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)

1. **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

2. 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

3. 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

4. Worden, J.*, D. Cusworth, Z. Qu, Y. Yin, Y. Zhang, A. A. Bloom, S. Ma, **B. Byrne**, T. Scarpelli, J. D. Maasakkers, 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

5. 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 CO_2 and Land Surface Variables. *J. Geophys. Res. Biogeo.* https://doi.org/10.1029/2021JG006644

6. **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., Velazco, 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

7. Frankenberg, C.*, Y. Yin, **B. Byrne**, L. He and P. Gentine (2021) Comment on "Recent global decline of CO_2 fertilization effects onvegetation photosynthesis", *Science Technical Comment* https://doi.org/10.1126/science.abg2947

8. 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, CO_2, and CH_4 in Downtown Toronto Using Open-Path Fourier Transform Spectroscopy. *Atmosphere*. 2021; 12(7):848. https://doi.org/10.3390/atmos12070848

9. 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

10. **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

11. **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. Velazco, P. O. Wennberg, and D. Wunch (2020). Improved constraints on northern extratropical CO_2 fluxes obtained by combining surface-based and space-based atmospheric CO_2 measurements. *J. Geophys. Res. Atmos.*, 125, https://doi.org/10.1029/2019JD032029

12. 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

13. **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

14. **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.

15. **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 CO_2 measurements, *J. Geophys. Res. Biogeo.*, 123, https://doi.org/10.1029/2018JG004472

16. Polavarapu, S. M.*, F. Deng, **B. Byrne**, D. B.A Jones, D. B. A., and M. Neish, (2018) A comparison of atmospheric CO_2 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.

17. **Byrne, B.***, D. B. A. Jones, K. Strong, Z.-C. Zeng, F. Deng, and J. Liu (2017), Sensitivity of CO_2 surface flux constraints to observational coverage, *J. Geophys. Res. Atmos.*, 122, 6672–6694, https://doi:10.1002/2016JD026164

18. **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.

19. **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.

20. **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.

Publications in review (*Corresponding author)

1. **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., Feng, S., García, O., 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 Discuss.* [preprint], https://doi.org/10.5194/essd-2022-213, in review, 2022.

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 CO_2 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

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