Elizabeth C. Asher, PhD

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| Cooperative Institute for Research in Environmental Sciences (CIRES); 216 UCB, RM318, University of Colorado, Boulder, CO 80309; 512-587-2684  NOAA ESRL Global Monitoring Laboratory  325 Broadway, R/GM1, Boulder, CO 80305, USA | [elizabeth.asher@colorado.edu](mailto:elizabeth.asher@colorado.edu)  elizabethasher.net |

# Research Interests

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| * Characterizing the baseline and natural variability in earth systems * Combining in situ measurements, satellite retrievals and numerical models to advance understanding of chemistry and climate dynamics * Assessing climate and chemical impacts of volcanic eruptions and large wildfires, with implications for climate intervention activities |

# Professional Strengths

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| * Oral and written communication * Supervising scientific and engineering personnel * Proposal development/ grant management * Project management * Data cleaning/ processing and analysis * Instrument development * Python, MATLAB, LabVIEW; familiarity with R, C, FORTRAN, IGOR |

# Professional Experience

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| Research Scientist III, Research and Innovation Office, Cooperative Institute for Research in Environmental Sciences (CIRES); Leader of the Upper Atmospheric Water Vapor Group, NOAA Global Monitoring Laboratory | 2023 – Present |
| Research Scientist II, Research and Innovation Office, CIRES; NOAA Chemical Sciences Laboratory | 2019 – 2023 |
| Advanced Study Program Postdoctoral Research Fellow  National Center for Atmospheric Research | 2017 – 2019 |
| Postdoctoral Research Associate  University of California, Davis, CA | 2015 – 2017 |

# Education

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| Ph.D. | University of British Columbia, Vancouver, Canada  Oceanography | July 2015 |
| B.A. | Dartmouth College, Hanover, NH  Earth Sciences *Magna Cum Laude*  Philosophy Minor | June 2009 |

# Academic Awards and Distinctions

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| CIRES Silver Medal Award for Scientific/Engineering Achievement | 2024 |
| United States Patent No. US 011598697 B2  Air Sample Collection Apparatus and Methods for Use | 2023 |
| CIRES Outstanding Performance Award, $2,000 | 2023 |
| NASA Group Achievement Award — Atmospheric Tomography Mission | 2019 |
| Atmospheric Chemistry Observation and Modeling Special Recognition Award, NCAR, $1,000 | 2018 |
| Captain Thomas S. Byrne Prize for Outstanding Doctoral Thesis in Oceanography, UBC, $250 | 2015 |
| Captain Thomas S. Byrne Scholarship for Outstanding Research Paper in Oceanography, UBC, $500 | 2012  2011 |
| Doug Bangs Research Award for Overall Best Student in Earth Science Field Program,  Dartmouth college | 2008 |

# Project Management

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| **Principal Investigator;** Monitoring Stratospheric Water Vapor in the Absence of Aura MLS: Ensuring Continuity of Three Long-Term NOAA Frost Point Hygrometer Records of Upper Tropospheric and Stratospheric Water Vapor  **Program**: NASA Upper Atmospheric Composition Observations Program  Value: ($565,000) | 2025–2029 |
| **Co-Investigator;** Ice-Nucleating Particles in the Upper Troposphere: Advancing Cirrus Control and Experiment Science Strength  **Program**: Advanced Research Invention Agency (ARIA) Exploring Climate Cooling  Value ($1,200,000) | 2025–2027 |
| **Principal Investigator;** B2SAP — manage Baseline Balloon Stratopheric Aerosol Profiles network for regular measurements from latitudinally distributed sites through NOAA sites and international collaborators; lead Intensive Operation Periods (IOP)  **Program**: NOAA annual Earth Radiation Budget Intra-Agency Funding Transfer $330K-350K | 2023 – Present |
| **Principal Investigator:** POPS measurements onboard World View Stratollite — led modification of a small aerosol instrument for continuous measurements onboard a commercial long-endurance, navigable stratospheric platform and managed collaboration with World View Inc. for three successful deployments (5 – 25 days each in duration)  **Program**: NOAA annual Earth Radiation Budget Intra-Agency Funding Transfer $54K-68K | 2021–2023 |
| **Principal Investigator:** Whole Air Sampling Pilotless Platform (WASPP) — developed drone-based system for whole air sample collection and meteorological measurements and led deployments in Boulder, Colorado and Broomfield, Colorado to study boundary layer pollution  **Program**(s): NCAR Advanced Study Program; City of Broomfield ($2000) | 2018 – 2019 |

# Service and Leadership

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| Lead Author, SPARC Hunga Tonga-Hunga Ha’apai Report; Ch.2 Plume eruption and early dispersion phase | 2023 – 2025 |
| Steering Committee Sonde Working Group Representative, Network for the Detection of Atmospheric Composition Change (NDACC) | 2023 – Present |
| Supervisor, NOAA GML CIRES engineers Alex Fritz, Nicholas Mastromonaco, CIRES scientists Peter Effertz, Glen McConville  NOAA CSL CIRES scientists Alexandre Baron, Georgia Michailoudi, Collin Garganus, and Eleanor Waxman | 2023 – Present  2021 – 2023 |
| Organizer, First Friday Forum Chemical Sciences Division, NOAA Earth Systems Research Laboratory | 2019 – 2022 |
| Writing Mentor, Significant opportunities in Atmospheric Research and Science (SOARS) | 2017 |

# Peer-Reviewed Publications:

Asher, E., Baron, A., Yu, P., Todt, M., Smale, P., Liley, B., et al. (2024). Balloon Baseline Stratospheric Aerosol Profiles (B2 SAP)—Perturbations in the Southern Hemisphere, 2019–2022. Journal of Geophysical Research: Atmospheres, 129(22), e2024JD041581. <https://doi.org/10.1029/2024JD041581>

Dunn, R. J. H., Blannin, J., Gobron, N., Miller, J. B., Willett, K. M., Ades, M., et al. (2024). Global Climate. Bulletin of the American Meteorological Society, 105(8), S12–S155. <https://doi.org/10.1175/BAMS-D-24-0116.1>

Zhou, X., Dhomse, S. S., Feng, W., Mann, G., Heddell, S., Pumphrey, H., et al. (2024). Antarctic Vortex Dehydration in 2023 as a Substantial Removal Pathway for Hunga Tonga‐Hunga Ha’apai Water Vapor. Geophysical Research Letters, 51(8), e2023GL107630. <https://doi.org/10.1029/2023GL107630>

Li, C., Peng, Y., Asher, E., Baron, A. A., Todt, M., Thornberry, T. D., et al. (2024). Microphysical Simulation of the 2022 Hunga Volcano Eruption Using a Sectional Aerosol Model. Geophysical Research Letters, 51(11), e2024GL108522. <https://doi.org/10.1029/2024GL108522>

Lappin, F., De Boer, G., Klein, P., Hamilton, J., Spencer, M., Calmer, R., et al. (2024). Data collected using small uncrewed aircraft systems during the TRacking Aerosol Convection interactions ExpeRiment (TRACER). Earth System Science Data, 16(5), 2525–2541. <https://doi.org/10.5194/essd-16-2525-2024>

Asher, Elizabeth C., Todt, M. A., Rosenlof, K., Thornberry, T., Gao, Ru-Shan, Taha, Ghassan, et al. (2023). Unexpectedly rapid aerosol formation in the Hunga Tonga plume. Proceedings of the National Academy of Sciences, 120(44). <https://doi.org/10.1073/pnas.2219547120>

Yu, P., Portmann, R. W., Peng, Y., Liu, C., Zhu, Y., Asher, E., et al. (2023). Radiative Forcing From the 2014–2022 Volcanic and Wildfire Injections. Geophysical Research Letters, 50(13), e2023GL103791. <https://doi.org/10.1029/2023GL103791>

Evan, S., Brioude, J., Rosenlof, K. H., Gao, R.-S., Portmann, R. W., Zhu, Y., et al. (2023). Rapid ozone depletion after humidification of the stratosphere by the Hunga Tonga Eruption. Science, 382(6668), eadg2551. <https://doi.org/10.1126/science.adg2551>

Todt, M. A., Asher, E., Hall, E., Cullis, P., Jordan, A., Xiong, K., et al. (2023). Baseline Balloon Stratospheric Aerosol Profiles (B 2 SAP)—Systematic Measurements of Aerosol Number Density and Size. Journal of Geophysical Research: Atmospheres, 128(12), e2022JD038041. <https://doi.org/10.1029/2022JD038041>

Li, Y., Pedersen, C., Dykema, J., Vernier, J.-P., Vattioni, S., Pandit, A. K., et al. (2023). In situ measurements of perturbations to stratospheric aerosol and modeled ozone and radiative impacts following the 2021 La Soufrière eruption. Atmospheric Chemistry and Physics, 23(24), 15351–15364. <https://doi.org/10.5194/acp-23-15351-2023>

Asher, E., Thornberry, T., Fahey, D. W., McComiskey, A., Carslaw, K., Grunau, S., et al. (2022). A Novel Network‐Based Approach to Determining Measurement Representation Error for Model Evaluation of Aerosol Microphysical Properties. Journal of Geophysical Research: Atmospheres, 127(3). <https://doi.org/10.1029/2021JD035485>

Thompson, C. R., Wofsy, S. C., Prather, M. J., Newman, P. A., Hanisco, T. F., Ryerson, T. B., et al. (2022). The NASA Atmospheric Tomography (ATom) Mission: Imaging the Chemistry of the Global Atmosphere. Bulletin of the American Meteorological Society, 103(3), E761–E790. <https://doi.org/10.1175/BAMS-D-20-0315.1>

Asher, E., Hills, A. J., Hornbrook, R. S., Shertz, S., Gabbard, S., Stephens, B. B., et al. (2021). Unpiloted Aircraft System Instrument for the Rapid Collection of Whole Air Samples and Measurements for Environmental Monitoring and Air Quality Studies. Environmental Science & Technology, 55(9), 5657–5667. <https://doi.org/10.1021/acs.est.0c07213>

Asher, E., Hornbrook, R. S., Stephens, B. B., Kinnison, D., Morgan, E. J., Keeling, R. F., et al. (2019). Novel approaches to improve estimates of short-lived halocarbon emissions during summer from the Southern Ocean using airborne observations. Atmospheric Chemistry and Physics, 19(22), 14071–14090. <https://doi.org/10.5194/acp-19-14071-2019>

Asher, Elizabeth C., Christensen, J. N., Post, A., Perry, K., Cliff, S. S., Zhao, Y., et al. (2018). The Transport of Asian Dust and Combustion Aerosols and Associated Ozone to North America as Observed From a Mountaintop Monitoring Site in the California Coast Range. Journal of Geophysical Research: Atmospheres, 123(10), 5667–5680. <https://doi.org/10.1029/2017JD028075>

Asher, E., Dacey, J. W., Ianson, D., Peña, A., & Tortell, P. D. (2017). Concentrations and cycling of DMS, DMSP, and DMSO in coastal and offshore waters of the Subarctic Pacific during summer, 2010‐2011. Journal of Geophysical Research: Oceans, 122(4), 3269–3286. <https://doi.org/10.1002/2016JC012465>

Asher, E. C., Dacey, J. W. H., Stukel, M., Long, M. C., & Tortell, P. D. (2017). Processes driving seasonal variability in DMS, DMSP, and DMSO concentrations and turnover in coastal Antarctic waters. Limnology and Oceanography, 62(1), 104–124. <https://doi.org/10.1002/lno.10379>

Asher, Elizabeth C., Dacey, J. W. H., Jarniková, T., & Tortell, P. D. (2015). Measurement of DMS , DMSO , and DMSP in natural waters by automated sequential chemical analysis. Limnology and Oceanography: Methods, 13(9), 451–462. <https://doi.org/10.1002/lom3.10039>

Stukel, M. R., Asher, E., Couto, N., Schofield, O., Strebel, S., Tortell, P., & Ducklow, H. W. (2015). The imbalance of new and export production in the western Antarctic Peninsula, a potentially “leaky” ecosystem. Global Biogeochemical Cycles, 29(9), 1400–1420. <https://doi.org/10.1002/2015GB005211>

Tortell, P. D., Asher, E. C., Ducklow, H. W., Goldman, J. A. L., Dacey, J. W. H., Grzymski, J. J., et al. (2014). Metabolic balance of coastal Antarctic waters revealed by autonomous p CO 2 and ΔO 2 /Ar measurements. Geophysical Research Letters, 41(19), 6803–6810. <https://doi.org/10.1002/2014GL061266>

Asher, Elizabeth C., Merzouk, A., & Tortell, P. D. (2011). Fine-scale spatial and temporal variability of surface water dimethylsufide (DMS) concentrations and sea–air fluxes in the NE Subarctic Pacific. Marine Chemistry, 126(1–4), 63–75. <https://doi.org/10.1016/j.marchem.2011.03.009>

Asher, Elizabeth C., Dacey, J. W. H., Mills, M. M., Arrigo, K. R., & Tortell, P. D. (2011). High concentrations and turnover rates of DMS, DMSP and DMSO in Antarctic sea ice: DMS DYNAMICS IN ANTARCTIC SEA ICE. Geophysical Research Letters, 38(23), n/a-n/a. <https://doi.org/10.1029/2011GL049712>

# Select First Author Conference Presentations

European Geophysical Union (EGU) — April 28, 2025, “Transport of Hunga aerosol to the NH and the 2023 aerosol induced bump in stratospheric water vapor”, [Accepted for Platform].

American Geophysical Union (AGU) — Dec 14, 2023, “Springtime polar stratospheric measurements of water vapor, ozone, and aerosol in 2022 and 2023 following the Hunga Tonga Hunga Ha’apai eruption”, [Platform].

American Meterological Society (AMS) — Jan 9, 2023, “The unprecedented rapid aerosol formation from the Hunga Tonga-Hunga Ha’apai eruption”, [Platform].

American Geophysical Union (AGU) — Dec 15, 2022, “The unprecedented rapid aerosol formation from the Hunga Tonga-Hunga Ha’apai eruption”, [Invited Platform].

American Geophysical Union (AGU) — Dec 15, 2021, “Pyrogenic pertubations to the stratospheric aerosol layer and subsequent climate impacts”, [eLightning Platform].

American Geophysical Union (AGU) — Dec 16, 2020, “A spatially dense aerosol instrument network in the southern great plains: POPSnet-SGP”, [Platform].

American Geophysical Union— Dec 13, 2018, Washington, D.C, “Quality Assessment and airborne measurements in the Colorado Front Range using the Unmanned Whole Air Sampler” [Platform].

Biogenic Hydrocarbons and the Atmosphere: Connecting Volatiles and Climate System from Leaf to Planet, Gordon Research Conference— June 10-15, 2018, Les Diablerets, Switzerland, “Constraining Southern Ocean emissions of halogenated VOCs,” [Invited Young Scientist Platform].

6th DMSP Symposium— May 26-30, 2014, Barcelona, Spain, “The effect of sea-ice extent on DMS oxidation at high latitudes in the Southern Hemisphere: DMS chemistry, climate implications and MSA records,” [Platform].

# Professional Affiliation

Member, American Geophysical Union (AGU)

Member, American Meteorological Society (AMS)