SARAH HANCOCK
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EDUCATION

Harvard University, Cambridge, MA 2021 – Present
School of Engineering and Applied Sciences
Ph.D. Candidate, Environmental Science and Engineering

Columbia University, New York, NY 2017 – 2021
Fu Foundation School of Engineering and Applied Science
Bachelor of Science, Computer Science

PUBLICATIONS

Chen, Z., Jacob, D. J., Gautam, R., Omara, M., Stavins, R. N., Stowe, R. C., Nesser, H. O., Sulprizio, M. P., Lorente, A., Varon, D. J., Lu, X., Shen, L., Qu, Z., Pendergrass, D. C., and **Hancock, S.E.**, Satellite quantification of methane emissions and oil/gas methane intensities from individual countries in the Middle East and North Africa: implications for climate action, Atmos. Chem. Phys., 23, 5945–5967, https://doi.org/10.5194/acp-23-5945-2023, 2023.

Hancock, S.E., A.M. Fiore, D.M. Westervelt, G. Correa, J.-F. Lamarque, C. Venkataraman, A. Sharma, Changing $PM_{2.5}$ and related meteorology over India from 1950-2014: A new perspective from a chemistry-climate model ensemble, Environ. Res.: Climate 2, 015003, DOI 10.1088/2752-5295/acb22a, 2023.

Varon, D.J., D.J. Jacob, M. Sulprizio, L.A. Estrada, W.B. Downs, L. Shen, **S.E. Hancock**, H. Nesser, Z. Qu, E. Penn, Z. Chen, X. Lu, A. Lorente, A. Tewari, and C.A. Randles, Integrated Methane Inversion (IMI 1.0): a user-friendly, cloud-based facility for inferring high-resolution methane emissions from TROPOMI satellite observations, Geosci. Model Dev., 15, 5787–5805, https://doi.org/10.5194/gmd-15-5787-2022, 2022.

Fiore, A.M., **S.E. Hancock**, J.-F. Lamarque, G.P. Correa, K.-L. Chang, M. Ru, O. Cooper, A. Gaudel, L.M. Polvani, B. Sauvage, J.R. Ziemke, Understanding recent tropospheric ozone trends in the context of large internal variability: A new perspective from chemistry-climate models, Environ. Res.: Climate 1 025008 DOI 10.1088/2752-5295/ac9cc2, 2022

Fiore, A. M., Milly, G. P., **Hancock, S. E.**, Quiñones, L., Bowden, J. H., Helstrom, E., et al. Characterizing changes in eastern U.S. pollution events in a warming world. Journal of Geophysical Research: Atmospheres, 127, e2021JD035985. https://doi.org/10.1029/2021JD035985, 2022

PRESENTATIONS

American Geophysical Union (AGU) Fall 2023 Meeting, December 2023.
Remote. South American methane: a high-resolution inversion of blended TROPOMI+ GOSAT satellite observations. (Oral)

American Meteorological Society (AMS) Annual Meeting, January 2021.
Remote. Changing $PM_{2.5}$ and related meteorology over India from 1950-2014: A new perspective from a chemistry-climate model ensemble. (Oral)

Community Earth System Model (CESM) Winter Working Group Meeting, February 2021.
Remote. Changing $PM_{2.5}$ and related meteorology over India from 1950-2014: A new perspective from a chemistry-climate model ensemble. (Oral)

American Geophysical Union (AGU) Fall 2020 Meeting, December 2020.
Remote. Changing $PM_{2.5}$ and related meteorology over India from 1950-2014: A new perspective from a chemistry-climate model ensemble. (Oral)

Lamont-Doherty Earth Institute Summer Intern Poster Session, August 2020.
Remote. Changing $PM_{2.5}$ and related meteorology over India from 1950-2014: A new perspective from a chemistry-climate model ensemble. (Poster)

Young Scholars Program Symposium, June 2016.
Davis, CA. Canopy and leaf temperature, stomatal conductance, and stem water potential in greenhouse tomato plants sensitive to water stress. (Oral)

RESEARCH EXPERIENCE

Harvard, Atmospheric Chemistry Modeling Group August 2021– Present
Graduate Research Assistant
Advisor: Dr. Daniel Jacob

- Perform atmospheric inversions of satellite observations from TROPOMI and GOSAT instruments

Lamont-Doherty Earth Institute, Atmospheric Chemistry Group May 2020 – October 2021
Research Assistant
Advisors: Dr. Arlene M. Fiore, Dr. Daniel M. Westervelt

- Explored the relationship between fine particulate matter and meteorology in India using 12 ensemble members from a chemistry-climate model (CESM2-WACCM6)
- Utilized Python (NumPy, Matplotlib, Shapely) and bash shell scripts to analyze large netcdf files and shapefiles on a remote server.
- Examined long-term trends in global tropospheric ozone using CMIP6 model simulations
- Employed statistical techniques (empirical orthogonal function analysis, correlation analysis) to quantify relationship between $PM_{2.5}$ components and meteorology

University of California, Davis, Department of Plant Sciences June 2016 – August 2016
Research Assistant (Young Scholars Program)
Advisor: Dr. Kenneth A. Shackel

- Analyzed greenhouse tomato plant response to water stress by measuring different physiological responses of the plants.
- Compared canopy temperature trends to trends in water stress measured with conventional techniques with the goal of quantifying the link between canopy temperature and water stress.

TEACHING EXPERIENCE

Harvard University January 2023 – Present
SCIENCE 5, Introduction to Computation Teaching Fellow, Spring 2023, Spring 2024

- Designed problem sets and laboratory exercises for new, introductory computer science course

EPS 200, Atmospheric Chemistry Teaching Fellow, Fall 2023

- Wrote problem sets and taught weekly sections for graduate-level atmospheric chemistry class

Children's Creativity Museum May 2019 – September 2020
Senior Education Intern, May 2020 – September 2020

- Researched changes in museum programming during COVID-19 and created digestible reports using JavaScript, HTML/CSS, and Google Sheets.
- Designed curriculum and taught introductory coding classes for over 40 children on Zoom using block coding.

Education Intern, May 2019 – September 2019

- Facilitated GSK "Science in the Summer" outreach program in community centers.
- Taught block coding to youth using Blockly robots and growth-mindset techniques.

Columbia University Center for Student Advising January 2020 – May 2020
Computer Science Tutor

- Selected to work as 1 of 30 peer tutors to assist with coursework in Python, Java, data structures, discrete math, and calculus.

Harlem Grown August 2018 – May 2019
Farm Education Intern

- Directed outdoor farm tours for groups of 10 to 40 youth at urban farm sites across Harlem.
- Developed and facilitated curriculum about agriculture, nutrition, and hydroponics.

Columbia Tutoring and Learning Center September 2017 – May 2018
Mathematics Tutor

- Tutored high schoolers in mathematics and assisted with implementation of online learning systems.

HONORS AND GRANTS

Harvard Teaching Staff Special Recognition (2023)
NSF GRFP (2022)
Winston Chen Family Graduate Fellowship (2022)
Harvard University Graduate Prize Fellowship (2021)
American Meteorological Society Graduate Fellowship (2021-2022)
Columbia University Earth Institute Collaborative Research Grant (2020-2021)
Columbia Engineering Internship Fund (2018-2020)
Columbia Work Exemption Award (2018-2020)
Pinterest Engage Scholar (2019)
Elks Most Valuable Student State Finalist (2017)
Ronald McDonald House Charities Scholarship (2017)
U.S. Presidential Scholar Semifinalist (2017)
National Merit Finalist (2017)

TECHNICAL SKILLS

Python, Java, JavaScript, C, C++, HTML, CSS, Unix, Linux, Git, SQL, R

ADDITIONAL EXPERIENCE

Wallbreakers May 2020 – August 2020
Software Engineering Trainee
- Solved weekly sets of Python coding problems with team of software engineers.

Columbia University Office of Disability Services September 2019 – December 2019
Notetaker
- Recorded and organized class notes for COMS W3203 Discrete Mathematics.

Columbia Engineers Without Borders: Ghana Chapter September 2017 – September 2019
Finance Team Lead, Travel Team Lead, Water Team Member
- Led a team of 6 Columbia University students to construct 2 boreholes in Amanfrom, Ghana in August of 2018.
- Funded several construction projects by organizing fundraising campaigns, managing corporate outreach, and writing grants.

Aptos Chamber of Commerce May 2018 – August 2018
Web Development Intern
- Transitioned all office transactions from written credit card slips to secure online payments by integrating WordPress with Converge API to create an online payment system.
- Designed custom website and social media content with WordPress, Canva, and HTML/CSS.