Association for the Advancement of Science (AAAS)

#### **FIELD EXPERIENCE**

August 2022	<i>Nuuk, Greenland</i> Deploy GNSS receiver for GNSS reflectometry tidal measurements
July 2022	<i>Juneau Icefield Research Program, Juneau, Alaska</i> Teaching Instructor on SAR technology and applications in glaciology
October 2014	<i>Columbia Glacier, Valdez, Alaska</i> Conducted terrestrial radar interferometric measurements of Columbia Glacier
August 2012	<i>Jakobshavn Isbræ, Ilulissat Greenland</i> Performed terrestrial radar interferometric measurements of glacier and ice mélange, time-lapse photogrammetry, tidal measurements

*Curriculum Vitae – Ryan K. Cassotto*

- August 2010/11*      *Kangiata Nunaata Sermia, Nuuk Greenland*  
Acquired terrestrial radar interferometric measurements of terminus and ice mélange, time-lapse photogrammetry, theodolite and GPS surveys
- April 2010*      *Jakobshavn Isbræ, Ilulissat, Greenland*  
Assisted in GPS survey of 2000-meter contour, time-lapse photogrammetry
- July-Aug 2009*      *Juneau Icefield Research Program, Juneau, Alaska*  
Excavated snow pits for surface mass balance estimates, Assisted GPS surveying
- July 2008*      *Castner Glacier, Delta, Alaska*  
Volunteer field assistant for glacial geomorphology project