

Megan M. Bela, Ph.D.

<https://www.esrl.noaa.gov/csl/staff/megan.bela/>

Education

PhD, *University of Colorado Boulder*, Atmospheric and Oceanic Sciences, Advisor: Owen B. Toon, Title: Cloud and Biomass Burning Effects on the Abundance of Ozone and its Precursors over the Amazon Basin and Central and Southeast U.S.

MS, *Stanford University*, Environmental Fluid Mechanics and Hydrology

BS, *Stanford University*, Environmental Engineering; Honors in Environmental Science, Technology and Policy; Spanish/Portuguese Minor

Selected Professional Experience

- 2020–present **University of Colorado Cooperative Institute for Research in the Environmental Sciences (CIRES) / NOAA Chemical Sciences Laboratory (CSL)**, *Research Scientist II*
- 2017–2020 **CIRES/CSL**, *Research Scientist I*
- 2016–2017 **National Research Council (NRC) Research Associateship Programs (RAP), NOAA Earth System Research Lab Global Systems Division**, *Postdoctoral Research Associate*
- 2011–2016 **Laboratory for Atmospheric and Space Physics, University of Colorado Boulder**, *Graduate Research Assistant*
- 2011–2016 **National Center for Atmospheric Research (NCAR), USA**, *Graduate Visitor*
- 2009–2011 **National Institute for Space Research, Brazil**, *Researcher*
- 2008–2009 **Institute of Physics, University of São Paulo**, *Fulbright Scholar*
- 2007–2008 **Delta Modeling Associates, Inc.**, *Research Assistant*
- 2006–2007 **Environmental Fluid Mechanics Laboratory, Stanford University**, *Graduate Research Assistant*
- 2004–2005 **NASA-Ames Research Center**, *Research Assistant*
- 2002–2004 **Environmental Fluid Mechanics Laboratory, Stanford University**, *Research Assistant*
- 2001–2002 **US Geological Survey Oregon Water Science Center**, *Hydrologic Assistant*

Project Management

- 2020–present **Principal Investigator**, *Wildfire (WF)-2 - Advance Finite-Volume Cubed-Sphere Dynamical Core - Convective Allowing Model (FV3-CAM) to improve wildfire detection and prediction*, NOAA Fiscal Year 2019 Disaster Supplemental

Fellowships and Awards

CIRES Group Administrator Award
NRC RAP Postdoctoral Fellowship
Summer Graduate School Fellowship, University of Colorado Boulder
Fulbright Scholarship (Brazil)
EPA Science to Achieve Results (STAR) Graduate Fellowship
American Meteorological Society Industry/Government Graduate Fellowship

Areas of Expertise

Weather and Air Quality Forecasting, Atmospheric Chemistry, Atmospheric Science, Atmospheric Physics, Atmospheric Modeling, Hydrology, Hydrologic Modeling, Surface Water Hydrology

Technical Skills

High Performance Computing (HPC), Shell scripting, Cron; Programming Languages: Python, C++, LaTeX, IDL, IGOR Pro, R; Software: ArcGIS, Jabref, Microsoft Office; Models: WRF, WRF-Chem, UnTRIM, ARPS; Operating systems: Linux, macOS, Windows

Foundational Skills

Model Simulations and Analysis, Data Analysis, Communication (Public Speaking, Media Interviews), Writing (Scientific, Technical, Report, Proposal), Translation (Portuguese)

Language Skills

English: Native
Portuguese: Full Professional Proficiency
Spanish: Professional Working Proficiency
French: Elementary Proficiency

Supervising, Advising, and Mentoring

- 2021-2022 **Co-mentor, Druhin Bhowal and Arihant Singh, "Using AI To Emulate Wildfire Growth," Nikola Tesla STEM High School students and 2022 Regeneron International Science and Engineering Fair participants**
- 2019-2021 **PhD co-advisor, Dr. Janaína Nascimento, Program for Climate and the Environment, Institute of Physics, University of São Paulo and National Institute of Amazonian Research, Brazil**
- 2018-2019 **CIRES Supervisor, Janaína Nascimento**

Service

US Group on Earth Observations (GEO) Satellite Needs Working Group (active)

Reviewer, J. Geophys. Res. Atmos., Atmos. Chem. Phys., Environ. Sci. Pollut. R.

NCAR Weather Research and Forecasting with Chemistry (WRF-Chem) model Tutorial, developer/presenter

WRF-Chem and fire emissions pre-processor technical support

Workshop Participation

2021 **NSF Wildfire in the Biosphere Innovation Lab**

2020 **NCAR System for Integrated Modeling of the Atmosphere (SIMA) Community Workshop**

Invited Talks

2017 **Meteorology and Climate - Modeling for Air Quality Conference (MAC-MAQ)**

2017 **Pacific Northwest National Laboratory Seminar**

Conference Presentations

International Association of Wildland Fire (IAWF) Fire and Climate Conference in Pasadena (oral); American Geophysical Union Fall Meeting 2020, 2019, 2018, 2016 (oral), 2021, 2015, 2014, 2013 (poster); Meteorology and Climate - Modeling for Air Quality (MAC-MAQ) Conference 2021 (oral), 2019 (poster); 3rd International Smoke Symposium (ISS3) 2020 (oral); American Association for Aerosol Research (AAAR) 2019 (poster), Gordon Research Conference in Atmospheric Chemistry 2019, 2015 (poster); WRF Workshop 2019, 2018, 2017 (oral), 2019 (poster); American Meteorological Society Annual Meeting 2021, 2019, 2014 (oral); International Global Atmospheric Chemistry Conference 2018, 2016, 2014 (poster); European Geophysical Union General Assembly 2013 (poster)

Publications

[Andreae et al., 2012] Andreae, M. O., Artaxo, P., Beck, V., Bela, M., Freitas, S., Gerbig, C., Longo, K., Munger, J. W., Wiedemann, K. T., and Wofsy, S. C. (2012). Carbon monoxide and related trace gases and aerosols over the Amazon Basin during the wet and dry seasons. *Atmospheric Chemistry and Physics*, 12(13):6041–6065.

[Archer-Nicholls et al., 2015] Archer-Nicholls, S., Lowe, D., Darbyshire, E., Morgan, W. T., Bela, M. M., Pereira, G., Trembath, J., Kaiser, J. W., Longo, K. M., Freitas, S. R., Coe, H., and McFiggans, G. (2015). Characterising Brazilian biomass burning emissions using WRF-Chem with MOSAIC sectional aerosol. *Geoscientific Model Development*, 8(3):549–577.

[Beck et al., 2013] Beck, V., Gerbig, C., Koch, T., Bela, M. M., Longo, K. M., Freitas, S. R.,

- Kaplan, J. O., Prigent, C., Bergamaschi, P., and Heimann, M. (2013). WRF-Chem simulations in the Amazon region during wet and dry season transitions: evaluation of methane models and wetland inundation maps. *Atmospheric Chemistry and Physics*, 13(16):7961–7982.
- [Bela et al., 2016] Bela, M. M., Barth, M. C., Toon, O. B., Fried, A., Homeyer, C. R., Morrison, H., Cummings, K. A., Li, Y., Pickering, K. E., Allen, D. J., Yang, Q., Wennberg, P. O., Crouse, J. D., St. Clair, J. M., Teng, A. P., O’Sullivan, D., Huey, L. G., Chen, D., Liu, X., Blake, D. R., Blake, N. J., Apel, E. C., Hornbrook, R. S., Flocke, F., Campos, T., and Diskin, G. (2016). Wet scavenging of soluble gases in DC3 deep convective storms using WRF-Chem simulations and aircraft observations. *Journal of Geophysical Research: Atmospheres*, 121(8):4233–4257.
- [Bela et al., 2018] Bela, M. M., Barth, M. C., Toon, O. B., Fried, A., Ziegler, C., Cummings, K. A., Li, Y., Pickering, K. E., Homeyer, C. R., Morrison, H., Yang, Q., Mecikalski, R. M., Carey, L., Biggerstaff, M. I., Betten, D. P., and Alford, A. A. (2018). Effects of Scavenging, Entrainment, and Aqueous Chemistry on Peroxides and Formaldehyde in Deep Convective Outflow Over the Central and Southeast United States. *Journal of Geophysical Research: Atmospheres*, 123(14):7594–7614.
- [Bela et al., 2022] Bela, M. M., Kille, N., McKeen, S. A., Romero-Alvarez, J., Ahmadov, R., James, E., Pereira, G., Schmidt, C., Pierce, R. B., O’Neill, S. M., Zhang, X., Kondragunta, S., Wiedinmyer, C., and Volkamer, R. (2022). Quantifying Carbon Monoxide Emissions on the Scale of Large Wildfires. *Geophysical Research Letters*, 49(3):e2021GL095831.
- [Bela et al., 2015] Bela, M. M., Longo, K. M., Freitas, S. R., Moreira, D. S., Beck, V., Wofsy, S. C., Gerbig, C., Wiedemann, K., Andreae, M. O., and Artaxo, P. (2015). Ozone production and transport over the Amazon Basin during the dry-to-wet and wet-to-dry transition seasons. *Atmospheric Chemistry and Physics*, 15(2):757–782.
- [Cuchiara et al., 2020] Cuchiara, G. C., Fried, A., Barth, M. C., Bela, M., Homeyer, C. R., Gaubert, B., Walega, J., Weibring, P., Richter, D., Wennberg, P., Crouse, J., Kim, M., Diskin, G., Hanisco, T. F., Wolfe, G. M., Beyersdorf, A., Peischl, J., Pollack, I. B., St. Clair, J. M., Woods, S., Tanelli, S., Bui, T. V., Dean-Day, J., Huey, L. G., and Heath, N. (2020). Vertical Transport, Entrainment, and Scavenging Processes Affecting Trace Gases in a Modeled and Observed SEAC4RS Case Study. *Journal of Geophysical Research: Atmospheres*, 125(11):e2019JD031957.
- [Cuchiara et al., 2022] Cuchiara, G. C., Fried, A., Barth, M. C., Bela, M. M., Homeyer, C. R., Walega, J., Weibring, P., Richter, D., Woods, S., Beyersdorf, A., Bui, T. V., and Dean-Day, J. (2022). Effect of Marine and Land Convection on Wet Scavenging of Ozone Precursors Observed during a SEAC4RS case study. *J. Geophys. Research Atmospheres*, under review.
- [Cummings et al., 2022] Cummings, K. A., Pickering, K. E., Barth, M. C., Bela, M. M., Li, Y., Allen, D., Bruning, E., MacGorman, D. R., Ziegler, C., Biggerstaff, M. I., Fuchs, B., Davis, T., Carey, L., Mecikalski, R., and Finney, D. L. (2022). Evaluation of lightning flash rate parameterizations in a cloud-resolved WRF simulation of the

29-30 May 2012 Oklahoma severe supercell system observed during DC3. *To be submitted to Journal of Geophysical Research: Atmospheres.*

- [Gkatzelis et al., 2022] Gkatzelis, G. I., Coggon, M. M., Stockwell, C. E., Allen, H., Apel, E., Bela, M., Blake, D. R., Bourgeois, I., Brown, S. S., Campuzano-Jost, P., Clair, J. M. S., Crawford, J. H., Crouse, J. D., Day, D. A., DiGangi, J. P., Diskin, G. S., Fried, A., Gilman, J., Guo, H., Hair, J. W., Halliday, H. A., Hanisco, T. F., Hannun, R., Hills, A., Hornbrook, R., Huey, G. L., Jimenez, J. L., Katich, J. M., Lamplugh, A., Lee, Y. R., Liao, J., Lindaas, J., McKeen, S. A., Mikoviny, T., Nault, B. A., Neuman, A. J., Nowak, J. B., Pagonis, D., Peischl, J., Perring, A. E., Piel, F., Rickly, P. S., Robinson, M. A., Rollins, A. W., Ryerson, T. B., Schueneman, M. K., Schwantes, R. H., Schwarz, J. P., Sekimoto, K., Selimovic, V., Shingler, T., Tanner, D. J., Tomsche, L., Vasquez, K. T., Veres, P., Washenfelder, R., Weibring, P., Wennberg, P. O., Wisthaler, A., Wolfe, G. M., Womack, C. C., Xu, L., Yokelson, R. J., and Warneke, C. (2022). Parameterization of US wildfire and prescribed fire emission ratios/factors based on FIREX-AQ aircraft measurements. *To be submitted to Atmos. Chem. Phys.*
- [Li et al., 2021] Li, M., McDonald, B. C., McKeen, S. A., Eskes, H., Levelt, P., Francoeur, C., Harkins, C., He, J., Barth, M., Henze, D. K., Bela, M. M., Trainer, M., de Gouw, J. A., and Frost, G. J. (2021). Assessment of Updated Fuel-Based Emissions Inventories Over the Contiguous United States Using TROPOMI NO₂ Retrievals. *Journal of Geophysical Research: Atmospheres*, 126(24):e2021JD035484.
- [Li et al., 2019] Li, Y., Pickering, K. E., Barth, M. C., Bela, M. M., Cummings, K. A., and Allen, D. J. (2019). Wet Scavenging in WRF-Chem Simulations of Parameterized Convection for a Severe Storm During the DC3 Field Campaign. *Journal of Geophysical Research: Atmospheres*, 124(13):7413–7428.
- [Longo et al., 2013] Longo, K. M., Freitas, S. R., Pirre, M., Marécal, V., Rodrigues, L. F., Panetta, J., Alonso, M. F., Rosário, N. E., Moreira, D. S., Gácita, M. S., Arteta, J., Fonseca, R., Stockler, R., Katsurayama, D. M., Fazenda, A., and Bela, M. (2013). The Chemistry CATT-BRAMS model (CCATT-BRAMS 4.5): a regional atmospheric model system for integrated air quality and weather forecasting and research. *Geoscientific Model Development*, 6(5):1389–1405.
- [Nascimento et al., 2022] Nascimento, J. P., Barbosa, H. M. J., Banducci, A. L., Rizzo, L. V., Vara-Vela, A. L., Meller, B. B., Gomes, H., Cezar, A., Franco, M. A., Ponczek, M., Wolff, S., Bela, M. M., and Artaxo, P. (2022). Major Regional-Scale Production of O₃ and Secondary Organic Aerosol in Remote Amazon Regions from the Dynamics and Photochemistry of Urban and Forest Emissions. *Environmental Science & Technology*, 56(14):9924–9935.
- [Nascimento et al., 2021] Nascimento, J. P., Bela, M. M., Meller, B. B., Banducci, A. L., Rizzo, L. V., Vara-Vela, A. L., Barbosa, H. M. J., Gomes, H., Rafee, S. A. A., Franco, M. A., Carbone, S., Cirino, G. G., Souza, R. A. F., McKeen, S. A., and Artaxo, P. (2021). Aerosols from anthropogenic and biogenic sources and their interactions – modeling aerosol formation, optical properties, and impacts over the central Amazon basin. *Atmospheric Chemistry and Physics*, 21(9):6755–6779.

- [Shuman et al., 2022] Shuman, J. K., Balch, J. K., Barnes, R. T., Higuera, P. E., Roos, C. I., Schwilk, D. W., Stavros, E. N., Banerjee, T., Bela, M. M., Bendix, J., Bertolino, S., Bililign, S., Bladon, K. D., Brando, P., Breidenthal, R. E., Buma, B., Calhoun, D., Carvalho, L. M. V., Cattau, M. E., Cawley, K. M., Chandra, S., Chipman, M. L., Cobian-Iñiguez, J., Conlisk, E., Coop, J. D., Cullen, A., Davis, K. T., Dayalu, A., De Sales, F., Dolman, M., Ellsworth, L. M., Franklin, S., Guiterman, C. H., Hamilton, M., Hanan, E. J., Hansen, W. D., Hantson, S., Harvey, B. J., Holz, A., Huang, T., Hurteau, M. D., Ilangakoon, N. T., Jennings, M., Jones, C., Klimaszewski-Patterson, A., Kobziar, L. N., Kominoski, J., Kosovic, B., Krawchuk, M. A., Laris, P., Leonard, J., Loria-Salazar, S. M., Lucash, M., Mahmoud, H., Margolis, E., Maxwell, T., McCarty, J. L., McWethy, D. B., Meyer, R. S., Miesel, J. R., Moser, W. K., Nagy, R. C., Niyogi, D., Palmer, H. M., Pellegrini, A., Poulter, B., Robertson, K., Rocha, A. V., Sadegh, M., Santos, F., Scordo, F., Sexton, J. O., Sharma, A. S., Smith, A. M. S., Soja, A. J., Still, C., Swetnam, T., Syphard, A. D., Tingley, M. W., Tohidi, A., Trugman, A. T., Turetsky, M., Varner, J. M., Wang, Y., Whitman, T., Yelenik, S., and Zhang, X. (2022). Reimagine fire science for the anthropocene. *PNAS Nexus*, 1(3):pgac115.
- [Stockwell et al., 2022] Stockwell, C. E., Bela, M. M., Coggon, M. M., Gkatzelis, G. I., Wiggins, E., Gargulinski, E. M., Shingler, T., Fenn, M., Griffin, D., Holmes, C. D., Ye, X., Saide, P. E., Bourgeois, I., Peischl, J., Womack, C. C., Washenfelder, R. A., Veres, P. R., Neuman, J. A., Gilman, J. B., Lamplugh, A., Schwantes, R. H., McKeen, S. A., Wisthaler, A., Piel, F., Guo, H., Campuzano-Jost, P., Jimenez, J. L., Fried, A., Hanisco, T. F., Huey, L. G., Perring, A., Katich, J. M., Diskin, G. S., Nowak, J. B., Bui, T. P., Halliday, H. S., DiGangi, J. P., Pereira, G., James, E. P., Ahmadov, R., McLinden, C. A., Soja, A. J., Moore, R. H., Hair, J. W., and Warneke, C. (2022). Airborne Emission Rate Measurements Validate Remote Sensing Observations and Emission Inventories of Western U.S. Wildfires. *Environmental Science & Technology*.
- [Wang et al., 2021] Wang, S., Coggon, M. M., Gkatzelis, G. I., Warneke, C., Bourgeois, I., Ryerson, T., Peischl, J., Veres, P. R., Neuman, J. A., Hair, J., Shingler, T., Fenn, M., Diskin, G., Huey, L. G., Lee, Y. R., Apel, E. C., Hornbrook, R. S., Hills, A. J., Hall, S. R., Ullmann, K., Bela, M. M., Trainer, M. K., Kumar, R., Orlando, J. J., Flocke, F. M., and Emmons, L. K. (2021). Chemical Tomography in a Fresh Wildland Fire Plume: A Large Eddy Simulation (LES) Study. *Journal of Geophysical Research: Atmospheres*, 126(18):e2021JD035203.