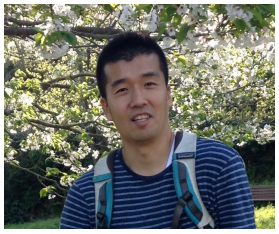

Kazuyuki Miyazaki

NASA Jet Propulsion Laboratory

My research

Kazuyuki Miyazaki is a scientist who specializes in atmospheric composition research. His research activities range from the development of chemical data assimilation system to the study of the impact of air quality on climate and human health. His chemical reanalysis product, based on assimilation of multiple satellite measurements from various NASA missions, has provided unique information on decadal changes in the atmospheric environment for various air quality and climate studies. He is a PI of the NASA Aura Science team and JPL Science Understanding from Data Science projects. His current research includes observing system simulation experiments (OSSEs), evaluations of satellite data products and IPCC model predictions, and air quality and GHG emission analysis.

contact

+1 (818) 354-3266

kazuyuki.miyazaki@jpl.nasa.gov

4800 Oak Grove Drive, MS 233-200, Pasadena,

https://science.jpl.nasa.gov/people/Miyazaki/

EDUCATION

Ph.D. in Geophysics, 2006
Tohoku University, Japan

Focus: Atmospheric Sciences

Professional Experience

	University of California, Los Angeles
2022 - Present	**Visiting Project Scientist**, Joint Institute for Regional Earth System Science and Engineering (JIFRESSE)
	Jet Propulsion Laboratory, California Institute of Technology
2019 - Present	**Scientist**, Tropospheric Composition Group
2016 - 2017	**Research Scholar**, Carbon Cycle and Ecosystems Group
	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
2017 - 2019	**Deputy Group Leader**, Geochemical Cycle Research Group
2013 - 2019	**Senior Scientist (tenured)**, Research and Development Center for Global Change
2011 - 2012	**Research Scientist**, Environmental Biogeochemical Cycle Research Program
2006 - 2010	**Postdoctoral Scientist**, Frontier Research Center for Global Change
	University of Hawai'i
2012 - 2013	**Visiting Scientist,** International Pacific Research Center (IPRC)
	Royal Netherlands Meteorological Institute (KNMI)
2010 - 2012	**Visiting Scientist,** Chemistry and Climate Division
	The Japan Society for the Promotion of Science for Young Scientists (JSPS)
2003 - 2006	**Research Fellow**, Category DC1: for excellent Ph.D. students

Professional Activities

2021	**Review Panel,** Japan Society for the Promotion of Science, Grants-in-Aid for Scientifitc Resaerch
2021 - present	**Working group lead,** IGAC, Tropospheric Ozone Assessment Report, Phase II (TOAR-II, 2020-2024), Chemical Reanalysis Focus working group
2021 - present	**Working group lead,** IGAC, Tropospheric Ozone Assessment Report, Phase II (TOAR-II, 2020-2024), Chemical Reanalysis Focus working group
2021 - present	**Validation team member**, GEMS L1/L2 validation team
2020	**Workshop member,** COVID-19: Identifying Unique Opportunities for Earth System Science, Caltech KISS Virtual Workshop
2020	**Panelist**, the EPA's webinar "Moving from research to regular utilization of satellite data: NO_2 and O_3" (2020)
2020	**Workshop organizer**, AMIGO/IGAC VIRTUAL WORKSHOP, CHANGES IN ATMOSPHERIC COMPOSITION DURING THE COVID-19 LOCKDOWNS, NOVEMBER 3, 2020
2020	**Session Chair**, AGU fall meeting 2020 "Satellite-Based Air Quality and Atmospheric Composition Impacts of COVID-19"
2019 - present	**Steering members,** IGAC (International Global Atmospheric Chemistry), AMIGO (Analysis of eMIssions usinG Observations)
2019 - present	**Science Advisory Group member,** the ESA Mission ESP-MACCS
2018 - present	**Review Panel,** NASA, ESA, EFG grant proposals
2015	**Review Panel**, Wageningen University graduate school evaluation panel
2015 - 2019	**Committee member**, the IGPB/WCRP/DIVERSITAS subcommittee, *Science Council of Japan*

Awards

2020	NASA group achievement award for MUSES algorithm team
2020	JPL team bonus award for COVID-19 air quality research
2017	NASA group achievement award to KORUS-AQ team
2012	Yamamoto-Shono Award (best young scientist award) from the Meteorological Society of Japan
2009	Young Scientist Award from the Japan Society of Atmospheric Chemistry
2009	JAMSTEC award for Outstanding Research Accomplishments
2004	Best poster award, 5th International Workshop on Global Change: Connection to the Arctic (GCCA5)
2004 - 2006	Half exemption of the school fee at Tohoku University
1999 - 2003	Japanese Government Scholarship, Ministry of Education, Culture, Sports, Science and Technology

Mentor / Teaching experience

2022	**Mentor**, 2022 UCLA Student Research Program
	Mentor, 2022 JIFRESSE Summer Internship Program (JSIP)
	Mentor, 2022 UCLA Strategic University Research Partnerships (SURP) Program
	Co-Mentor, 2022 Caltech SURF Internship Program (JSIP)
2021	**Mentor**, 2021 JIFRESSE Summer Internship Program (JSIP) & JPL Visiting Student Research Program (JVSRP)
	Co-Mentor, summertime intern student (UCLA)
2020 - 2021	**Co-mentor**, Caltech graduate student
2020 - present	**Mentor**, UCLA graduate student intern
2019	**Mentor**, summertime intern student (UCLA)
2016 - 2020	**Mentor**, postdoctoral scientist (JAMSTEC)
2016 - 2019	**Co-supervisor**, PhD course student (University of Tokyo)
2015 - 2016	**Co-supervisor**, PhD course student (Tohoku University)

2013	**Part-time Lecturer**, Ibaraki University
2009 - 2010	**Co-supervisor**, master's candidate (Hokkaido University)
2003 – 2006	**Technical assistance**, Supercomputing System Information Synergy Center, Tohoku University
2003 - 2004	**Research Assistant**, Tohoku University

Funding

- **PI,** Impact of COVID-19 on radiative forcing from short-lived climate pollutants (SLCPs) informed by satellites, modeling, and assimilation, JPL Researchers on Campus (JROC) Program, (FY2023)
- **PI,** Studying 2020 western US mega-fires using carbon monoxide from satellites, models, and reanalysis, JPL Strategic University Research Partnership (SURP), (FY2023-2025)
- **PI,** Sub-grid Scale Drivers of Pollution Inferred from Model-based Inference and Machine Learning, JIFRESSE Summer Internship Program (JSIP), (FY2022)
- **PI,** *Subgrid Scale Drivers of Pollution Inferred from Model-Based Inference and Machine Learning*, JPL Strategic research and technology development (SRTD), (FY2022-2024)
- **Co-I,** *Ozone and Trace Gases,* JPL Strategic research and technology development (SRTD), (FY2022-2024)
- **Co-I,** *Air Quality Architecture to Meet US National Needs for Forecasting, Management, and Assessment of Health Impacts,* JPL Strategic research and technology development (SRTD), (FY2022-2024)
- **Co-I**, A scalable framework for assessing variability in CO_2 point sources using multiple satellite instruments, NASA ROSES 2020: Science Team for the OCO Missions NNH20ZDA001N-OCOST (2021-2014) (PI: Daniel Cusworth)
- **Co-I**, *Quantifying Trends in Top-down Emission Estimates of CO and NOx*, CSA Class Grant and Contribution Program (2021-2024) (PI: Dylan Jones)
- **PI**, JPL Earth Science Division Raise the Bar (2020-2023)
- **PI,** *Quantifying the impacts of global shifts of anthropogenic emissions on air quality using a decadal chemical reanalysis based on the Aura and A-train satellite measurements,* NASA ROSES Aura Science team NNH19ZDA001N-AURAST (2020–2023)
- **PI,** *TROPOMI multi-constituent data assimilation*, Fund for the Promotion of Joint International Research (Fostering Joint International Research (B)), 18KK0102 (2018–2019)
- **PI,** *Tropospheric chemistry reanalysis: TCR-2*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (B)18H01285D (2018–)
- **PI,** *Multi-constituent chemical data assimilation*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (C) 15K05296 (2015–2017)
- **PI,** *Assimilation of multiple chemical satellite observations and emission estimations*, Japan Society for the Promotion of Science Grant-in-Aid for Yong Scientists (B) 19740300 (2012–2014)
- **PI**, *Global chemical data assimilation of OMI NO_2 data*, JSPS Postdoctoral Fellowship for Research Abroad (2010–2012)
- **PI,** *Development of a data assimilation system for ozone and related species using an ensemble Kalman filter*, Japan Society for the Promotion of Science Grant-in-Aid for Yong Scientists (B) 19740300 (2006–2009)
- **PI**, WMO/WCRP financial assistance for the Earth System Science Partnership (ESSP), Global Environmental Change Open Science Conference (2006)
- **PI**, Financial assistance for the carbon data assimilation workshop from the Mathematical Sciences Research Institute, University of California Berkeley (2006)
- **PI**, WMO/WCRP financial assistance for SPARC data assimilation workshop (2005)
- **PI**, Travel grant from the Tohoku development foundation (2005)
- **PI,** Grant-in-Aid for Fellows of the Japan Society for the Promotion of Science (2003–2006)
- **Collaborator**, A scalable framework for assessing variability in CO2 point sources using multiple satellite instruments, NASA ROSES NNH20ZDA001N-OCOST (2021-2023)

- **CoI,** Substantiating Key Synergies Between Air Quality (AQ) and Greenhouse Gas (GHG) Monitoring from Space: A case for anthropogenic CO2 and CH4 constraints from CO and NO2, NNH18ZDA001N, NASA Atmospheric Composition Modeling and Analysis Program (2019–2022)
- **CoI,** *Emission estimates of black carbon and methane*, Global Environment Research Fund (2-1803) by the Ministry of the Environment, Japan (2018–2021)
- **CoI,** *The Role of Anthropogenic Combustion on Urban-Geo System Environments: A Multi-Species Analysis Over Megacities*, NASA Research Announcement, NNH16ZDA001N-ACMAP, Atmospheric Composition: Aura Science Team and Atmospheric Composition Modeling and Analysis Program (PI: Avelino F. Arellano, Jr., University of Arizona) (2017–2019)
- **CoI**, *Development and application of intelligent measurement-analysis methods through coalition between measurement technologies and informatics,* Japan Science and Technology Agency (JST) CREST program (PI: K. Sato) (2016–2022)
- **CoI,** *Tropospheric ozone variations over southeast Asia*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (C) 16K00535 (PI: S. Ogino) (2016–2022)
- **CoI,** *A.19 KORUS-AQ: An International Cooperative Air Quality Field Study in Korea*, NASA Research Announcement (NRA) NNH15ZDA001N, Research Opportunities in Space and Earth Science (ROSES-2015) (PI: L. Emmons) (2016–2018)
- **CoI,** *Big data and Earth sciences*, FLAGSHIP2020 Post-K computer project (PI: K. Takahashi) (2015–2019)
- **CoI,** *Towards km-scale air pollution observations from space*, Coordination Funds for Promoting AeroSpace Utilization (PI: Y. Kanaya) (2015–2017)
- **CoI,** Arctic Challenge for Sustainability (ArCS) Project (PI: T. Koike) (2015–2019)
- **CoI,** *Isentropic analyses of atmospheric/oceanic global circulations*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (A) 15H02129 (PI: T. Iwasaki) (2015–2019)
- **CoI,** *Dynamics and chemistry in the tropical tropopause layer*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (S) 26220101 (PI: F. Hasebe) (2014–2018)
- **CoI,** *Understanding QBO variations in changing climate*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (B) 26287117 (PI: Y. Kawatani) (2014–2016)
- **CoI,** *Understanding CH_4 and N_2O variations from an atmospheric chemistry-land vegetation coupling model*, Japan Society for the Promotion of Science Grant-in-Aid for Scientific Research (B) 25241006 (PI: K. Sudo) (2013–2015)
- **CoI,** *Development of a data assimilation system for ozone and related species using an ensemble Kalman filter*, Global Environment Research Fund (B-93) by the Ministry of the Environment, Japan (PI: T. Iwasaki) (2009–2012)

Selected invited presentations

1. **Miyazaki, K.**, Atmospheric composition chemical reanalysis and emission estimates based on multi-constituent satellite data assimilation. Harvard University Atmospheric & Environmental Chemistry Seminar, 1 April 2022 (Virtual)
2. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, AGU Fall Meeting 2021, 15 December 2021 (Virtual)
3. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, Caltech Yuk Lunch Seminar, 1 September 2021 (Virtual)
4. **Miyazaki, K.,** K. Bowman, T. Sekiya, M. Takigawa, J. L Neu, K. Sudo, G. Osterman, H. Eskes, Updated atmospheric composition chemical reanalysis and emission estimates, JpGU Meeting 2021, 2 June 2021. (Virtual)
5. **Miyazaki, K.**, Jones, D., W. Helen, K. Bowman (2021). Assessment of measurement representativeness by chemical reanalyses and TOAR-II chemical reanalysis Focus Working Group plan, IGAC TOAR-II HEGIFTOM working group meeting, 25 March 2021. (Virtual)
6. **Miyazaki, K.**, Bowman, K., Neu, J., Osterman, G., Sekiya, T., Takigawa, M., Eskes, H., Sudo, K. (2021). Quantifying the impacts of global shifts of anthropogenic emissions on air quality using a decadal chemical reanalysis based on multiple NASA's satellite measurements, UCLA JIFRESSE seminar, 26 February 2021. (Virtual)

7. **Miyazaki, K.**, Bowman, K., Sekiya, T., Jiang, Z., Chen, X., Eskes, H., Ru, M., Zhang, Y., Shindell, D., (2020). Quantifying the impacts of global shifts of anthropogenic emissions on air quality using a decadal chemical reanalysis based on multiple NASA's satellite measurements, AGU fall meeting, 8 December 2020. (Virtual)
8. **Miyazaki, K.**, K. W. Bowman, T. Sekiya, D. Fu, S. S. Kulawik, K. Sudo, T. Walker, Y. Kanaya, M. Takigawa, K. Ogochi, H. Eskes, K. F. Boersma, A. M. Thompson, B. Gaubert, J. Barre, and L. K. Emmons, K. Yumimoto Multi-constituent chemical data assimilation and its applications in air quality and climate research, EOS Aura Science Team Meeting, Pasadena, CA, USA, 27 August 2019.
9. **Miyazaki, K.,** T. Sekiya, D. Fu, K. W. Bowman, T. Walker, S. S. Kulawik, K. Sudo, Y. Kanaya, M. Takigawa, K. Ogochi, B. Gaubert, J. Barre, L. Emmons, Applications of satellite, ozonesonde, and aircraft measurements and chemical transport models on air quality research, USTH workshop on Upper Air Sounding and Air Quality, Hanoi, Vietnam, 8 October 2018.
10. **Miyazaki, K.,** T. Sekiya, H. Eskes, F. Boersma, D. Fu, K. Bowman, Susan S. Kulawik, T. Walker, K. Sudo, Y. Kanaya, M. Takigawa, K. Ogochi, B. Gaubert, J. Barre, L. Emmons, A tropospheric chemistry reanalysis based on multi-constituent satellite data assimilation and its application for KORUS-AQ, 2017 annual conference of Korean Society for Atmospheric Environment, Deagu, Republic of Korea, 10 November, 2017.
11. **Miyazaki, K.**, A tropospheric chemistry reanalysis based on multi-constituent satellite data assimilation, University of Toronto Noble seminar series, Toronto, Canada, 3 October 2016.
12. **Miyazaki, K.**, H. Eskes, and K. Sudo, A tropospheric chemistry reanalysis for the years 2005-2014 based on an assimilation of AURA OMI, MLS, TES and MOPITT satellite data, The Moscone Center, San Francisco, AGU fall meeting, 15 December 2015.
13. **Miyazaki, K.**, A tropospheric chemistry reanalysis for the years 2005-2014 based on an assimilation of AURA OMI, MLS, TES and MOPITT satellite data, UC Berkeley BASC Seminar, Berkeley, USA, 18 November 2015.
14. **Miyazaki, K.,** A tropospheric chemistry reanalysis for the years 2005-2014 based on an assimilation of AURA OMI, MLS, TES and MOPITT satellite data, Wageningen University Meteorology and Air Quality seminar, Wageningen, the Netherlands, 10 September 2015.
15. **Miyazaki, K.**, A tropospheric chemistry reanalysis for the years 2005-2012 based on an assimilation of AURA OMI, MLS, TES and MOPITT satellite data, NCAR formal seminar, Boulder, USA, 19 March 2015.
16. **Miyazaki, K.**, Estimating surface NOx and CO emissions and lightning NOx sources by assimilating satellite observations of multiple chemical species, Workshop on parameter estimation and inverse modelling for atmospheric composition, ECMWF, Reading, UK, 22 October 2013.
17. **Miyazaki, K.**, Global and Asian NOx emission estimates derived from a combined assimilation of multiple satellite observations, International Workshop on "Inventory, Modeling and Climate Impacts of Greenhouse Gas emissions (GHG's) and Aerosols in the Asian Region, Tsukuba International Conference Center, Tsukuba, Japan, 26 June 2013.
18. **Miyazaki, K.**, Simultaneous assimilation of multi-species data for the analysis of chemical composition in the troposphere and stratosphere, WCRP Regional Workshop on Stratosphere-Troposphere Processes and their Role in Climate (SPARC), Kyoto University, Kyoto, 1 April 2013.

Publications

Google scholar

1. **Miyazaki, K.**, and K. Bowman, Predictability of fossil fuel CO2 from air quality emissions, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-2019513/v1]
2. Malina, E., Bowman, K. W., Kantchev, V., Kuai, L., Kurosu, T. P., **Miyazaki, K.**, Natraj, V., Osterman, G. B., and Thill, M. D.: Joint spectral retrievals of ozone with Suomi NPP CrIS augmented by S5P/TROPOMI, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2022-774, 2022.
3. Shogrin, M. J., Payne, V. H., Kulawik, S. S., **Miyazaki, K.**, and Fischer, E. V.: Measurement Report: Spatiotemporal variability of peroxy acyl nitrates (PANs) over Mexico City from TES and CrIS satellite measurements, Atmos. Chem. Phys. Discuss. [preprint], https://doi.org/10.5194/acp-2022-582, in review, 2022.
4. Christian A. DiMaria; Dylan B. A. Jones; Helen M Worden; A. Anthony Bloom; Kevin W. Bowman; Trissevgeni Stavrakou; **K. Miyazaki**; John R. Worden; Alex B. Guenther; Chinmoy Sarkar et al., Optimizing the isoprene emission model MEGAN with satellite and ground-based observational constraints, [preprint], https://doi.org/10.1002/essoar.10512404.1, in review, 2022.

5. Bisht, J. S. H., Patra, P. K., Takigawa, M., Sekiya, T., Kanaya, Y., Saitoh, N., and **Miyazaki, K.**: Estimation of CH4 emission based on advanced 4D-LETKF assimilation system, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2022-719, 2022.
6. He, T.-L., Jones, D. B. A., **Miyazaki, K.**, Bowman, K. W., Jiang, Z., Chen, X., Li, R., Zhang, Y., and Li, K.: Inverse modelling of Chinese NO_x emissions using deep learning: integrating in situ observations with a satellite-based chemical reanalysis, Atmos. Chem. Phys., 22, 14059–14074, https://doi.org/10.5194/acp-22-14059-2022, 2022.
7. **Miyazaki, K.**, J. L. Neu, G. Osterman, K. Bowman, Changes in U.S. background ozone associated with the 2011 turnaround in Chinese NOx emissions, Environmental Research Communications, https://doi.org/10.1088/2515-7620/ac619b, 2022.
8. Sekiya, T., **Miyazaki, K.**, Eskes, H., Sudo, K., Takigawa, M., and Kanaya, Y.: A comparison of the impact of TROPOMI and OMI tropospheric NO_2 on global chemical data assimilation, Atmos. Meas. Tech., 15, 1703–1728, https://doi.org/10.5194/amt-15-1703-2022, 2022.
9. Payne, V. H., Kulawik, S. S., Fischer, E. V., Brewer, J. F., Huey, L. G., **Miyazaki, K.**, Worden, J. R., Bowman, K. W., Hintsa, E. J., Moore, F., Elkins, J. W., and Juncosa Calahorrano, J.: Satellite measurements of peroxyacetyl nitrate from the Cross-Track Infrared Sounder: comparison with ATom aircraft measurements, Atmos. Meas. Tech., 15, 3497–3511, https://doi.org/10.5194/amt-15-3497-2022, 2022.
10. J. L. Laughner, J. L. Neu, D. Schimel, P. O. Wennberg, K. Barsanti, K. W. Bowman, A. Chatterjee, B. E. Croes, H. L. Fitzmaurice, D. K. Henze, J. Kim, E. A. Kort, Z. Liu, **K. Miyazaki**, A. Turner, S. Anenberg, J. Avise, H. Cao, D. Crisp, J. de Gouw, A. Eldering, J. C. Fyfe, D. L. Goldberg, K. R. Gurney, S. Hasheminassab, F. Hopkins, C. E. Ivey, D. B. A. Jones, J. Liu, N. S.Lovenduski, R. V. Martin, G. A. McKinley, L. Ott, B. Poulter, M. Ru, S. P. Sander, N. Swart, Y. L. Yung, Z.-C. Zeng, Societal shifts due to COVID-19 reveal large-scale complexities and feedbacks between atmospheric chemistry and climate change, Proceedings of the National Academy of Sciences Nov 2021, 118 (46) e2109481118; DOI:10.1073/pnas.2109481118, 2021
11. Hansen Cao, Daven K. Henze, Liye Zhu, Mark W. Shephard, Karen Cady-Pereira, Enrico Dammers, Michael Sitwell, Nicholas Heath, Chantelle Lonsdale, Jesse O. Bash, **Kazuyuki Miyazaki**, Christophe Flechard, Yannick Fauvel, Roy Wichink Kruit, Stefan Feigenspan, Christian Brümmer, Frederik Schrader, Marsailidh M. Twigg, Sarah Leeson, Yuk S. Tang, Amy C. M. Stephens, Christine Braban, Keith Vincent, Mario Meier, Eva Seitler, Camilla Geels, Thomas Ellermann, Agnieszka Sanocka, Shannon L. Capps (2022), 4D-Var inversion of European NH_3 emissions using CrIS NH_3 measurements and GEOS-Chem adjoint with bi-directional and uni-directional flux schemes. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035687. https://doi.org/10.1029/2021JD035687
12. Ogino, S.-Y., **Miyazaki, K.**, Fujiwara, M., Nodzu, M. I., Shiotani, M., Hasebe, F., et al. (2022). Cause of a lower-tropospheric high-ozone layer in spring over Hanoi. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035727. https://doi.org/10.1029/2021JD035727
13. He, T.-L., Jones, D. B. A., **Miyazaki, K.**, Huang, B., Liu, Y., Jiang, Z., et al. (2022). Deep learning to evaluate US NO_x emissions using surface ozone predictions. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035597. https://doi.org/10.1029/2021JD035597
14. J. Chen, Z. Jiang, R. Li, C. Liao, **K. Miyazaki**, D. B. A. Jones, Large discrepancy between observed and modeled wintertime tropospheric NO2 variabilities due to COVID-19 controls in China, *Environ. Res. Lett.*, ***17, 035007,*** https://doi.org/10.1088/1748-9326/ac4ec0
15. Z. Jiang, R. Zhu, **K. Miyazaki**, B. C. McDonald, Z. Klimont, B. Zheng, K. F. Boersma, Q. Zhang, H. Worden, J. R. Worden, D. K. Henze, D. B. A. Jones, H. A.C. Denier van der Gon, H. Eskes (2022). Decadal variabilities in tropospheric nitrogen oxides over United States, Europe, and China. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035872. https://doi.org/10.1029/2021JD035872
16. Byrne, B., Liu, J., Lee, M., Yin, Y., Bowman, K. W., Miyazaki, K., et al. (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
17. Jiang, Z., Shi, H., Zhao, B., Gu, Y., Zhu, Y., **Miyazaki, K.**, Lu, X., Zhang, Y., Bowman, K. W., Sekiya, T., and Liou, K.-N.: Modeling the impact of COVID-19 on air quality in southern California: implications for future control policies, *Atmos. Chem. Phys.*, 21, 8693–8708, https://doi.org/10.5194/acp-21-8693-2021, 2021.
18. Sekiya, T., **Miyazaki, K.**, Ogochi, K., Sudo, K., Takigawa, M., Eskes, H., & Boersma, K. F.(2021). Impacts of horizontal resolution on global data assimilation of satellite measurements for tropospheric chemistry analysis. *Journal of Advances in Modeling Earth Systems*, 13, e2020MS002180. https://doi.org/10.1029/2020MS002180
19. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, Science Advances, Vol. 7, no. 24, eabf7460, DOI: 10.1126/sciadv.abf7460, 2021

20. D. Weidmann, K. Antonini, D. Martinez Pino, B.K. Brodersen, G. Patel, M. I. Hegglin, C. Sioris, W. Bell, **K. Miyazaki**, L. K. Alminde, A. Gabriele, M. Pastena, A. Hoffmann, "Cubesats for monitoring atmospheric processes (CubeMAP): a constellation mission to study the middle atmosphere," Proc. SPIE 11530, Sensors, Systems, and Next-Generation Satellites XXIV, 115300U (20 September 2020); https://doi.org/10.1117/12.2573727, 2020
21. Gaubert, B., Emmons, L. K., Raeder, K., Tilmes, S., **Miyazaki, K.**, Arellano Jr., A. F., Elguindi, N., Granier, C., Tang, W., Barré, J., Worden, H. M., Buchholz, R. R., Edwards, D. P., Franke, P., Anderson, J. L., Saunois, M., Schroeder, J., Woo, J.-H., Simpson, I. J., Blake, D. R., Meinardi, S., Wennberg, P. O., Crounse, J., Teng, A., Kim, M., Dickerson, R. R., He, H., Ren, X., Pusede, S. E., and Diskin, G. S.: Correcting model biases of CO in East Asia: impact on oxidant distributions during KORUS-AQ, Atmos. Chem. Phys., 20, 14617–14647, https://doi.org/10.5194/acp-20-14617-2020, 2020.
22. **Miyazaki, K.**, Bowman, K., Sekiya, T., Jiang, Z., Chen, X., Eskes, H., Ru, M., Zhang, Y., Shindell, D., (2020). Air quality response in China linked to the 2019 novel coronavirus (COVID-19) lockdown. *Geophysical Research Letters*, 47, e2020GL089252. https://doi.org/10.1029/2020GL089252
23. Elguindi, N., Granier, C., Stavrakou, T., Darras, S., Bauwens, M., Cao, H., Chen, C., Denier van der Gon, H.A.C., Dubovik, O., Fu, T.M., Henze, D.K., Jiang, Z., Keita, S., Kuenen, J.J.P., Kurokawa, J., Liousse, C., **Miyazaki, K.**, Müller, J.-F., Qu, Z., Solmon, F. and Zheng, B. (2020), Intercomparison of Magnitudes and Trends in Anthropogenic Surface Emissions From Bottom-Up Inventories, Top-Down Estimates, and Emission Scenarios. Earth's Future, 8: e2020EF001520. doi:10.1029/2020EF001520
24. **Miyazaki, K.**, Bowman, K., Sekiya, T., Eskes, H., Boersma, F., Worden, H., Livesey, N., Payne, V. H., Sudo, K., Kanaya, Y., Takigawa, M., and Ogochi, K.: Updated tropospheric chemistry reanalysis and emission estimates, TCR-2, for 2005–2018, Earth Syst. Sci. Data, 12, 2223–2259, https://doi.org/10.5194/essd-12-2223-2020, 2020b.
25. **Miyazaki, K.**, Bowman, K. W., Yumimoto, K., Walker, T., and Sudo, K.: Evaluation of a multi-model, multi-constituent assimilation framework for tropospheric chemical reanalysis, Atmos. Chem. Phys., 20, 931–967, https://doi.org/10.5194/acp-20-931-2020, 2020a.
26. Kuai, L., Bowman, K. W., **Miyazaki, K.**, Deushi, M., Revell, L., Rozanov, E., Paulot, F., Strode, S., Conley, A., Lamarque, J.-F., Jöckel, P., Plummer, D. A., Oman, L. D., Worden, H., Kulawik, S., Paynter, D., Stenke, A., and Kunze, M.: Attribution of Chemistry-Climate Model Initiative (CCMI) ozone radiative flux bias from satellites, Atmos. Chem. Phys., 20, 281–301, https://doi.org/10.5194/acp-20-281-2020, 2020.
27. Huijnen, V., **Miyazaki, K.**, Flemming, J., Inness, A., Sekiya, T., and Schultz, M. G.: An intercomparison of tropospheric ozone reanalysis products from CAMS, CAMS interim, TCR-1, and TCR-2, Geosci. Model Dev., 13, 1513–1544, https://doi.org/10.5194/gmd-13-1513-2020, 2020.
28. Koshin, D., Sato, K., **Miyazaki, K.**, and Watanabe, S.: An ensemble Kalman filter data assimilation system for the whole neutral atmosphere, Geosci. Model Dev., 13, 3145–3177, https://doi.org/10.5194/gmd-13-3145-2020, 2020.
29. Itahashi, S., K. Yumimoto, J Kurokawa, Y. Morino, T Nagashima, **K. Miyazaki**, T. Maki and T. Ohara, Inverse estimation of NOx emissions over China and India 2005–2016: contrasting recent trends and future perspectives, *Environmental Research Letters*, *14*(12), 124020, 2019
30. Thompson, A. M., R. M. Stauffer, T. P. Boyle, D. E. Kollonige, **K. Miyazaki**, M. Tzortziou, J. R. Herman, C. E. Jordan, B. T. Lamb, Comparison of Near-surface NO2 Pollution with Pandora Total Column NO2 during the Korea-United States Ocean Color (KORUS OC) Campaign, *Journal of Geophysical Research: Atmospheres,* 124, 13560– 13575. https://doi.org/10.1029/2019JD030765, 2019.
31. Kanaya, Y., **Miyazaki, K.**, Taketani, F., Miyakawa, T., Takashima, H., Komazaki, Y., Pan, X., Kato, S., Sudo, K., Sekiya, T., Inoue, J., Sato, K., and Oshima, K.: Ozone and carbon monoxide observations over open oceans on R/V *Mirai* from 67° S to 75° N during 2012 to 2017: testing global chemical reanalysis in terms of Arctic processes, low ozone levels at low latitudes, and pollution transport, Atmos. Chem. Phys., 19, 7233-7254, https://doi.org/10.5194/acp-19-7233-2019, 2019.
32. **Miyazaki, K.**, Sekiya, T., Fu, D., Bowman, K. W., Kulawik, S. S., Sudo, K., et al., Balance of emission and dynamical controls on ozone during the Korea-United States Air Quality campaign from multiconstituent satellite data assimilation. *J. Geophys. Res.- Atmos.*, 124, 387–413. https://doi.org/10.1029/2018JD028912, 2019
33. Tang, W., Arellano, A. F., Gaubert, B., **Miyazaki, K.**, and Worden, H. M.: Satellite data reveal a common combustion emission pathway for major cities in China, Atmos. Chem. Phys., 19, 4269-4288, https://doi.org/10.5194/acp-19-4269-2019, 2019.
34. Fu, D., Kulawik, S. S., **Miyazaki, K.**, Bowman, K. W., Worden, J. R., Eldering, A., Livesey, N. J., Teixeira, J., Irion, F. W., Herman, R. L., Osterman, G. B., Liu, X., Levelt, P. F., Thompson, A. M., and Luo, M.: Retrievals of tropospheric ozone profiles from the synergism of AIRS and OMI: methodology and validation, Atmos. Meas. Tech., 11, 5587-5605, https://doi.org/10.5194/amt-11-5587-2018, 2018.
35. Jiang, Z., B. C McDonald, H. M Worden, J. R Worden, **K. Miyazaki**, Z. Qu, D. K. Henze, D. Jones, A. Arellano, E. Fischer, L. Zhu, F. Boersma, Unexpected slowdown of US pollutant emission reduction in the past decade, *Proc. Natl. Acad. Sci. USA*, https://doi.org/10.1073/pnas.1801191115, 2018.

36. Sekiya, T., **Miyazaki, K.**, Ogochi, K., Sudo, K., and Takigawa, M.: Global high-resolution simulations of tropospheric nitrogen dioxide using CHASER V4.0, *Geosci. Model Dev.*, 11, 959-988, https://doi.org/10.5194/gmd-11-959-2018, 2018.
37. Cuesta, J., Kanaya, Y., Takigawa, M., Dufour, G., Eremenko, M., Foret, G., **Miyazaki, K.**, and Beekmann, M.: Transboundary ozone pollution across East Asia: daily evolution and photochemical production analysed by IASI+GOME2 multispectral satellite observations and models, *Atmos. Chem. Phys.*, https://doi.org/10.5194/acp-2017-972, 2018.
38. Cady-Pereira, K. E., Payne, V. H., Neu, J. L., Bowman, K. W., **Miyazaki, K.**, Marais, E. A., Kulawik, S., Tzompa-Sosa, Z. A., and Hegarty, J. D.: Seasonal and spatial changes in trace gases over megacities from Aura TES observations: two case studies, *Atmos. Chem. Phys.*, 17, 9379-9398, https://doi.org/10.5194/acp-17-9379-2017, 2017.
39. Ding, J., **Miyazaki, K.**, van der A, R. J., Mijling, B., Kurokawa, J.-I., Cho, S., Janssens-Maenhout, G., Zhang, Q., Liu, F., and Levelt, P. F.: Intercomparison of NOx emission inventories over East Asia, *Atmos. Chem. Phys.*, 17, 10125-10141, https://doi.org/10.5194/acp-17-10125-2017, 2017.
40. **Miyazaki, K.**, Eskes, H., Sudo, K., Boersma, K. F., Bowman, K., and Kanaya, Y.: Decadal changes in global surface NOx emissions from multi-constituent satellite data assimilation, *Atmos. Chem. Phys.*, 17, 807-837, doi:10.5194/acp-17-807-2017, 2017.
41. **Miyazaki, K.** and Bowman, K.: Evaluation of ACCMIP ozone simulations and ozonesonde sampling biases using a satellite-based multi-constituent chemical reanalysis, *Atmos. Chem. Phys.*, 17, 8285-8312, https://doi.org/10.5194/acp-17-8285-2017, 2017.
42. **Miyazaki, K.**, Iwasaki, T., Kawatani, Y., Kobayashi, C., Sugawara, S., and Hegglin, M. I.: Inter-comparison of stratospheric mean-meridional circulation and eddy mixing among six reanalysis data sets, *Atmos. Chem. Phys.*, 16, 6131-6152, doi:10.5194/acp-16-6131-2016, 2016.
43. Kawatani, Y., Hamilton, **K., Miyazaki**, K., Fujiwara, M., and Anstey, J. A.: Representation of the tropical stratospheric zonal wind in global atmospheric reanalyses, *Atmos. Chem. Phys.*, 16, 6681-6699, doi:10.5194/acp-16-6681-2016, 2016.
44. Jiang, Z., **K. Miyazaki**, J. R. Worden, J. J. Liu, D. B. A. Jones, and D. K. Henze, Impacts of anthropogenic and natural sources on free tropospheric ozone over the Middle East, *Atmos. Chem. Phys.,* 16, 6537-6546, https://doi.org/10.5194/acp-16-6537-2016, 2016.
45. Yumimoto, K., U. Itsushi, S. Itahashi, M. Kuribayashi, **K. Miyazaki**, Application of Inversion Technique to Quick Update of Anthropogenic NOx Emission with Satellite Observations and Chemical Transport Model, *J. Jpn. Soc. Atmos. Environ.*, 50 (5), 199-206, 2015.
46. **Miyazaki, K.**, Eskes, H. J., and Sudo, K.: A tropospheric chemistry reanalysis for the years 2005–2012 based on an assimilation of OMI, MLS, TES, and MOPITT satellite data, *Atmos. Chem. Phys.*, 15, 8315-8348, doi:10.5194/acp-15-8315-2015, 2015.
47. Patra, P. K., M. C. Krol, S. A. Montzka, T. Arnold, E. L. Atlas, B. R. Lintner, B. B. Stephens, B. Xiang, J. W. Elkins, P. J. Fraser, A. Ghosh, E. J. Hintsa, D. F. Hurst, K. Ishijima, P. B. Krummel, B. R. Miller, **K. Miyazaki**, F. L. Moore, J. Mühle, S. O'Doherty, R. G. Prinn, L. P. Steele, M. Takigawa, H. J. Wang, R. F. Weiss, S. C. Wofsy, D. Young, Observational evidence for interhemispheric hydroxyl parity, *Nature*, doi:10.1038/nature13721, 2014.
48. **Miyazaki, K.**, Eskes, H. J., Sudo, K., and Zhang, C.: Global lightning NO_x production estimated by an assimilation of multiple satellite data sets, *Atmos. Chem. Phys.*, 14, 3277-3305, doi:10.5194/acp-14-3277-2014, 2014.
49. Nakamura, T., H. Akiyoshi, M. Deushi, **K. Miyazaki**, C. Kobayashi, K. Shibata, and T. Iwasaki, A multimodel comparison of stratospheric ozone data assimilation based on an ensemble Kalman filter approach, *J. Geophys. Res. Atmos.*, 118, 3848–3868, doi:10.1002/jgrd.50338, 2013.
50. **Miyazaki, K.**, and H. Eskes, Constraints on surface NOx emissions by assimilating satellite observations of multiple species, *Geophys. Res. Lett.*, 40, doi:10.1002/grl.50894, 2013.
51. Tomikawa, Y., K. Sato, S. Watanabe, Y. Kawatani, **K. Miyazaki**, M. Takahashi, Growth of planetary waves and the formation of an elevated stratopause after a major stratospheric sudden warming in a T213L256 GCM, *J. Geophys. Res.*, 117, D16101, doi:10.1029/2011JD017243, 2012.
52. **Miyazaki, K.**, Eskes, H. J., and Sudo, K., Global NOx emission estimates derived from an assimilation of OMI tropospheric NO_2 columns, *Atmos. Chem. Phys.*, 12, 2263-2288, doi:10.5194/acp-12-2263-2012, 2012.
53. **Miyazaki, K.**, H. J. Eskes, K. Sudo, M. Takigawa, M. van Weele, and K. F. Boersma, Simultaneous assimilation of satellite NO_2, O_3, CO, and HNO_3 data for the analysis of tropospheric chemical composition and emissions, *Atmos. Chem. Phys.*, 12, 9545-9579, doi:10.5194/acp-12-9545-2012, 2012.
54. **Miyazaki K**., T. Maki, P. K. Patra, and T. Nakazawa, CO_2 fluxes estimated with satellite, aircraft, and surface observations using an ensemble-based 4D data assimilation system, *J. Geophys. Res.*, 116, D16306, doi:10.1029/2010JD015366, 2011.

55. **Miyazaki K.**, S. Watanabe, Y. Kawatani, Y. Tomikawa, K. Sato, and M. Takahashi, Transport and mixing in the extratropical tropopause region in a high vertical resolution GCM. Part I: Potential vorticity and heat budget analysis, *J. Atmos. Sci.*, 67, No. 5, 1293–1314, 2010.
56. **Miyazaki K.**, K. Sato, S. Watanabe, Y. Kawatani, Y. Tomikawa, and M. Takahashi, Transport and mixing in the extratropical tropopause region in a high vertical resolution GCM. Part II: Relative importance of large-scale and small-scale dynamics, *J. Atmos. Sci.*, 67, No. 5, 1315–1336, 2010.
57. Patra, P. K., M. Takigawa, G. S. Dutton, K. Uhse, K. Ishijima, B. R. Lintner, **K. Miyazaki**, and J.W. Elkins, Transport mechanisms for synoptic, seasonal and interannual SF6 variations and "age" of air in troposphere, *Atmos. Chem. Phys.*, 9, 1209-1225, 2009.
58. Watanabe, S., Y. Tomikawa, K. Sato, Y. KawataniY. Tomikawa, **K. Miyazaki**, and M. Takahashi, Simulation of the eastward 4-day wave in the Antarctic winter mesosphere using a gravity wave resolving general circulation model, *J. Geophys. Res.*, 114, D16111, doi:10.1029/2008JD011636, 2009.
59. Sato, K., S. Watanabe, Y. Kawatani, Y. Tomikawa, **K. Miyazaki**, and M. Takahashi, On the origins of mesospheric gravity waves, *Geophys.Res. Lett.*, 36, L19801, doi:10.1029/2009GL039908, 2009.
60. **Miyazaki, K.**, T. Machida, P.K. Patra, T. Iwasaki, Y. Sawa, H. Matsueda, and T. Nakazawa, Formation mechanisms of latitudinal CO_2 gradient in the upper troposphere over the subtropics and tropics, *J. Geophys. Res.*, 114, D03306, doi:10.1029/2008JD010545, 2009.
61. **Miyazaki, K.**, and T. Iwasaki, Isentropic diffusion coefficient derived from chemical constituent data, *Scientific Online Letters on the Atmosphere*, Vol. 5, 009-012, doi:10.2151/sola.2009-003, 2009.
62. **Miyazaki, K.**, Performance of a local ensemble transform Kalman filter for the analysis of atmospheric circulation and distribution of long-lived tracers under idealized conditions, *J. Geophys. Res.*, 114, D19304, doi:10.1029/2009JD011892, 2009.
63. Iwasaki, T., H. Hamada, and **K. Miyazaki**, Comparisons of Brewer-Dobson Circulations diagnosed from Reanalysis, *Journal of the Meteorological Society of Japan*, 87, 997-1006, 2009.
64. Sato, K., S. Watanabe, Y. Kawatani, Y. Tomikawa, **K. Miyazaki**, and M. Takahashi, On the origins of mesospheric gravity waves, *Geophys. Res. Lett.*, 36, L19801, doi:10.1029/2009GL039908, 2009.
65. **Miyazaki, K.**, and T. Iwasaki, The gradient genesis of stratospheric trace species in the subtropics and around the polar vortex, *J. Atmos. Sci.*, 65, 490-508, 2008.
66. **Miyazaki, K.**, P. K. Patra, M. Takigawa, T. Iwasaki, and T. Nakazawa, Global-scale transport of carbon dioxide in the troposphere, *J. Geophys. Res.*, 113, D15301, doi:10.1029/2007JD009557, 2008.
67. **Miyazaki, K.**, and T. Iwasaki, On the analysis of mean vertical velocities around the Antarctic polar vortex, *J. Atmos. Sci.*, 65, 3989–4003, 2008.
68. Tomikawa, Y., K. Sato, S. Watanabe, Y. Kawatani, **K. Miyazaki**, M. Takahashi, Wintertime Temperature Maximum at the Subtropical Stratopause in a T213L256 GCM, *J. Geophys. Res.*, 113, D17117, doi:10.1029/2008JD009786, 2008.
69. Watanabe, S., Y. Kawatani, Y. Tomikawa, **K. Miyazaki**, M. Takahashi, K. Sato, General Aspects of a T213L256 Middle Atmosphere General Circulation Model, *J. Geophys. Res.*, 113, D12110, doi:10.1029/2008JD010026, 2008.
70. Iwasaki, T., and **K. Miyazaki**, Global Transport of Atmospheric Ozone. *Japanese Journal of Multiphase Flow*, 22(1), 36-41, 2008.
71. **Miyazaki, K.**, and T. Iwasaki, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, *J. Atmos. Sci.,* 62, 1192-1208, 2005.
72. **Miyazaki, K.**, T. Iwasaki, K. Shibata and M. Deushi, The roles of transports in seasonal variation of total ozone amount, *J. Geophys. Res.,* VOL. 110, D18309, doi:10.1029/2005JD005900, 2005.
73. **Miyazaki, K.**, T. Iwasaki, K. Shibata, M. Deushi and T. Sekiyama, The impact of changing meteorological variables to be assimilated into GCM on ozone simulation with MRI CTM, *Journal of the Meteorological Society of Japan,* 83, 909-918, 2005.
74. Tanaka, D., T. Iwasaki, S. Uno, M. Ujiie, and **K. Miyazaki**, Eliassen-Palm flux diagnosis based on isentropic representation, *J. Atmos. Sci.*, 61, 2370-2383, 2004.

Technical Reports

75. Boersma, F., H. Eskes, J. Ding, R. van der A, **K. Miyazaki**, A. Visser, L. Ganzeveld, A. Georgoulias, M. Bauwens, T. Stavrakou, S. Compernolle, J.-F. Muller, M. George, P.-F. Coheur, and C. Clerbaux, Report on the impact of Atmospheric ECV records on data assimilation, emission and trend estimates, QA4ECV Report / Deliverable n° D6.3, 24 March, 2018.
76. Herman, R.(editor), D. Fu, S. Kulawik, **K. Miyazaki**, G. Osterman, K. Bowman, J. Worden, and TES team, AIRS/OMI Validation Report, Version 1.0, Jet Propulsion Laboratory, California Institute of Technology, December 8, 2017.

Data sets

77. **Miyazaki, K.**, Bowman, K., Sekiya, T., Eskes, H., Boersma, F., Worden, H., Livesey, N., Payne, V. H., Sudo, K., Kanaya, Y., Takigawa, M., and Ogochi, K., (2019). Chemical Reanalysis Products. Jet Propulsion Laboratory. https://doi.org/10.25966/9qgv-fe81

Presentations

1. **Miyazaki, K.**, Tropospheric chemistry reanalysis and emission estimates based on the A-train satellite measurements, 2nd Climate Observation Conference, 17 October 2022, Darmstadt, Germany.
2. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, Sentinel-5P Mission: 5 years anniversary, 12 October 2022 | Taormina, Italy.
3. **Miyazaki, K.**, D. Jones, H. Worden, TOAR-II Chemical Reanalysis Focus Working Group, The iCACGP-IGAC 2022 Conference, 11 September 2020, Manchester, the UK.
4. **Miyazaki, K.** and K. Bowman, Predictability of fossil fuel CO_2 from air quality emissions, IWGGMS-18, 13 July 2022.
5. **Miyazaki, K.,** Development of a GCHP-EnKF chemical data assimilation system, The 10th International GEOS-Chem Meeting (IGC10) June 9, 2022.
6. **Miyazaki, K.**, T. Sekiya, D. Fu, K. W. Bowman, S. S. Kulawik, K. Sudo, T. Walker, Y. Kanaya, M. Takigawa, K. Ogochi, H. Eskes, F. Boersma, B. Gaubert, J. Barre, and L. Tropospheric chemistry reanalysis and emission estimates, TCR-2, for 2005–2020, US CLIVAR Workshop on Future US Earth System Reanalysis, 16 May 2022.
7. **Miyazaki, K.** and K. Bowman, Updating global fossil fuel CO_2 flux inventories using top-down NOx emissions, CEOS AC-VC-18, 14 March 2022.
8. **Miyazaki, K.**, J. Neu, G. Osterman, K. Bowman, Multi-constituent satellite constraints for identification of background ozone variations over the United States, AMS annual meeting, 17 January 2022
9. **Miyazaki, K.**, K. Bowman, Updating global fossil fuel CO_2 flux inventories using top-down NOx emissions, AGU Fall Meeting 2021, 16 December, 2021.
10. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, NASA AIRS/Sounder Virtual Science Team Meeting 2021**,** 28 October 2021 (Virtual)
11. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NOx emissions linked to the COVID-19 world-wide lockdowns, IGAC conference 2021**,** 9 September 2021 (Virtual)
12. **Miyazaki, K.**, D. Jones, H. Worden, TOAR-II Chemical Reanalysis Focus Working Group, IGAC conference 2021**,** 9 September 2021 (Virtual)
13. **Miyazaki, K.**, D. Jones, H. Worden, IGAC TOAR-II chemical reanalysis Focus Working Group, The 17th Meeting of the CEOS Atmospheric Composition Virtual Constellation, 9 June, 2021.
14. **Miyazaki, K.**, Constraining CH_4 lifetime using multi-constituent chemical DA, The 17th Meeting of the CEOS Atmospheric Composition Virtual Constellation, 7 June, 2021.
15. **Miyazaki, K.**, K. Bowman, T. Sekiya, H. Eskes, F. Boersma, H. Worden, N. Livesey, K. Sudo, V. Payne, Quantifying the impacts of global shifts of anthropogenic emissions on air quality using a decadal chemical reanalysis based on the Aura and A-train satellite measurements, 2021 AMS annual meeting, 11 January 2021.
16. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, H. Eskes, J. Neu, V. Payne, T. Walker, Global NOx emission reductions and tropospheric chemistry response linked to the world-wide COVID-19 lockdowns, AGU fall meeting, 11 December 2020. (Virtual)
17. **Miyazaki, K.**, K. Bowman, J. Neu, G. Osterman, T. Sekiya, M. Takigawa, H. Eskes, K. Sudo, Z. Jiang , X. Chen, M. Ru, Y. Zhang, and D. Shindell, Global air quality and tropospheric ozone responses to reduced NOx emissions linked to COVID-19, TROPOMO-OMI workshop 2020, 28 October 2020. (Virtual)
18. **Miyazaki, K.**, K. Bowman, J. Neu, G. Osterman, V. Payne, Updated tropospheric chemistry reanalysis and emission estimates using long-term sounder composition records, NASA Sounder Science Team Virtual Meeting FALL 2020, October 13, 2020. (Virtual)
19. **Miyazaki, K.**, K. Bowman, T. Oda, Evolution of fossil-fuel emissions constrained by chemical data assimilation, The 16th international workshop on greenhouse gas measurements from space, June 2-5, 2020 (Virtual)
20. **Miyazaki, K.**, K. Bowman, T. Sekiya, H. Eskes, F. Boersma, H. Worden, N. Livesey, V. H. Payne, K. Sudo, Y. Kanaya, M. Takigawa, and K. Ogochi, Decadal air quality changes and short-term ozone responses linked to the COVID-19 mitigation using AIRS-OMI ozone in chemical reanalysis, AIRS Science Team Meeting, May 7-14, 2020, Pasadena, CA, USA (Virtual).

21. **Miyazaki, K.**, and K. Bowman, Evaluating the potential of chemical reanalysis products for air pollution exposure assessment, AGU Fall Meeting 2019, San Francisco, CO, USA, 10 December 2019.
22. **Miyazaki, K.**, K. W. Bowman, D. Fu, J. Neu, G. Osterman, S. S. Kulawik, M. Lee, J. Worden, Z. Jiang, T. Sekiya, K. Sudo, Y. Kanaya, H. Eskes, K. F. Boersma, V. Huijnen, A. M. Thompson, B. Gaubert, J. Barre, L. K. Emmons, H. Worden, D. Henze, B. McDonald, T. He, D. Jones, A. Arellano, K. Yumimoto, T. Walker, J. Flemming, A. Inness, and the MLS and TES science teams, Decadal multi-constituent chemical reanalysis and its applications in air quality and climate research, 14th SPARC data assimilation workshop, Boulder, Colorado, USA, 11-12 September 2019.
23. **Miyazaki, K.**, K. Bowman, J. Worden, T. Sekiya, K. Sudo, Y. Kanaya, H. Eskes, K. F. Boersma, Z. Jiang, K. Yumimoto, T. Walker, Decadal changes in global NOx, CO, and SO_2 emissions derived from multi-model multi-constituent satellite data assimilation, 2019 International Emission Inventory Conference, Dallas, Texas, USA, 1 August 2019.
24. **Miyazaki, K.**, K. W. Bowman, Predicting FF CO_2 fluxes using top-down NOx and CO emissions estimated from multi-constituent chemical data assimilation, The 15th Meeting of the Atmospheric Composition Virtual Constellation, Tokyo, Japan, 11 June 2019.
25. **Miyazaki, K.**, Bowman, K. W., Yumimoto, K., Walker, T., and Sudo, K., Multi-model comparisons of multi-constituent satellite data assimilation based on ensemble Kalman filter for tropospheric chemistry analysis, 9th International GEOS-Chem Meeting (IGC9), May 6-9, 2019, Harvard University, MA, USA.
26. **Miyazaki, K.** and K. W. Bowman, Estimating and predicting FF CO_2 fluxes using top-down NOx emissions and CO_2 observations and inventories, OCO-2/OCO-3 Science Team Meeting, 25 April 2019, Cocoa Beach, Florida, USA.
27. **Miyazaki, K.**, D. Fu, K. W. Bowman, J. Neu, G. Osterman, S. S. Kulawik, T. Sekiya, K. Sudo, Y. Kanaya, M. Takigawa, K. Ogochi, B. Gaubert, J. Barre, L. Emmons, and KORUS-AQ team, AIRS/OMI tropospheric ozone assimilation and chemical reanalysis during the NASA KORUS-AQ aircraft campaign, AIRS Science Team Meeting Agenda April 3-5, 2019, Pasadena, CA, USA.
28. **Miyazaki, K.**, K. W. Bowman, K. Yumimoto, T. Walker, K. Sudo, and H. Eskes, Multi-model comparisons of multi-constituent satellite data assimilation for tropospheric chemistry analysis using ensemble Kalman filter, AGU Fall Meeting 2018, Washington DC, USA, 14 December 2018.
29. **Miyazaki, K.**, K. W. Bowman, H. Eskes, T. Sekiya, K. Sudo, Multi-constituent chemical data assimilation and AQ-GHG synergies, The 14th Meeting of the Atmospheric Composition Virtual Constellation, College Park, Maryland, USA, 4 May 2018.
30. **Miyazaki, K.**, T. Sekiya, D. Fu, K. W. Bowman, S. S. Kulawik, K. Sudo, T. Walker, Y. Kanaya, M. Takigawa, K. Ogochi, H. Eskes, F. Boersma, B. Gaubert, J. Barre, and L. Emmons, NOx, CO, SO2 emissions from an updated Tropospheric Chemistry Reanalysis (TCR-2) for 2005–2017, IGAC AMIGO Scoping Meeting, Laboratoire d'Aerologie, Toulouse, April 4, 2018.
31. **Miyazaki, K.**, T. Sekiya, D. Fu, K. W. Bowman, T. Walker, S. S. Kulawik, K. Sudo, Y. Kanaya, M. Takigawa, K. Ogochi, B. Gaubert, J. Barre, L. Emmons, Application of multi-constituent satellite data assimilation for KORUS-AQ, AGU Fall Meeting 2017, New Orleans, USA, 11 December 2017.
32. **Miyazaki, K.**, H. Eskes, F. Boersma, K. Bowman, Y. Kanaya, T. Sekiya, Decadal changes in global surface NOx emissions from multi-constituent satellite data assimilation, 18th GEIA Conference, Hamburg, Germany,14 September, 2017.
33. **Miyazaki, K.**, T. Sekiya, D. Fu, K. W. Bowman, S. S. Kulawik, K. Sudo, Y. Kanaya, M. Takigawa, K. Ogochi, B. Gaubert, J. Barre, L. Emmons, and KORUS-AQ team, Application of multiple-species satellite data assimilation for KORUS-AQ and air quality monitoring over East Asia, AOGS 14th Annual Meeting, SUNTEC Singapore, Singapore, 12 August, 2017.
34. **Miyazaki, K.**, K. Bowman, Evaluation of ACCMIP and CCMI ozone simulations using a multi-constituent chemical reanalysis, Chemistry-Climate Model Initiative Science Workshop, Météo-France, Toulouse, France, 15 June, 2017.
35. **Miyazaki, K.**, K. Bowman, K. Yumimoto, T. Walker, Development of a tropospheric chemistry data assimilation system: GEOS-Chem-EnKF, The 8th International GEOS-Chem Meeting, Harvard University, Cambridge, USA, 2 May, 2017.
36. **Miyazaki, K.**, H. Eskes, K. Sudo, K. W. Bowman, F. Boersma, D. Fu, S. S. Kulawik, E. Wong, T. Sekiya, A tropospheric chemistry reanalysis based on an assimilation of the A-Train's multi-sensor system, 3rd International A-Train Symposium, 2017 Pasadena Convention Center Pasadena, California, USA, 21 April, 2017.
37. **Miyazaki, K.**, D. Fu, K. Bowman, S. Kulawik, T. Sekiya, Y. Kanaya, K. Sudo, H. Worden, B. Gaubert, J. Barre, L. Emmons, Air quality monitoring over East Asia based on multiple-species satellite data assimilation, The 1st KORUS-AQ Science Team Meeting, Jeju, South Korea, 27 February, 2017.
38. **Miyazaki, K.**, H. Eskes, K. Sudo, K. F. Boersma, K. W. Bowman, Y. Kanaya, Decadal changes in global surface NOx emissions from multi-constituent satellite data assimilation, AGU Fall Meeting 2016, San Francisco, USA, 16 December 2016.

39. **Miyazaki, K.** and K. Bowman, Application of tropospheric chemistry reanalysis to chemical OSSE studies, Second Workshop on Atmospheric Composition Observation System Simulation Experiments (OSSEs), Reading, UK, 11 November, 2016.
40. **Miyazaki, K.**, K. Bowman, and H. Eskes, Evaluation of CCMI and ACCMIP ensemble simulations using atmospheric chemical reanalysis, IGAC/SPARC CCMI workshop 2015, Rome, Italy, 8 October 2015.
41. **Miyazaki, K.**, and P. Patra, OH inter-hemispheric ratio and inter-annual variations in CCMs, IGAC/SPARC CCMI workshop 2015, Rome, Italy, 8 October 2015.
42. **Miyazaki, K.**, A tropospheric chemistry reanalysis for the years 2005-2014 based on an assimilation of AURA OMI, MLS, TES and MOPITT satellite data, OMI Science Team Meeting nr. 19 (2015), KNMI, Utrecht, the Netherlands, 2 September 2015.
43. **Miyazaki, K.**, Simultaneous assimilation of multi-species data for the analysis of chemical composition, Univ. of Reading seminar, Reading, UK, 25 October 2013.
44. **Miyazaki, K.**, Global lightning production of NOx estimated by assimilation of multiple satellite datasets, KNMI seminar, Utrecht, The Netherlands, 18 October 2013.
45. **Miyazaki, K.**, Satellite data assimilation of atmospheric composition, A U.S. – Japan Workshop on the Tropical Tropopause Layer, East-West Center Honolulu, East-west Center, Honolulu, USA, 15 October 2012.
46. Miyazaki, K., and H. Eskes, Simultaneous assimilation of satellite NO2, O_3, CO, HNO_3 data for the analysis of tropospheric chemical composition and emissions, ESA ATMOS2012, Oud sint-jan congress centre, Bruges, Belgium, 22 June 2012.
47. Miyazaki, K., H. Eskes, and K. Sudo, Simultaneous assimilation of satellite NO_2, O_3, CO, and HNO_3 data for the analysis of the tropospheric chemical composition, The EGU General Assembly 2012, Austria center Vienna, Vienna, Austria, 24 April 2012.
48. Miyazaki, K., H. Eskes, Surface and lightning NOx emission estimates from data assimilation of OMI and TES satellite data, AGU Fall Meeting 2011, San Francisco, December 2011.
49. Miyazaki, K., H. Eskes, Global NOx emission estimates from OMI NO_2 data and ensemble Kalman filter data assimilation, AIR QUALITY AND CLIMATE CHANGE: Interactions and Feedback, Urbino, Italy, 13-16 September 2011.
50. Miyazaki, K., T. Sekiyama, T. Nakamura, M. Deushi, T. Maki, C. Kobayashi, H. Akiyoshi, K. Shibata, Y. Yokoo, M. Sawada, T. Nakazawa, S. Aoki, and T. Iwasaki, Recent developments in chemical data assimilation for atmospheric gases and aerosols in Japan, The 8th Stratospheric Processes and their Role in Climate (SPARC) Data Assimilation workshop, Brussels, Belgium, June 20-22, 2011.
51. Miyazaki, K., T. Maki, T. Iwasaki, Four-dimensional data assimilation of GOSAT data using an ensemble Kalman filter, The 3rd GOSAT RA PI Meeting, Edinburgh, Scotland, 19-20 May, 2011.
52. Miyazaki, K., H. Eskes, Global NOx emission estimates from OMI NO_2 data and ensemble Kalman filter data assimilation, MACC Conference on Monitoring and Forecasting Atmospheric Composition, Utrecht, The Netherlands, 23-27 May 2011.
53. Miyazaki, K., H. Eskes, Global NOx emission estimates using OMI NO_2 data and ensemble-based data assimilation, The EGU General Assembly 2011, Vienna, Austria, 03-08 April 2011.
54. Miyazaki, K., K. Sato, S. Watanabe, Y. Tomikawa, Y. Kawatani, and M. Takahashi, Transport and mixing in the extratropical tropopause region in a high vertical resolution GCM, AGU Chapman Conference on Atmospheric Gravity Waves and Their Effects on General Circulation and Climate, Honolulu, Hawaii, March 2011.
55. Miyazaki, K., Potential impacts of GOSAT, CONTRAIL, and surface observations on carbon flux estimation with an ensemble-based 4D data assimilation, The Seventh Stratospheric Processes And their Role in Climate (SPARC) Data Assimilation (SPARC-DA7), Exeter, England, 21-23 June 2010.
56. Miyazaki, K., S. Watanabe, Y. Kawatani, Y. Tomikawa, M. Takahashi, and K. Sat, Transport and mixing in the extratropical tropopause region in a high vertical resolution GCM, IGAC-SPARC Joint Workshop, Kyoto, Japan, October 25-26, 2009.
57. Miyazaki, K., Performance of a local ensemble transform Kalman filter data assimilation system for the analysis of the atmospheric circulation and the distribution of long-lived tracers, The 5TH WMO Symposium on Data Assimilation, Melbourne, Australia, 5- 9 October, 2009.
58. Miyazaki, K., S. Watanabe, Y. Kawatani, Y. Tomikawa, M. Takahashi, and K. Sat, Transport and mixing in the extratropical tropopause region in a high vertical resolution GCM, The Extra-tropical UTLS: observations, concepts and future directions, Boulder, USA, 19-22 October, 2009.
59. Miyazaki, K., Performance of local ensemble transform Kalman filter data assimilation system on analysis of long-lived tracer distributions in the troposphere and stratosphere, MOCA-09: IAMAS - IAPSO - IACS 2009 Joint Assembly, Montreal, Canada, July, 2009.
60. Miyazaki, K., and K. Sudo, Development of a chemical data assimilation system using a local ensemble transformed Kalman filter: A perfect model experiment, WWRP/THORPEX WORKSHOP on 4D-VAR and ENSEMBLE KALMAN FILTER INTER-COMPARISONS, Buenos Aires, Argentina, November 2008.

61. Miyazaki, K., and T. Iwasaki, Analysis of mean downward velocity around the Antarctic polar vortex, SPARC 4th General Assembly, Bologna, Italy, August-September 2008.
62. Miyazaki, K., S. Watanabe, Y. Tomikawa, Y. Kawatani, M. Takahashi, K. Sato, Analysis of extratropical UTLS structure using a high vertical resolution GCM, SPARC 4th General Assembly, Bologna, Italy, August-September 2008.
63. Miyazaki, K., and K. Sudo, Development of a chemistry-climate coupling data assimilation system using a local ensemble transformed Kalman filter, Quadrennial Ozone Symposium 2008, Tromso, Norway, June-July 2008.
64. Miyazaki, K., and T. Iwasaki, Global transport and life cycle of ozone in the stratosphere, SMILES International Workshop 2008, Kyoto, Japan, March 2008.
65. Miyazaki, K., and K. Sudo, Development of a chemical data assimilation system using a local ensemble transformed Kalman filter, Third WCRP International Conference on Reanalysis, Tokyo, Japan, January 2008.
66. Miyazaki, K., and T. Iwasaki, The gradient genesis of the stratospheric trace species in the subtropics and around the polar vortex, AMS 14th Conference on Middle Atmosphere, Portland, Oregon, USA, August 2007.
67. Miyazaki, K., and T. Iwasaki, The gradient genesis of the stratospheric trace species in the subtropics and around the polar vortex, European Geosciences Union General Assembly 2007, Vienna, Austria, April 2007.
68. Miyazaki, K., and Patra, K. Prabir, M, Takigawa, and T, Nakazawa, Transport analysis of tropospheric carbon dioxide, European Geosciences Union General Assembly 2007, Vienna, Austria, April 2007.
69. Miyazaki, K., and T. Iwasaki, Formation and maintenance mechanisms of the constituent gradient in the lower stratosphere, An Earth System Science Partnership Global Environmental Change Open Science Conference, Beijing, China, November 2006.
70. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, Third Stratospheric Processes And their Role in Climate (SPARC) Data Assimilation (SPARC-DA3) Workshop, Banff, Canada, September 2005.
71. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi and T. Sekiyama, Choosing meteorological variables to be assimilated into CTM driven by GCM for ozone reanalysis, Third Stratospheric Processes And their Role in Climate (SPARC) Data Assimilation (SPARC-DA3) Workshop, Banff, Canada, September 2005.
72. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi, T. Sekiyama, H.Akiyoshi and M. Takigawa, Diagnostic tool for meridional constituent transport based on mass-weighted isentropic zonal means: Intercomparison of MRI and NIES chemical transport models, Chemistry-Climate Workshop CCMVal 2005, Boulder, USA, October 2005.
73. Miyazaki, K., T. Iwasaki and K. Shibata, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, IAGA Scientific Assembly, Toulouse, France, July 2005.
74. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi, The roles of transports in seasonal variation of total ozone amount, IAGA Scientific Assembly, Toulouse, France, July 2005.
75. Miyazaki, K., T. Iwasaki and K. Shibata, The roles of transports in seasonal variation of total ozone amount, AMS 13th Conference on Middle Atmosphere, Cambridge, Massachusetts, USA, June 2005.
76. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi, The roles of transports in seasonal variation of total ozone amount, AMS 13th Conference on Middle Atmosphere, Cambridge, Massachusetts, USA, June 2005.
77. Miyazaki, K., T. Iwasaki, K. Shibata and M. Deushi and T. Sekiyama, Choosing meteorological variables to be assimilated into CTM driven by GCM for ozone reanalysis, 2005/6/13-17, AMS 13th Conference on Middle Atmosphere, Cambridge, Massachusetts, USA, June 2005.
78. Miyazaki, K., and T. Iwasaki, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, Canadian GCC (Global Chemistry for Climate) summer school, Banff, Canada, May 2005.
79. Miyazaki, K., and T. Iwasaki, Seasonal variation of the meridional ozone transport in the troposphere and stratosphere based on isentropic representation, 5th International Workshop on Global Change: Connection to the Arctic (GCCA5), Tsukuba, Japan, November 2004.
80. Miyazaki, K., and T. Iwasaki, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, 3rd SPARC General Assembly, Victoria, Canada, August 2004.
81. Miyazaki, K., and T. Iwasaki, Diagnosis of meridional ozone transport based on isentropic zonal mean -Part II: Seasonal cycle, Quadrennial Ozone Symposium 2004, Kos, Greece, June 2004.
82. Miyazaki, K., and T. Iwasaki, Diagnosis of meridional ozone transport based on mass weighted isentropic zonal means, International Review Meeting on the Northern Environmental Change Research Project, Sendai, Japan. March 2004.
83. Miyazaki, K., T. Iwasaki, K. Shibata, M. Chiba, T. Sekiyama and K. Orito, Sensitivity of stratospheric ozone to mean circulation in the MRI/JMA ozone reanalysis system, International Conference on Earth System Modelling, Hamburg, Germany, September 2003.
84. Miyazaki, K., T. Iwasaki, M. Chiba, K. Shibata, T. Sekiyama and K. Orito, Sensitivity of stratospheric ozone to mean circulation an ozone reanalysis system based on a CTM, International Union of Geodesy and Geophysics, Sapporo, Japan, July 2003.

+ More than 100 presentations at Japanese domestic conferences

Colloquia and Seminars

2022: Harvard University, JPL Carbon Club

2021: UCLA, NASA/NOAA Interagency COVID-AQ Discussion

2018: KNMI, University of Toronto, Environment and Climate Change Canada

2016: University of Toronto

2015: NCAR, JPL, Wageningen University, UC Berkeley

2013: University of Hawai‘i, KNMI, University of Reading, Kyushu University, Ibaraki University

2012: Eindhoven University of Technology, KNMI, University of Tokyo

2010: KNMI, Nagoya University

2007: Japan Meteorological Agency

2006: Kyoto University, University of Tokyo

2004: University of Chicago, NCAR, NOAA

Media releases

NASA Tracks COVID-19's Atmospheric Fingerprint https://www.youtube.com/watch?v=mBXeA3v1NLY used in "NASA Science Enables First-of-its-Kind Detection of Reduced Human CO2 Emissions" https://www.nasa.gov/feature/goddard/2022/for-the-1st-time-nasa-spots-short-term-drops-in-co2-emissions-from-human-activity
https://science.nasa.gov/science-news/nasa-trackscovid-19s-atmospheric-fingerprint

Local Lockdowns Brought Fast Global Ozone Reductions, NASA Finds, June 9, 2021 (more than 200 new articles) https://www.jpl.nasa.gov/news/local-lockdowns-brought-fast-global-ozone-reductions-nasa-finds

China's COVID Lockdown Significantly Cut Air Pollution-Related Hospitalizations, October 10, 2020 https://nicholas.duke.edu/news/chinas-covid-lockdown-significantly-cut-air-pollution-related-hospitalizations

Unexpected slowdown of US pollutant emission reduction in the past decade (in Japanese), May 1, 2018 http://www.jamstec.go.jp/j/about/press_release/20180501/

Decadal changes in global surface NOx emissions from multi-constituent satellite data assimilation (in Japanese), January 27, 2017 http://www.jamstec.go.jp/j/about/press_release/20170127/

Animations and articles for the general public: Global Tropospheric Ozone Response to Worldwide COVID-19 Lockdowns, https://svs.gsfc.nasa.gov/4912

Animations and articles for the general public: Reduction in Tropospheric NOx and Ozone Corresponding to Worldwide COVID-19 Lockdowns, https://svs.gsfc.nasa.gov/4959

Animations and articles for the general public: The impact of COVID-19 restrictions on global air quality, https://www.youtube.com/watch?v=prTLw1YoiIU

Peer review

Proceedings of the National Academy of Sciences, Elementa, Earth System Science Data, Scientific Reports, Journal of the Atmospheric Sciences, Journal of Geophysical Research –Atmosphere, Atmospheric Chemistry and Physics, Geoscientific Model Development, Journal of Atmospheric and Solar-Terrestrial Physics,

Atmospheres, Environmental Pollution, Scientific Online Letters on the Atmosphere, Remote Sensing, Engineering and Applied Science Research, Geoscience letters, Environmental Research Letter, Geoscience Letters

Public lecture

2022: Middle school science class
2022: Elementary school science class
2021: Elementary school science class