

HANNAH NESSER

EDUCATION

HARVARD UNIVERSITY

Ph.D. Candidate, School of Engineering and Applied Sciences

CAMBRIDGE, MA

2017 - present

Researches high-resolution, analytic inversions satellite observations of atmospheric methane concentrations.

YALE UNIVERSITY

B.S., Environmental Engineering, with Distinction

NEW HAVEN, CT

2012 - 2016

Led a senior research team to develop an operational prototype of a portable air quality monitor that measured concentrations of critical pollutants for an EPA SEARCH Center.

SCHOOL FOR INTERNATIONAL TRAINING

B.S., Environmental Engineering, with Distinction

FORT DAUPHIN, MADAGASCAR

August - December 2014

Conducted research on the mechanical and social feasibility of using biogas as a fuel source for an essential oils still in two remote communities.

AWARDS

- National Science Foundation Graduate Research Program Fellowship (2017 - 2022)
- Special Commendation for Extraordinary Teaching in Extraordinary Times (COVID-19), awarded to 10% of Harvard instructors based on nomination by students (2020)
- Bok Center Certificate of Distinction in Teaching, awarded to Harvard Teaching Fellows who received an average score of 4.5 or above (2019)
- D. Allan Bromley Prize in Environmental Engineering, awarded to a Senior who has exhibited superior accomplishment and scholarly achievement in Environmental Engineering (2016)
- Richter Summer Fellowship (2015)

RESEARCH

HARVARD UNIVERSITY

Advisor: Daniel Jacob

CAMBRIDGE, MA

2017 - present

- Works to improve constraints on the magnitude and distribution of methane emission sources using high-resolution analytic inversions of observations from the TROPOMI instrument aboard the Sentinel-5 Precursor satellite.
- Develops and applies methods to conduct high-resolution analytic inversions at reduced computational cost while preserving information content.
- Implements those methods to improve estimates of methane emission sources at high resolution over North America using TROPOMI observations.

- Served as Design Lead for a senior research team developing a first-generation operational prototype of portable and stationary air quality monitors measuring concentrations of greenhouse gases and EPA criteria pollutants using low-cost sensors. The sensors were designed for deployment in Baltimore, MD as part of an EPA SEARCH Center.

TEACHING

HARVARD UNIVERSITY | DEPARTMENT OF EARTH AND PLANETARY SCIENCES **CAMBRIDGE, MA**
Atmospheric Chemistry, Teaching Fellow **Spring 2020**

Taught weekly section and office hours, including material preparation. Created and graded homework assignments. Developed and taught midterm review session. Helped lead the transition to remote learning following COVID-19 adjustments.

HARVARD UNIVERSITY | DEPARTMENT OF EARTH AND PLANETARY SCIENCES **CAMBRIDGE, MA**
Atmospheric Chemistry, Teaching Fellow **Spring 2019**

Taught weekly section and office hours, including material preparation. Created and graded homework assignments. Contributed to exam development and graded exams. Developed and taught midterm and final review sessions.

PRESENTATIONS

Reduced-Cost Construction of Jacobian Matrices for High-Resolution Inverse Modeling, presentation at the 2020 AMS meeting, Boston, MA, January 17, 2020.

Reduced Cost Construction of Jacobian Matrices for High-Resolution Inverse Modeling, poster at the 2019 AGU meeting, San Francisco, CA, December 12, 2019.

Decreasing the computational cost of analytic inversions of high-resolution satellite observations, presentation at the Netherlands Institute for Space Research (SRON), Utrecht, Netherlands, June 11, 2019.

PUBLICATIONS

Zhang, Y., P. Sadavarte, R. Gautam, M. Omara, J.D. Maasakkers, S. Pandey, D. Lyon, H. Nesser, M.P. Sulprizio, R. Zhang, S. Houweling, D. Zavala-Araiza, R.A. Alvarez, A.L. Delgado, S.P. Hamburg, I. Aben, and D.J. Jacob, Quantifying methane emissions from the largest oil producing basin in the U.S. from space, *Science Advances*, 6, eaaz5120, 2020.

Maasakkers, J.D., D.J. Jacob, M.P. Sulprizio, T. Scarpelli, H. Nesser, J.-X. Sheng, Y. Zhang, M. Hersher, A.A. Bloom, K.W. Bowman, J.R. Worden, G. Janssens-Maenhout, and R.J. Parker, Global distribution of methane emissions, emission trends, and OH concentrations and trends inferred from an inversion of GOSAT satellite data for 2010-2015, *Atmos. Chem. Phys.*, 19, 7859-7881, 2019.

ACTIVITIES

Co-President, Graduate Environmental Action Team (GrEAT); Volunteer, Harvard Law School Emmet Environmental Law and Policy Clinic.