

Brendan Byrne

EDUCATION

- Ph.D., University of Toronto** 2018
Department of Physics, Advisors: Kimberly Strong and Dylan B. A. Jones
– Thesis: “Monitoring the carbon cycle: Evaluation of terrestrial biosphere models and anthropogenic greenhouse gas emissions with atmospheric observations”
- M.Sc., University of Victoria** 2014
School of Earth and Ocean Sciences, Advisor: Colin Goldblatt
– Thesis: “Radiative Forcings for a wide variety of Greenhouse Gases”
- B.Sc., University of Victoria** 2012
Combined Physics and Ocean Sciences, *with distinction*

PROFESSIONAL EXPERIENCE

- Scientist** 2022 – Present
Jet Propulsion Laboratory, California Institute of Technology
- JPL Postdoctoral Fellow** 2020 – 2022
Jet Propulsion Laboratory, California Institute of Technology
- NASA Postdoctoral Program Fellow** 2018 – 2020
Affiliate at Jet Propulsion Laboratory, California Institute of Technology

PEER-REVIEWED PUBLICATIONS (*CORRESPONDING AUTHOR)

- Byrne, B.***, Baker, D. F., Basu, S., Bertolacci, M., Bowman, K. W., Carroll, D., Chatterjee, A., Chevallier, F., Ciais, P., Cressie, N., Crisp, D., Crowell, S., Deng, F., Deng, Z., Deutscher, N. M., Dubey, M. K., Feng, S., García, O. E., Griffith, D. W. T., Herkommer, B., Hu, L., Jacobson, A. R., Janardanan, R., Jeong, S., Johnson, M. S., Jones, D. B. A., Kivi, R., Liu, J., Liu, Z., Maksyutov, S., Miller, J. B., Miller, S. M., Morino, I., Notholt, J., Oda, T., O’Dell, C. W., Oh, Y.-S., Ohyama, H., Patra, P. K., Peiro, H., Petri, C., Philip, S., Pollard, D. F., Poulter, B., Remaud, M., Schuh, A., Sha, M. K., Shiomi, K., Strong, K., Sweeney, C., Té, Y., Tian, H., Velazco, V. A., Vrekoussis, M., Warneke, T., Worden, J. R., Wunch, D., Yao, Y., Yun, J., Zammit-Mangion, A., and Zeng, N.: National CO₂ budgets (2015–2020) inferred from atmospheric CO₂ observations in support of the global stocktake, *Earth Syst. Sci. Data*, 15, 963–1004, <https://doi.org/10.5194/essd-15-963-2023>, 2023.
- Watts, J.D.*, Farina, M., Kimball, J.S., Schiferl, L.D., Liu, Z., Arndt, K.A., Zona, D., Ballantyne, A., Euskirchen, E.S., Parmentier F.-J. W., Helbig, M., Sonnentag, O., Tagesson, T., Rinne, J., Ikawa, H., Ueyama, M., Kobayashi, H., Sachs, T., Nadeau, D.F., Kochendorfer, J., Jackowicz-Korczynski, M., Virkkala, A., Aurela, M., Commane, R., **Byrne, B.**, Birch, L., Johnson, M. S., Madani, N., Rogers, B., Du, J., Endsley, A., Savage, K., Poulter, B., Zhang, Z., Bruhwiler, L. M., Miller, C. E., Goetz, S., Oechel, W. C. (2023). Carbon uptake in Eurasian boreal forests dominates the high-latitude net ecosystem carbon budget, *Global Change Biology*, <https://doi.org/10.1111/gcb.16553>
- Byrne, B.***, Liu, J., Yi, Y., Chatterjee, A., Basu, S., Cheng, R., Doughty, R., Chevallier, F., Bowman, K. W., Parazoo, N. C., Crisp, D., Li, X., Xiao, J., Sitch, S., Guenet, B., Deng, F., Johnson, M. S., Philip, S., McGuire, P. C., and Miller, C. E. (2022). Multi-year observations reveal a larger than expected autumn respiration signal across northeast Eurasia, *Biogeosciences*, 19, 4779–4799, <https://doi.org/10.5194/bg-19-4779-2022>

4. He, L.* , **B. Byrne**, Y. Yin, J. Liu, C. Frankenberg* (2022). Remote-sensing derived trends in gross primary production explain increases in the CO₂ seasonal cycle amplitude. *Global Biogeochem. Cy.*, 36, e2021GB007220. <https://doi.org/10.1029/2021GB007220>
5. Schuh, A.E.* , **Byrne, B.**, Jacobson, A.R. et al. On the role of atmospheric model transport uncertainty in estimating the Chinese land carbon sink. *Nature* 603, E13–E14 (2022). <https://doi.org/10.1038/s41586-021-04258-9>
6. Worden, J.* , D. Cusworth, Z. Qu, Y. Yin, Y. Zhang, A. A. Bloom, S. Ma, **B. Byrne**, T. Scarpelli, J. D. Maasackers, D. Crisp, R. Duren, and D. J. Jacob (2021) The 2019 Methane Budget And Uncertainties At 1 Degree Resolution And Each Country Through Bayesian Integration Of GOSAT Total Column Methane Data And A Priori Inventory Estimates, *Atmos. Chem. Phys.*, 22, 6811–6841, <https://doi.org/10.5194/acp-22-6811-2022>, 2022
7. He, W.* , F. Jiang*, M. Wu, W. Ju, M. Scholze, Z. Chen, **B. Byrne** et al. (2022). China’s Terrestrial Carbon Sink over 2010–2015 Constrained by Satellite Observations of Atmospheric CO₂ and Land Surface Variables. *J. Geophys. Res. Biogeo.* <https://doi.org/10.1029/2021JG006644>
8. **Byrne, B.***, Liu, J., Lee, M., Yin, Y., Bowman, K. W., Miyazaki, K., Norton, A. J., Joiner, J., Pollard, D. F., Griffith, D. W. T., Velasco, V. A., Deutscher, N. M., Jones, N. B., and Paton-Walsh (2021). The carbon cycle of southeast Australia during 2019–2020: Drought, fires, and subsequent recovery. *AGU Advances*, 2, e2021AV000469. <https://doi.org/10.1029/2021AV000469>
 - Media coverage: E&E News, Scientific American, The Courier, and 32 other news outlets.
9. Frankenberg, C.* , Y. Yin, **B. Byrne**, L. He and P. Gentine (2021) Comment on “Recent global decline of CO₂ fertilization effects on vegetation photosynthesis”, *Science Technical Comment* <https://doi.org/10.1126/science.abg2947>
10. You, Y.* , **B. Byrne**, O. Colebatch, R. L. Mittermeier, F. Vogel, and K. Strong (2021) Quantifying the Impact of the COVID-19 Pandemic Restrictions on CO, CO₂, and CH₄ in Downtown Toronto Using Open-Path Fourier Transform Spectroscopy. *Atmosphere*. 2021; 12(7):848. <https://doi.org/10.3390/atmos12070848>
11. Zeng, Z. C.* , **B. Byrne***, F. Y. Gong, Z. He, and L. Lei (2021) Correlation between paddy rice growth and satellite-observed methane column abundance does not imply causation. *Matters Arising* 12, 1163. <https://doi.org/10.1038/s41467-021-21434-7>
12. **Byrne, B.***, J. Liu, A. A. Bloom, K. W. Bowman, Z. Butterfield, J. Joiner, T. F. Keenan, G. Keppel-Aleks, N. C. Parazoo, and Y. Yin (2020) Contrasting regional carbon cycle responses to seasonal climate anomalies across the east-west divide of temperate North America, *Global Biogeochem. Cy.*, 34, e2020GB006598. <https://doi.org/10.1029/2020GB006598>
13. **Byrne, B.***, J. Liu, M. Lee, I. Baker, K. W. Bowman, N. M. Deutscher, D. G. Feist, D. W. T. Griffith, L. T. Iraci, M. Kiel, J. S. Kimball, C. E. Miller, I. Morino, N. C. Parazoo, C. Petri, C. M. Roehl, M. K. Sha, K. Strong, V. A. Velasco, P. O. Wennberg, and D. Wunch (2020). Improved constraints on northern extratropical CO₂ fluxes obtained by combining surface-based and space-based atmospheric CO₂ measurements. *J. Geophys. Res. Atmos.*, 125, <https://doi.org/10.1029/2019JD032029>
14. Yin, Y.* , **B. Byrne***, J. Liu, P. O. Wennberg, K. J. Davis, T. Magney, P. Köhler, L. He, R. Jeyaram, V. Humphrey, T. Gerken, S. Feng, J. P. Digangi, and C. Frankenberg (2020). Cropland carbon uptake delayed and reduced by 2019 Midwest floods. *AGU Advances*, 1, e2019AV000140. <https://doi.org/10.1029/2019AV000140>
 - Media coverage: Phys.org, AZO clean tech, Environmental News Network, and 5 other news outlets.
15. **Byrne, B.***, K. Strong, O. Colebatch, Y. You, D. Wunch, S. Ars, D. B. A. Jones, P. Fogal, R. L. Mittermeier, D. Worthy and D. W. T. Griffith (2020). Monitoring Urban Greenhouse Gases Using Open-Path Fourier Transform Spectroscopy, *Atmosphere-Ocean*, 58(1), 25–45, <https://doi.org/10.1080/07055900.2019.1698407>
16. **Byrne, B.***, D. B. A. Jones, K. Strong, S. M. Polavarapu, A. B. Harper, D. F. Baker, and S. Maksyutov, (2019). On what scales can GOSAT flux inversions constrain anomalies in terrestrial ecosystems?, *Atmos. Chem. Phys.*, 19, 13017–13035, <https://doi.org/10.5194/acp-19-13017-2019>.

17. **Byrne, B.***, D. Wunch, D. B. A. Jones, K. Strong, F. Deng, I. Baker, P. Köhler, C. Frankenberg, J. Joiner, V. K. Arora, B. Badawy, A. Harper, T. Warneke, C. Petri, R. Kivi, and C. M. Roehl, (2018) Evaluating GPP and respiration estimates over northern midlatitude ecosystems using solar induced fluorescence and atmospheric CO₂ measurements, *J. Geophys. Res. Biogeo.*, 123, <https://doi.org/10.1029/2018JG004472>
18. Polavarapu, S. M.*, F. Deng, **B. Byrne**, D. B.A Jones, D. B. A., and M. Neish, (2018) A comparison of atmospheric CO₂ flux signals obtained from GEOS-Chem flux inversions constrained by in situ or GOSAT observations, *Atmos. Chem. Phys.*, 8, 12011–12044, <https://doi.org/10.5194/acp-2017-1235>.
19. **Byrne, B.***, D. B. A. Jones, K. Strong, Z.-C. Zeng, F. Deng, and J. Liu (2017), Sensitivity of CO₂ surface flux constraints to observational coverage, *J. Geophys. Res. Atmos.*, 122, 6672–6694, <https://doi:10.1002/2016JD026164>
20. **Byrne, B.*** and Goldblatt, C. (2015), Diminished greenhouse warming from Archean methane due to solar absorption lines, *Clim. Past*, 11, 559-570, <https://doi:10.5194/cp-11-559-2015>.
21. **Byrne, B.*** and Goldblatt, C. (2014), Radiative forcings for 28 potential Archean greenhouse gases, *Clim. Past*, 10, 1779-1801, <https://doi:10.5194/cp-10-1779-2014>.
22. **Byrne, B.***, and Goldblatt, C. (2014), Radiative forcing at high concentrations of well-mixed greenhouse gases, *Geophys. Res. Lett.*, 41, <https://doi:10.1002/2013GL058456>.

NON-PEER REVIEWED PUBLICATIONS

1. Kaushik, A., J. Graham, K. Dorheim, R. Kramer, J. Wang, and **B. Byrne**, (2020), The future of the carbon cycle in a changing climate, *Eos*, 101, <https://doi.org/10.1029/2020EO140276>. Published on 20 February 2020.

FUNDING

1. NASA OCO Science Team, title: Diagnosing and attributing Arctic-Boreal carbon fluxes using in situ and satellite CO₂ monitoring network. co-I, 2021-2024.
2. NASA OCO Science Team, title: Revealing the mystery of African carbon cycle, co-I: 2021-2024.

SELECTED CONFERENCE PRESENTATIONS AND INVITED SEMINARS

- 2022 4th Carbon from Space Workshop (invited)
- 2021 American Geophysical Union Fall Meeting (invited)
- 2021 Orbiting Carbon Observatory Science Team Meeting
- 2021 International Workshop on Greenhouse Gas Measurements from Space
- 2021 GML Virtual Global Monitoring Annual Conference
- 2021 NOAA CCGG Modeling and Analysis meeting (invited seminar)
- 2020 American Geophysical Union Fall Meeting (invited)
- 2020 GML Virtual Global Monitoring Annual Conference (invited)
- 2020 European Geophysical Union General Assembly
- 2019 American Geophysical Union Fall Meeting
- 2019 Chapman Conference on Understanding Carbon Climate Feedbacks
- 2019 International Workshop on Greenhouse Gas Measurements from Space
- 2019 Arctic-Boreal Vulnerability Experiment Science Team Meeting
- 2019 Yuk Yung Lunch Seminar Series, California Institute of Technology (invited seminar)
- 2018 Orbiting Carbon Observatory Science Team Meeting
- 2018 International Workshop on Greenhouse Gas Measurements from Space
- 2018 Carbon Club Seminar Series, Jet Propulsion Laboratory (invited seminar)
- 2018 Canadian Meteorological and Oceanographic Society Congress

- 2017 American Geophysical Union Fall Meeting
- 2017 Connaught Summer Institute in Arctic Science (Outstanding Poster Award)
- 2016 American Geophysical Union Fall Meeting
- 2016 NOAA Global Monitoring Annual Conference
- 2015 Annual Joint NDACC-IRWG & TCCON Meeting
- 2015 International GEOS-Chem Meeting
- 2013 American Geophysical Union Fall Meeting

TEACHING

Teaching Assistant – Laboratory component

University of Toronto

PHY 131 - Introduction to Physics I (Fall 2014, Fall 2017)

PHY 132 - Introduction to Physics II (Winter 2015, Winter 2017)

University of Victoria

EOS 110 - Ocean and Atmosphere (Fall 2013)

EOS 314 - Descriptive Physical Oceanography (Summer 2012)

Teaching Assistant – Grading

University of Toronto

PHY 454 - Continuum Mechanics (Winter 2016, Winter 2017, Winter 2018)

ENV 237/238 - Physics of the Changing Environment (Winter 2018)

PHY 492/1498 - Advanced Atmospheric Physics (Fall 2016)

University of Victoria

EOS 360 - Atmospheric Sciences (Fall 2013)

AWARDS

- NASA Postdoctoral Program Fellowship 2018–2020

SERVICE

- Peer reviewer for *Atmospheric Chemistry and Physics*, *Biogeosciences*, *Earth System Science Data*, *Global Biogeochemical Cycles*, *Journal of Geophysical Research: Atmospheres*, *Journal of Geophysical Research: Biogeosciences*, *Nature*, *Philosophical Transactions B*, *PLOS One* and *Remote Sensing of Environment*.
- Co-chair, session at AGU Fall Meeting 2021
- Organizer of JPL Carbon Club Seminar Series 2020–2021
- Science Rendezvous volunteer 2018
- Organizer of Atmospheric Physics Journal Club, University of Toronto 2016–2017
- Treasurer for Graduate Environmental Students' Association, University of Toronto 2015–2017
- Graduate Student Representative, School of Earth and Ocean Sciences, University of Victoria 2012–2014