

Christopher Chan Miller

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Nationality: Australian

Current position

Research Scientist, Harvard-Smithsonian Center for Astrophysics

I am currently a core team member of the following projects:

- [TEMPO](#) - A soon to be launched geostationary UV-Visible satellite aimed at tracking diurnal variations in pollution over North America
- [MEaSURES](#) - a NASA funded project to produce long term records of formaldehyde, glyoxal and water from space
- [MethaneSAT](#) - An upcoming agile Earth observing satellite designed to target Methane emissions primarily from oil and natural gas

Areas of specialization

Atmospheric chemistry and physics • Chemical transport modeling • Radiative transfer • Spectroscopy • Satellite retrieval algorithms • Numerical methods

Education

2009 BSc (Adv) HONORS in Mathematics and Chemistry, University of Wollongong
2014 MA in Earth and Planetary Science, Harvard University
2016 PhD in Earth and Planetary Science, Harvard University

Awards

2005 Vice-Chancellors Academic Excellence Scholarship (U. Wollongong.)
2006-2008 Deans Merit List (2006,2007, U. Wollongong, 2008, UCLA)
2009 Bert Halpern Prize in Chemistry awarded for best undergraduate thesis
2009 RACI Student Prize awarded for best average mark in all chemistry subjects.
2010 Frank Knox Memorial Fellowship (Harvard University)
2014 Derek Bok certificate of distinction in teaching

Teaching Experience

- 2009 Laboratory Instructor, Introductory Physical and General Chemistry (U. Wollongong)
- 2009-2010 Engineering Mathematics (U. Wollongong)
- 2011 Nonlinear Dynamics (Harvard)
- 2012 Atmospheric Chemistry and Physics (Harvard)
- 2014 Spectroscopy and Radiative Transfer (Harvard)

Publications

- 2011 A. Fraser, **C. Chan Miller**, P. I. Palmer, N. M. Deutscher, N. B. Jones, and D. W. T. Griffith, "The Australian methane budget: Interpreting surface and train-borne measurements using a chemistry transport model" *J. Geophys. Res.*, 116, D20306, doi:10.1029/2011JD015964, 2011
- 2014 Wang, H., Liu, X., Chance, K., González Abad, G., and **Chan Miller, C.**: Water vapor retrieval from OMI visible spectra, *Atmos. Meas. Tech.*, 7, 1901-1913, doi:10.5194/amt-7-1901-2014, 2014.
- 2014 **Chan Miller, C.**, Gonzalez Abad, G., Wang, H., Liu, X., Kurosu, T., Jacob, D. J., and Chance, K.: Glyoxal retrieval from the Ozone Monitoring Instrument, *Atmos. Meas. Tech.*, 7, 3891-3907, doi:10.5194/amt-7-3891-2014, 2014.
- 2015 Kaiser J, Wolfe GM, Min KE, Brown SS, **Miller CC**, Jacob DJ, deGouw JA, Graus M, Hanisco TF, Holloway J, et al. Reassessing the ratio of glyoxal to formaldehyde as an indicator of hydrocarbon precursor speciation. *Atmospheric Chemistry and Physics*. 2015;15 (13) :7571-7583.
- 2016 Marais EA, Jacob DJ, Jimenez JL, Campuzano-Jost P, Day DA, Hu W, Krechmer J, Zhu L, Kim PS, **Miller CC**, et al. Aqueous-phase mechanism for secondary organic aerosol formation from isoprene: application to the southeast United States and co-benefit of SO₂ emission controls. *Atmospheric Chemistry and Physics*. 2016;16 (3) :1603-1618.
- 2016 Zoogman P and 52 others including **C. Chan Miller**, Tropospheric emissions: Monitoring of pollution (TEMPO). *Journal of Quantitative Spectroscopy and Radiative Transfer*. 2016
- 2016 Yu K, Jacob DJ, Fisher JA, Kim PS, Marais EA, **Miller CC**, Travis KR, Zhu L, Yantosca RM, Sulprizio MP, et al. Sensitivity to grid resolution in the ability of a chemical transport model to simulate observed oxidant chemistry under high-isoprene conditions. *Atmospheric Chemistry and Physics*. 2016;16 (7) :4369-4378
- 2016 Fisher JA, Jacob DJ, Travis KR, Kim PS, Marais EA, **Chan Miller C**, Yu K, Zhu L, Yantosca RM, Sulprizio MP, et al. Organic nitrate chemistry and its implications for nitrogen budgets in an isoprene- and monoterpene-rich atmosphere: constraints from aircraft (SEAC₄RS) and ground-based (SOAS) observations in the Southeast US. *Atmospheric Chemistry and Physics*. 2016;16 (9) :5969-5991.
- 2016 Travis KR, Jacob DJ, Fisher JA, Kim PS, Marais EA, Zhu L, Yu K, **Miller CC**, Yantosca RM, Sulprizio MP, et al. Why do models overestimate surface ozone in the Southeast United States, *Atmos. Chem. Phys.*, doi:10.5194/acp-16-13561-2016, 2016.
- 2016 **Chan Miller C**, Jacob DJ, González Abad G, Chance K. Hotspot of glyoxal over the Pearl River delta seen from the OMI satellite instrument: implications for emissions of aromatic hydrocarbons. *Atmospheric Chemistry and Physics*. 2016;16 (7) :4631-4639.
- 2017 **Chan Miller C.**, D. J. Jacob, E. A. Marais, K. Yu, K. R. Travis P. S. Kim J. A. Fisher L. Zhu, G. M. Wolfe, F. N. Keutsch J. Kaiser, K. E. Min, S. S. Brown, R. A. Washenfelder, G. González Abad, and K. Chance, Glyoxal yield from isoprene oxidation and relation to formaldehyde: chemical mechanism, constraints from SENEX aircraft observations, and interpretation of OMI satellite data, *Atmos. Chem. Phys.*, 17, 8725-8738, <https://doi.org/10.5194/acp-17-8725-2017>, 2017.
- 2017 Levelt, P. F., and 41 other including **C. Chan Miller**: The Ozone Monitoring Instrument: overview of 14 years in space, *Atmos. Chem. Phys.*, 18, 5699-5745, <https://doi.org/10.5194/acp-18-5699-2018>, 2018.
- 2018 Cao, H., Fu, T.-M., Zhang, L., Henze, D. K., **Chan Miller, C.**, Lerot, C., González Abad, G., De Smedt, I., Zhang, Q., Van Roozendaal, M., Chance, K., Li, J., Zheng, J., and Zhao, Y.: Adjoint inver-

sion of Chinese non-methane volatile organic compound emissions using space-based observations of formaldehyde and glyoxal, *Atmos. Chem. Phys.*, 18, 15017–15046, <https://doi.org/10.5194/acp-18-15017-2018>, 2018.

2018 Sun, K., Zhu, L., Cady-Pereira, K., **Chan Miller, C.**, Chance, K., Clarisse, L., Coheur, P.-F., Gonzalez Abad, G., Huang, G., Liu, X., Van Damme, M., Yang, K., and Zondlo, M.: *Atmos. Meas. Tech.*, 11, 6679–6701, <https://doi.org/10.5194/amt-11-6679-2018>, 2018.

2019 Wang, A., **Chan Miller, C.**, and Szostak, J.: Core-shell modelling of light scattering by vesicles: effect of size, contents, and lamellarity, *Biophysical Journal*, <https://doi.org/10.1016/j.bpj.2019.01.006>
2019 Gonzalez Abad, G., A. Souri, J. Bak, K. Chance, L. Flynn, N. Krotkov, L. Lamsal, C. Li, X. Liu, **C. Chan Miller**, C. Nowlan, R. Suleiman, H. Wang: Five decades observing Earth’s atmospheric trace gases using ultraviolet and visible backscatter solar radiation from space. *Journal of Quantitative Spectroscopy and Radiative Transfer*.

2019 Cusworth, D., D. Jacob, D. Varon, **C. Chan Miller**, X. Liu, K. Chance, A. Thorpe, R. Duren, C. Miller, C. Frankenberg, and C. Randles: Potential of next-generation imaging spectrometers to detect and quantify methane point sources from space, *Atmos. Meas. Tech.*, 12, 5655–5668, <https://doi.org/10.5194/amt-12-5655-2019>

2019 Kim, J. and 77 others including C. Chan Miller, New Era of Air Quality Monitoring from Space: Geostationary Environment Monitoring Spectrometer (GEMS), *Bull. Amer. Meteor. Soc.* (2019), doi: <https://doi.org/10.1175/BAMS-D-18-0013.1>

2019 Chance, K. and 45 others including C. Chan Miller, TEMPO Green Paper: Chemistry, physics, and meteorology experiments with the Tropospheric Emissions: monitoring of pollution instrument, *Proc. SPIE 11151, Sensors, Systems, and Next-Generation Satellites XXIII*, doi: <https://doi.org/10.1117/12.2534883>

2020 Souri, A. H., C. R. Nowlan, G. M. Wolfe, L. N. Lamsal, **C. Chan Miller**, G. González Abad, S. J. Janz, A. Fried, D. R. Blake, A. J. Weinheimer, G. S. Diskin, X. Liu, K. Chance, Revisiting the effectiveness of HCHO/NO₂ ratios for inferring ozone sensitivity to its precursors using high resolution airborne remote sensing observations in a high ozone episode during the KORUS-AQ campaign, *Atmos. Environ.*, <https://doi.org/10.1016/j.atmosenv.2020.117341>

2020 Zhu, L., González Abad, G., Nowlan, C. R., **Chan Miller, C.**, Chance, K., Apel, E. C., DiGangi, J. P., Fried, A., Hanisco, T. F., Hornbrook, R. S., Hu, L., Kaiser, J., Keutsch, F. N., Permar, W., St. Clair, J. M., and Wolfe, G. M.: Validation of satellite formaldehyde (HCHO) retrievals using observations from 12 aircraft campaigns, *Atmos. Chem. Phys.*, 20, 12329–12345, <https://doi.org/10.5194/acp-20-12329-2020>, 2020.

2020 Souri, A. H., Nowlan, C. R., González Abad, G., Zhu, L., Blake, D. R., Fried, A., Weinheimer, A. J., Woo, J.-H., Zhang, Q., **Chan Miller, C. E.**, Liu, X., and Chance, K.: An Inversion of NO_x and NMVOC Emissions using Satellite Observations during the KORUS-AQ Campaign and Implications for Surface Ozone over East Asia, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-220>, in review, 2020.

2020 Bak, J., Liu, X., Spurr, R., Yang, K., Nowlan, C. R., Miller, C. C., Abad, G. G., and Chance, K.: Radiative transfer acceleration based on the Principal Component Analysis and Look-Up Table of corrections: Optimization and application to UV ozone profile retrievals, *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2020-349>, in review, 2020.