



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 currently a PI of several NASA projects, including the NASA Aura Science team and Earth Science U.S. Participating Investigator programs, and the JPL Science Understanding from Data Science project. His current research includes observing system simulation experiments (OSSEs), evaluations of satellite data products and chemistry-climate models, and air quality and greenhouse gas emission analysis.

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EDUCATION

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

Focus: Atmospheric Sciences

Professional Experience

	<i>University of California, Los Angeles</i>
2022 - Present	Visiting Project Scientist , Joint Institute for Regional Earth System Science and Engineering (JIFRESSE)
	<i>Jet Propulsion Laboratory, California Institute of Technology</i>
2019 - Present	Scientist , Tropospheric Composition Group
2016 - 2017	Research Scholar , Carbon Cycle and Ecosystems Group
	<i>Japan Agency for Marine-Earth Science and Technology (JAMSTEC)</i>
2019 - Present	Visiting Senior Scientist , Geochemical Cycle Research Group
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
	<i>University of Hawai'i</i>
2012 - 2013	Visiting Scientist , International Pacific Research Center (IPRC)
	<i>Royal Netherlands Meteorological Institute (KNMI)</i>
2010 - 2012	Visiting Scientist , Chemistry and Climate Division
	<i>The Japan Society for the Promotion of Science (JSPS)</i>
2010 - 2012	Research Fellow , Overseas Research Fellowships
2003 - 2006	Research Fellow , Category DC1: for excellent Ph.D. students

Professional Activities

2023	Advisory Committee , The University of North Carolina at Chapel Hill, Environmental Sciences and Engineering
2023	Member , Use of Geostationary Satellites to Improve Air Quality Characterization and Forecasts, the International Space Science Institute (ISSI)
2022 – present	SOC , WMO workshop on the Impact of Various Observing Systems on NWP and Earth System Prediction
2022 – present	Team member , The Joint Center for Satellite Data Assimilation (JCSDA) AOP2022
2022 - present	Science team member , GOSAT-GW project
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
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, <i>Science Council of Japan</i>
2013 - 2017	Expert investigator , National Institute of Science and Technology Policy, <i>Ministry of Education, Culture, Sports, Science and Technology, Japan</i>

Awards

2023	Best presentation award at EPA 2023 International Emissions Inventory Conference
2021	NASA Exceptional Scientific Achievement Medal
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

2023-	Mentor , Mukesh Rai, JPL postdoc Mentor , Machenzie Arnold, 2023 JIFRESSE Summer Internship Program (JSIP) Mentor , Jiani Yang, JPL Summer Internship Program (JPLSIP) Co-mentor , Kelsey Doerksen, JPL Postdoctoral Researcher JPL Visiting Student Research Program (JVSRP)
2022 - present	Mentor , Joanna Li, UCLA Student Research Program (SRP) Mentor , Machenzie Arnold, UCLA Strategic University Research Partnerships (SURP) Program Mentor , Oscar Neya, 2022 UCLA Strategic University Research Partnerships (SURP) Program
2020 - present	Co-mentor , Jiani Yang, Caltech graduate student
2022	Mentor , Joanna Li, 2022 JIFRESSE Summer Internship Program (JSIP) Co-Mentor , Eshani Patel, 2022 Caltech SURF Internship Program (JSIP)
2021	Mentor , Madelyn Romberg, 2021 JIFRESSE Summer Internship Program (JSIP) & JPL Visiting Student Research Program (JVSRP)
2019	Mentor , Nadia Columbi, summertime intern student (UCLA)
2016 – 2020	Mentor , Takashi Sekiya, postdoctoral scientist (JAMSTEC)
2016 - 2019	Co-supervisor , Dai Koshin, 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

NASA and JPL proposals funded as PI

- **PI**, *Shifting patterns of global emissions and ozone chemical regime linked to human activity and natural processes using a decadal chemical reanalysis*, **NASA ROSES Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2023-2026)
- **PI**, *New satellite-based products of global fossil fuel CO₂ emissions from JAXA's GOSAT-GW*, **NASA ROSES Earth Science U.S. Participating Investigator** (FY2022-2027)
- **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**, *MOMO-Chem research support*, **NASA ROSES Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2022)
- **PI**, *Subgrid Scale Drivers of Pollution Inferred from Model-Based Inference and Machine Learning*, **JPL Strategic research and technology development (SRTD)**, (FY2022-2024)
- **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)

NASA and JPL proposals funded as Co-I and collaborators

- **Co-I**, *NASA Carbon Monitoring System Flux (CMS-Flux) in support of the Global Stocktake*, **NASA ROSES Carbon Monitoring System** (FY2023-2026) (PI: Kevin Bowman)
- **Collaborator**, *Tropospheric Regional Atmospheric Composition and Emissions Reanalysis - 1 (TRACER-1) 2005 - 2024*, **NASA ROSES Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2023-2026) (PI: Arthur Mizzi)
- **Collaborator**, *Regimes of Upper Troposphere / Lower Stratosphere (UTLS) Satellite-derived Trends in Composition (RUSTIC)*, **NASA ROSES Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2023-2026) (PI: Gloria Manney)
- **Co-I**, *STRATOS*, **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 CO₂ point sources using multiple satellite instruments, **NASA ROSES 2020: Science Team for the OCO Missions NNH20ZDA001N-OCOST** (2021-2014) (PI: Daniel Cusworth)
- **Collaborator**, 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, **NASA ROSES Atmospheric Composition: Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2018-2020) (Avelino Arellano Jr.)
- **Collaborator**, The Role of Anthropogenic Combustion on Urban-Geo System Environments: A Multi-Species Analysis Over Megacities, **NASA ROSES Atmospheric Composition: Aura Science Team and Atmospheric Composition Modeling and Analysis Program** (FY2016-2018) (Avelino Arellano Jr.)
- **Collaborator**, Global and Regional Chemical Forecasting and Analysis using CAM-chem, Data Assimilation and WRF-Chem for KORUS-AQ, **NASA ROSES KORUS-AQ: An International Cooperative Air Quality Field Study in Korea** (FY2015-2017) (PI: Louisa Emmons)

Other funded proposals

- **Co-I**, *Quantifying Trends in Top-down Emission Estimates of CO and NO_x*, CSA Class Grant and Contribution Program (2021-2024) (PI: Dylan Jones)
- **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 Young Scientists (B) 19740300 (2012–2014)
- **PI**, *Global chemical data assimilation of OMI NO₂ 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 Young 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 CH₄ and N₂O 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 talks

1. **Miyazaki, K.**, Shifting patterns of global emissions and ozone chemical regime linked to human activity and natural processes using a decadal chemical reanalysis, The 104th AMS Annual Meeting, 1 February 2024, Baltimore, MD
2. **Miyazaki, K.** and Kevin Bowman, Predictability of fossil fuel CO₂ from air quality emissions, AGU Annual Meeting 2023, San Francisco, CA, 11 December 2023
3. **Miyazaki, K.** and Kevin Bowman, Predictability of fossil fuel CO₂ from air quality emissions, Korean Society for Atmospheric Environment, Busan, Korea, 26 October 2023
4. **Miyazaki, K.**, Tropospheric Chemistry Reanalysis, The 2nd International Workshop for the FRIEND (Fine Particle Research Initiative in East Asia Considering National Differences) Project, Busan, Korea, 23 October 2023
5. **Miyazaki, K.**, Atmospheric Composition Reanalysis, 2023 Meteorology and Climate - Modeling for Air Quality Conference, Davis, CA, USA, 13 September 2023
6. **Miyazaki, K.**, Atmospheric Composition Reanalysis, ECMWF Annual Seminar, Reading, UK, 4 September 2023
7. **Miyazaki, K.**, Atmospheric composition Reanalysis, KNMI The R&D Satellite Observations department colloquium, De Bilt, the Netherlands, 31 August 2023
8. **Miyazaki, K.**, Atmospheric Chemistry Reanalysis, IGAC AMIGO training workshop, Brussels, Belgium, 19 June 2023
9. **Miyazaki, K.**, Tropospheric Chemistry Reanalysis, Banff International Research Station (BIRS) Workshop on Mathematical Approaches of Atmospheric Constituents Data Assimilation and Inverse Modeling, Banff, Canada, 20 March 2023

10. **Miyazaki, K.**, State of the Science: Source Attributions, Looking toward the 2027 Decadal Survey: Considerations for a coordinated national air quality architecture, Pasadena, CA, USA, February 6, 2023.
11. **Miyazaki, K.**, K. Bowman, Predictability of fossil fuel CO₂ from air quality emissions, Caltech Yuk Lunch Seminar, 1 February 2023
12. **Miyazaki, K.**, Atmospheric composition modeling, data assimilation, and emission estimates using multi-constituent satellite observations. University of California Irvine, Department of Earth System Science Seminar, 16 November 2022
13. **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)
14. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 world-wide lockdowns, AGU Fall Meeting 2021, 15 December 2021 (Virtual)
15. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 world-wide lockdowns, Caltech Yuk Lunch Seminar, 1 September 2021 (Virtual)
16. **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)
17. **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)
18. **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)
19. **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)
20. **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.
21. **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.
22. **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.
23. **Miyazaki, K.**, A tropospheric chemistry reanalysis based on multi-constituent satellite data assimilation, University of Toronto Noble seminar series, Toronto, Canada, 3 October 2016.
24. **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.
25. **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.
26. **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.
27. **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.

28. **Miyazaki, K.**, Estimating surface NO_x and CO emissions and lightning NO_x 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.
29. **Miyazaki, K.**, Global and Asian NO_x 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.
30. **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. W. Han, T.-L. He, Z. Jiang, R. Zhu, D. Jones, **K. Miyazaki**, Y. Shen, The capability of deep learning model to predict ozone across continents in China, the United States and Europe, *Geophysical Research Letter*, in revision.
2. Takashi Sekiya, **Kazuyuki Miyazaki**, Henk Eskes, Kevin Bowman, Kengo Sudo, Yugo Kanaya, Masayuki Takigawa, The worldwide COVID-19 lockdown impacts on global secondary inorganic aerosols and radiative budget. *Scienc. Advances*, **9**, eadh2688(2023). DOI: [10.1126/sciadv.adh2688](https://doi.org/10.1126/sciadv.adh2688)
3. B.M. Monge-Sanz, T. Birner, S. Chabrilat, M Diallo, F. Haenel, P. Konopka, B. Legras, F. Ploeger, T. Reddman, G. Stiller, J.S. Wright, M. Abalos, H. Boenisch, S. Davis, H. Garny, P. Hitchcock, **K. Miyazaki**, H.K. Roscoe, K. Sato, M Tao, D Waugh, SPARC Report N°10 (2022) of The SPARC S-RIP Activity: SPARC Reanalysis Intercomparison Project (S-RIP) Final Report, **Chapter 05**: Brewer-Dobson Circulation, WCRP Report 6/2021 SPARC Report No. 10, DOI 10.17874/800dee57d13.
4. Pendergrass, D. C., Jacob, D. J., Nesser, H., Varon, D. J., Sulprizio, M., **Miyazaki, K.**, and Bowman, K. W.: CHEEREIO 1.0: a versatile and user-friendly ensemble-based chemical data assimilation and emissions inversion platform for the GEOS-Chem chemical transport model, *Geosci. Model Dev.*, **16**, 4793–4810, <https://doi.org/10.5194/gmd-16-4793-2023>, 2023.
5. **Miyazaki, K.**, Bowman, K. Predictability of fossil fuel CO₂ from air quality emissions. *Nature Communications*, **14**, 1604 (2023). <https://doi.org/10.1038/s41467-023-37264-8>
6. Kaoru Sato and Yoshihiro Tomikawa and Masashi Kohma and Ryosuke Yasui and Dai Koshin and Haruka Okui and Shingo Watanabe and **Kazuyuki Miyazaki** and Masaki Tsutsumi and Damian Murphy and Chris Meek and Yufang Tian and Manfred Ern and Gerd Baumgarten and Jorge L. Chau and Xinzhaoh Chu and Richard L. Collins and Patrick Joseph Espy and Hiroyuki Hashiguchi and Andrew John Kavanagh and Ralph Latteck and Franz-Josef Luebken and Marco Milla and Satonori Nozawa and Yasunobu Ogawa and Kazuo Shiokawa and M. Joan Alexander and Takuji Nakamura and William Edmund Ward, Interhemispheric Coupling Study by Observations and Modelling (ICSOM): Concept, campaigns, and initial results. *Journal of Geophysical Research: Atmospheres*, **128**, e2022JD038249. <https://doi.org/10.1029/2022JD038249>
7. Okamoto, S., Cuesta, J., Beekmann, M., Dufour, G., Eremenko, **M.**, **Miyazaki, K.**, Boonne, C., Tanimoto, H., and Akimoto, H.: Impact of different sources of precursors on an ozone pollution outbreak over Europe analysed with IASI+GOME2 multispectral satellite observations and model simulations, *Atmos. Chem. Phys.*, **23**, 7399–7423, <https://doi.org/10.5194/acp-23-7399-2023>, 2023.
8. 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.
9. 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.*, **23**, 2667–2682, <https://doi.org/10.5194/acp-23-2667-2023>, 2023.
10. 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. *Journal of Geophysical Research: Atmospheres*, **128**, e2022JD037822. <https://doi.org/10.1029/2022JD037822>, 2023.
11. Bisht, J. S. H., Patra, P. K., Takigawa, M., Sekiya, T., Kanaya, Y., Saitoh, N., and **Miyazaki, K.**: Estimation of CH₄ emission based on an advanced 4D-LETKF assimilation system, *Geosci. Model Dev.*, **16**, 1823–1838, <https://doi.org/10.5194/gmd-16-1823-2023>, 2023.

12. 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.
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5. **Miyazaki, K.**, Y. Marchetti, S. Lu, K. Bowman, J. Montgomery, J. Li, E. Patel, K. Doerksen, Driving mechanisms of global surface ozone and its bias in the current chemical reanalysis using machine-learning approaches, TOAR-II IntelliAQ workshop on Machine Learning for Air Quality, 6 March 2023, Cologne, Germany.
6. **Miyazaki, K.**, Y. Marchetti, S. Lu, K. Bowman, J. Montgomery, J. Li, E. Patel, K. Doerksen, Driving mechanisms of global surface ozone and its bias in the current chemical reanalysis using machine-learning approaches, 2023 AMS annual meeting, 11 January 2023, Denver, USA.
7. **Miyazaki, K.**, Tropospheric chemistry reanalysis and emission estimates based on the A-train satellite measurements, 2nd Climate Observation Conference, 17 October 2022, Darmstadt, Germany.
8. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 world-wide lockdowns, Sentinel-5P Mission: 5 years anniversary, 12 October 2022 | Taormina, Italy.
9. **Miyazaki, K.**, D. Jones, H. Worden, TOAR-II Chemical Reanalysis Focus Working Group, The iCACGP-IGAC 2022 Conference, 11 September 2020, Manchester, the UK.
10. **Miyazaki, K.** and K. Bowman, Predictability of fossil fuel CO₂ from air quality emissions, IWGGMS-18, 13 July 2022.
11. **Miyazaki, K.**, Development of a GCHP-EnKF chemical data assimilation system, The 10th International GEOS-Chem Meeting (IGC10) June 9, 2022.
12. **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.
13. **Miyazaki, K.** and K. Bowman, Updating global fossil fuel CO₂ flux inventories using top-down NO_x emissions, CEOS AC-VC-18, 14 March 2022.
14. **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
15. **Miyazaki, K.**, K. Bowman, Updating global fossil fuel CO₂ flux inventories using top-down NO_x emissions, AGU Fall Meeting 2021, 16 December, 2021.
16. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 world-wide lockdowns, NASA AIRS/Sounder Virtual Science Team Meeting 2021, 28 October 2021 (Virtual)
17. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, J. Neu, K. Sudo, G. Osterman, H. Eskes, Global tropospheric ozone responses to reduced NO_x emissions linked to the COVID-19 world-wide lockdowns, IGAC conference 2021, 9 September 2021 (Virtual)
18. **Miyazaki, K.**, D. Jones, H. Worden, TOAR-II Chemical Reanalysis Focus Working Group, IGAC conference 2021, 9 September 2021 (Virtual)
19. **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.
20. **Miyazaki, K.**, Constraining CH₄ lifetime using multi-constituent chemical DA, The 17th Meeting of the CEOS Atmospheric Composition Virtual Constellation, 7 June, 2021.
21. **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.
22. **Miyazaki, K.**, K. Bowman, T. Sekiya, M. Takigawa, H. Eskes, J. Neu, V. Payne, T. Walker, Global NO_x emission reductions and tropospheric chemistry response linked to the world-wide COVID-19 lockdowns, AGU fall meeting, 11 December 2020. (Virtual)

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24. **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)
25. **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)
26. **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).
27. **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.
28. **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.
29. **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 NO_x, CO, and SO₂ emissions derived from multi-model multi-constituent satellite data assimilation, 2019 International Emission Inventory Conference, Dallas, Texas, USA, 1 August 2019.
30. **Miyazaki, K.**, K. W. Bowman, Predicting FF CO₂ fluxes using top-down NO_x and CO emissions estimated from multi-constituent chemical data assimilation, The 15th Meeting of the Atmospheric Composition Virtual Constellation, Tokyo, Japan, 11 June 2019.
31. **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.
32. **Miyazaki, K.** and K. W. Bowman, Estimating and predicting FF CO₂ fluxes using top-down NO_x emissions and CO₂ observations and inventories, OCO-2/OCO-3 Science Team Meeting, 25 April 2019, Cocoa Beach, Florida, USA.
33. **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.
34. **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.
35. **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.
36. **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, NO_x, 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.
37. **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.
38. **Miyazaki, K.**, H. Eskes, F. Boersma, K. Bowman, Y. Kanaya, T. Sekiya, Decadal changes in global surface NO_x emissions from multi-constituent satellite data assimilation, 18th GEIA Conference, Hamburg, Germany, 14 September, 2017.
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40. **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.

41. **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.
42. **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.
43. **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.
44. **Miyazaki, K.**, H. Eskes, K. Sudo, K. F. Boersma, K. W. Bowman, Y. Kanaya, Decadal changes in global surface NO_x emissions from multi-constituent satellite data assimilation, AGU Fall Meeting 2016, San Francisco, USA, 16 December 2016.
45. **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.
46. **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.
47. **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.
48. **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.
49. **Miyazaki, K.**, Simultaneous assimilation of multi-species data for the analysis of chemical composition, Univ. of Reading seminar, Reading, UK, 25 October 2013.
50. **Miyazaki, K.**, Global lightning production of NO_x estimated by assimilation of multiple satellite datasets, KNMI seminar, Utrecht, The Netherlands, 18 October 2013.
51. **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.
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54. Miyazaki, K., H. Eskes, Surface and lightning NO_x emission estimates from data assimilation of OMI and TES satellite data, AGU Fall Meeting 2011, San Francisco, December 2011.
55. Miyazaki, K., H. Eskes, Global NO_x emission estimates from OMI NO₂ data and ensemble Kalman filter data assimilation, AIR QUALITY AND CLIMATE CHANGE: Interactions and Feedback, Urbino, Italy, 13-16 September 2011.
56. 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.
57. 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.
58. Miyazaki, K., H. Eskes, Global NO_x emission estimates from OMI NO₂ data and ensemble Kalman filter data assimilation, MACC Conference on Monitoring and Forecasting Atmospheric Composition, Utrecht, The Netherlands, 23-27 May 2011.
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65. 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.
66. 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.
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69. 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.
70. Miyazaki, K., and T. Iwasaki, Global transport and life cycle of ozone in the stratosphere, SMILES International Workshop 2008, Kyoto, Japan, March 2008.
71. 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.
72. 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.
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79. 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.
80. 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.
81. 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.
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84. 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.
85. 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.
86. 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.

87. 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.
88. 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.
89. 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.
90. 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

2023: Caltech, BIRS, JAMSTEC, IGAC AMIGO, Hokkaido University, KNMI
 2022: UC Irvine, Harvard University, JPL Carbon Club, JAMSTEC, Caltech
 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 NO_x 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

Science, Nature, Nature communications, Science Advances, 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

2023: Public science lectures at explore JPL, Elementary school science class, Elementary school student tours at JPL

2022: Elementary school science class, Middle school science class, Elementary school student tours at JPL

2021: Elementary school science class