SUDHANSHU PANDEY

Earth Science Section
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PROFESSIONAL EXPERIENCE

Scientist 1/2022 - Present
NASA Jet Propulsion Laboratory (JPL) Pasadena, CA, USA

Scientist 8/2016 - 1/2022
SRON Netherlands Institute for Space Research Utrecht, The Netherlands

EDUCATION

Ph.D. Physics
Utrecht University Utrecht, The Netherlands 8/2012 – 2/2017

BS-MS Earth Sciences
Indian Institute of Science Education & Research Kolkata, India 7/2007 – 5/2012

RESEARCH

My research focuses on the atmospheric trace gases driving climate change and atmospheric pollution. I have extensive experience in developing and utilizing observations of trace gases. I employ satellite remote sensing and advanced numerical modeling techniques to estimate and comprehend the emissions, atmospheric transport, and chemical transformations affecting the atmosphere's methane and carbon dioxide concentrations.

- Carbon emissions (methane, CO & CO2).
- Remote sensing of atmospheric trace gases (GOSAT, OCO-2, OCO-3 & TROPOMI).
- Plume detection and qualification (EMIT, Sentinel-2, Landsat, AVIRIS-NG & PRISMA).
- Atmospheric transport models to track trace gas movements (TM5 & WRF-CHEM).
- Bayesian data assimilation methods (variational and analytical approaches).
- Machine learning tools to detect and measure strong point sources (CNNs).
- Theoretical development for understanding atmospheric trace gas dynamics.

PUBLICATIONS

Peer-reviewed

- Pandey, S., et al. Daily detection and quantification of methane leaks using Sentinel-3: A tiered satellite observation approach with Sentinel-2 and Sentinel-5p. Remote Sensing of Environment, 296, 113716, 2023.
- Byrne, B., et al. Unprecedented Canadian forest carbon emissions during 2023. Under Review Nature, ResearchSquare preprint DOI: 10.21203/rs.3.rs-3684305/v1, 2023.
- Schuit, B. J., et al. Automated detection and monitoring of methane super-emitters using satellite data. Atmos. Chem. Phys., 23, 9071–9098, 2023.
- Worden, J. R., et al. Verifying Methane Inventories and Trends With Atmospheric Methane Data. AGU Adv., 4, 2023.
- Naus, S., et al. Assessing the Relative Importance of Satellite-Detected Methane Superemitters in

Quantifying Total Emissions for Oil and Gas Production Areas in Algeria. Environ. Sci. Technol., 2023.
- Varon, D. J., et al. Continuous weekly monitoring of methane emissions from the Permian Basin by inversion of TROPOMI satellite observations. Atmos. Chem. Phys., 23, 7503–7520, 2023.
- Maasakkers, J. D., et al. Reconstructing and quantifying methane emissions from the full duration of a 38-day natural gas well blowout using space-based observations. Remote Sens. Environ., 270, 112755, 2022.
- Maasakkers, J. D., et al. "Using satellites to uncover large methane emissions from landfills." Science Advances, 8, 1–9, 2022.
- Sadavarte, P., et al. A high-resolution gridded inventory of coal mine methane emissions for India and Australia. Elementa, 10, 1–14, 2022.
- Pandey, S., et al. Order of magnitude wall time improvement of variational methane inversions by physical parallelization: a demonstration using TM5-4DVAR. Geoscientific Model Development, 15, 4555–4567, 2022.
- Pandey, S., et al. Using satellite data to identify the methane emission controls of South Sudan's wetlands. Biogeosciences, 18, 557–572, 2021.
- Cusworth, D. H., et al. Multi-Satellite Imaging of a Gas Well Blowout Enables Quantification of Total Methane Emissions. Geophys. Res. Lett., 48(2), 1–9, 2021.
- Sadavarte, P., et al. "Methane Emissions from Super-emitting Coal Mines in Australia quantified using TROPOMI Satellite Observations." Environmental Science & Technology, 55 (24), 16573-16580, 2021.
- Mazzini, A., et al. Relevant methane emission to the atmosphere from a geological gas manifestation. Nature Publishing Group UK., 2021.
- Zavala-Araiza, D., et al. "A tale of two regions: methane emissions from oil and gas production in offshore/onshore Mexico." Environmental Research Letters, 2021.
- Ma, S., et al. Satellite Constraints on the Latitudinal Distribution and Temperature Sensitivity of Wetland Methane Emissions. AGU Adv., 2(3), 1–12, 2021.
- Zhang, Y., et al. Quantifying methane emissions from the largest oil-producing basin in the United States from space. Sci. Adv., 2020.
- Pandey, S., et al. Satellite observations reveal extreme methane leakage from a natural gas well blowout. Proc. Natl. Acad. Sci. U. S. A., 116(52), 26376–26381, 2019.
- Ganesan, A. L., et al. Advancing Scientific Understanding of the Global Methane Budget in Support of the Paris Agreement. Global Biogeochem. Cycles, 33(12), 1475–1512, 2019.
- Varon, D.J., et al. "Satellite discovery of anomalously large methane point sources from oil/gas production." Geophysical Research Letters, 2019.
- Dekker, I. N., et al. What caused the extreme CO concentrations during the 2017 high pollution episode in India? Atmospheric chemistry and physics 19, 3433–3445, 2019.
- Borsdorff, T., et al. Carbon monoxide air-pollution on sub-city scales and along arterial roads detected by the Tropospheric Monitoring Instrument. Atmospheric chemistry and physics 19, 3579–3588, 2019.
- Naus, S., et al. Constraints and biases in a tropospheric two-box model of OH. Atmospheric Chemistry and Physics, 19(1), 407-424, 2019.
- Nechita-Banda, N., et al. Monitoring emissions from the 2015 Indonesian fires using CO satellite data. Philosophical Transactions of the Royal Society B: Biological Sciences, 373(1760), 20170307, 2018.
- Bruhwiler, L.M., et al. US CH4 emissions from oil and gas production: Have recent large increases been detected? Journal of Geophysical Research: Atmospheres, 122(7), pp.4070-4083, 2017.
- Worden, J.R., et al. Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget. Nature communications 8, no. 1: 2227, 2017.
- Pandey, S., et al. Enhanced methane emissions from tropical wetlands during the 2011 La Niña. Scientific Reports 7, 2017.
- Pandey, S., et al. Inverse modeling of GOSAT-retrieved ratios of total column CH4 and CO2 for 2009 and 2010. Atmospheric chemistry and physics, 16.8: 5043-5062, 2016.
- Pandey, S., et al. On the use of satellite-derived CH4: CO2 columns in a joint inversion of CH4 and

CO2 fluxes. Atmospheric chemistry and physics, 15.15: 8615-8629, 2015.

Others

- Bergamaschi, P., Danila, A., Weiss, R. F., Ciais, P., Thompson, R. L., Brunner, D., Pandey, S. ... & Bovensmann, H. (2018). "Atmospheric monitoring and inverse modelling for verification of greenhouse gas inventories." *Publications Office of the European Union*.
- Pandey, S. (2017). "Advancing the use of satellites to constrain atmospheric methane fluxes". Ph.D. Dissertation. Utrecht University.
- Chevallier, F.,… Pandey, S., Reuter, M., Scholze, M., and Voßbeck M.,, "Climate Assessment Report for the GHG-CCI project of ESA's Climate Change Initiative", pp. 96, version 4, 28 March 2017.

PRESENTATIONS

I have given oral and poster presentations at various conferences:

- American Geophysical Union (AGU) Fall meetings in 2015, 2018, 2019, 2021, 2022
- European Geosciences Union (EGU) General Assembly in 2017, 2018 & 2019.
- ESA Living Planet Symposium (LPS) in 2013 & 2016.
- International Carbon Dioxide Conference (ICDC) in 2017.
- International Symposium on Non-CO_2 Greenhouse Gases (NCGG) in 2014.
- International Workshop on Greenhouse Gas Measurements from Space (IWGGMS) in 2014, 2018 & 2021

COMMUNITY SERVICE

- Reviewer for scientific journals, including Atmospheric Measurement Techniques, Atmospheric Chemistry and Physics, Carbon Management, Journal of Geophysical Research, Nature Climate Change, Remote Sensing of Environment, Environmental Science & Technology, and Environmental Research Letters.

- Scientific research proposal review for NOAA.