Chayan Roychoudhury

Contact Information

Modeling and Analysis of Atmospheric Composition Laboratory

Education

Doctoral Studies - PhD January 2021 - *Present*
The University of Arizona, Department of Hydrology and Atmospheric Sciences
Supervisor : Dr. Avelino F. Arellano Jr.

Post-Graduation - MSc August 2017 - July 2019
University of Calcutta, Department of Atmospheric Science
Thesis: *Simulation of Hygroscopic Factors on Polar Aerosols over East Antarctica*
Supervisor : Dr. Sanat Kumar Das, Bose Institute

Graduation - BSc
University of Calcutta, Department of Physics August 2014 - June - 2017
First Class Honours

Work Experience

Graduate Research Assistant January 2021 - Present
Graduate Teaching Assistant January 2023 - May 2024
ATMO 430 - Computational Methods in Atmospheric Sciences (Spring 2023)
ATMO 569 - Air Pollution I : Gases (Fall Spring 2023)
ATMO 545 - Introduction to Data Assimilation (Spring 2024)
Department of Hydrology and Atmospheric Sciences, The University of Arizona
Supervisor : Dr. Avelino F. Arellano Jr.

Guest Research Worker August 2019 - July 2020
Bose Institute, Environmental Sciences Section
Supervisor : Dr. Sanat Kumar Das

Research Experience

Publications

1. *C Roychoudhury*, C He, R Kumar, JM McKinnon, and AF Arellano. **On the relevance of aerosols to snow cover variability over High Mountain Asia.** 2022. *Geophysical Research Letters, 49*.
2. R Kumar, C He, *C Roychoudhury*, W Cheng, N Mizukami, and AF Arellano. **High Mountain Asia 12 km Modeled Estimates of Aerosol Transport, Chemistry, and Deposition Reanalysis, 2003-2019. (HMA2_MATCHA, Version 1)**. 2024. *[Data Set]*. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/CG40T8DJX2Z7.
3. K Mottungan, *C Roychoudhury*, V Brocchi, B Gaubert, W Tang, MA Mirrezaei, JM McKinnon, Y Guo, DWT Griffith, DG Feist, I Morino, MK Sha, MK Dubey, M De Mazière, NM Deutscher, PO Wennberg, R Sussmann, R Kivi, TY Goo, VA Velazco, W Wang, and AF Arellano Jr. **Local and regional enhancements of CH4, CO, and CO2 inferred from TCCON column measurements**. 2024. *Atmospheric Measurement Techniques, 17*, 5861–5885.
4. M Greenslade, Y Guo, G Betito, MA Mirrezaei, C Roychoudhury, AF Arellano, A Sorooshian. **On ozone's weekly cycle for different seasons in Arizona.** 2024. *Atmospheric Measurement Techniques, 17*, 5861–5885.
5. MA Mirrezaei, AF Arellano, Y Guo, *C Roychoudhury*, A Sorooshian. **Ozone Production over Arid Regions: Insights into Meteorological and Chemical Drivers**. 2024. *Environmental Research Communications*, 6, 051009.
6. Y Guo, *C Roychoudhury*, MA Mirrezaei, R Kumar, A Sorooshian, and AF Arellano: **Investigating Ground-Level Ozone Pollution in Semi-Arid and Arid Regions of Arizona Using WRF-Chem v4.4 Modeling**. 2024. *Geoscientific Model Development*, 17, 4331–4353.
7. A Sorooshian, AF Arellano Jr, M Fraser, P Herckes, G Betito, E Betterton, R Braun, Y Guo, MA Mirrezaei, *C Roychoudhury*. **Ozone in the Desert Southwest of the United States: A Synthesis of Past Work and Steps Ahead.** 2024. *ACS ES&T Air, 1(2), 62-79*.
8. D Das, S Chiao, *C Roychoudhury*, F Khan, S Chaudhuri, S Mukherjee. **Tropical Cyclone Energy Variability in North Indian Ocean: Insights from ENSO.** 2023. *Climate, 11, 232*.

In progress

1. *C Roychoudhury*, C He, R Kumar, AF Arellano Jr. **Diagnosing Aerosol-Meteorological Interactions on Snow within the Earth System: A Proof-of-Concept Study over High Mountain Asia**. *Earth System*

Dynamics. *In review*.

2. C Roychoudhury, W Cheng, N Mizukami, C He, AF Arellano and R Kumar. **MATCHA, Model for Atmospheric Transport and Chemistry in Asia, a novel regional climate-chemical reanalysis. Part 1: System description and initial evaluation**. (*In preparation for Earth System Science Data*).
3. *C Roychoudhury*, AF Arellano, W Cheng, N Mizukami, J McKinnon, C He, and R Kumar. **Is traditional Bayesian inversion sufficient to constrain black carbon abundance in High Mountain Asia? Exploring machine learning to quanitfy model biases**. (*In preparation for Atmospheric Measurement Techniques*).
4. J McKinnon, *C Roychoudhury*, and AF Arellano Jr. **Spatio-temporal pattern analysis of MOPITT total column CO using varimax rotation and singular spectrum analysis**. (*In preparation for Atmospheric Measurement Techniques*).
5. H Bai, *C Roychoudhury*, C Strong. **Variability of summertime North American Dipole from large ensemble climate simulations.** (*In preparation*).
6. SK Das, *C Roychoudhury*, SK Ghosh, S Raha, and U Das. **Deterioration of background air quality by transported winter haze: Alarming high health risk for urban people over Indo-Gangetic Plain**. (*In preparation*).
7. SK Das, *C Roychoudhury*, and A Taori. **Virga observed over East Antarctica: An alarming indication of global warming**. (*In preparation*).

Conference Presentations

1. *C Roychoudhury*, MA Mirrezaei, Y Guo, AR Arellano, G Betito, A Sorooshian, AF Arellano. **Leveraging atmospheric chemistry observations in Arizona: Insights into the regional transport of ozone and aerosols.** Poster presented at AERONET Science and Application Exchange, College Park, MD, September 17-19, 2024.
2. *C Roychoudhury*, AF Arellano, W Cheng, N Mizukami, J McKinnon, C He, R Kumar. **Is traditional Bayesian inversion sufficient to constrain black carbon abundance in High Mountain Asia?** Poster C84 presented at the iCACGP-IGAC 2024 Conference in Kuala Lumpur, Malaysia, 9th-13th September, 2024.
3. *C Roychoudhury*, W Cheng, C He, R Kumar, JM McKinnon, AF Arellano. **How uncertain are BC emissions in High Mountain Asia? An inverse modeling approach.** Poster GC21K-1070 at AGU Fall Meeting 2023, San Francisco, CA.
4. *C Roychoudhury*, W Cheng, C He, R Kumar, AF Arellano. **MATCHA, Model for Atmospheric Transport and Chemistry in Asia: A novel regional climate-chemical reanalysis.** Poster C51C-0957 at AGU Fall Meeting 2023, San Francisco, CA.
5. Y Guo, AF Arellano, *C Roychoudhury*, A Sorooshian, R Kumar, G Pfister (2023). **Harnessing our Air Quality Modeling & Observational Capabilities to Establish Key Factors Influencing Ozone Levels in Arizona**. Poster at 2023 MAC-MAQ Conference, UC Davis, CA.
6. MA Mirrezaei, Y Guo, *C Roychoudhury*, AF Arellano, A Sorooshian, W Tang, L Emmons (2023). **Investigating surface ozone sensitivity to HCHO/NO_2 ratios over Arizona using the Multi-Scale Infrastructure for Chemistry and Aerosols (MUSICA) model**. Poster at 2023 MAC-MAQ Conference, UC Davis, CA.
7. D Das, S Chiao, ET Swenson, GG Persad, *C Roychoudhury* (2023). **Past, Present and Future Humid Heat Extremes over the East Coast of the United States** (2023). Poster at 2023 103rd AMS Annual Meeting, Denver, CO.
8. *C Roychoudhury*, C He, R Kumar, JM McKinnon and AF Arellano (2022). **Tracing the sources of black carbon deposition over the glaciers in High Mountain Asia: A tagged-tracer approach using WRF-Chem**. Poster at 2022 AGU Fall Meeting, Chicago, IL.
9. JM McKinnon, AF Arellano, *C Roychoudhury* (2022). **Spatio-temporal Pattern Analysis of Trace Gases and Aerosol Abundance Using Varimax Rotation and Locally Linear Embeddings.** Poster at 2022 AGU Fall Meeting, Chicago, IL.
10. *C Roychoudhury*, C He, R Kumar, JM McKinnon and AF Arellano (2022). **Source attribution of aerosol impacts to snow cover over High Mountain Asia.** Poster at 2022 International Global Atmospheric Chemistry (IGAC) Project Science Conference, Manchester, UK.
11. *C Roychoudhury*, C He, R Kumar, MK Shrivastava, JM McKinnon , AF Arellano (2022). **Do aerosols really matter over High Mountain Asia?**. Oral Presentation at University of Arizona's annual El Día Del Agua Y La Atmósfera, Tucson, AZ.
12. *C Roychoudhury*, C He, R Kumar, and AF Arellano (2021). **Investigating the relationship of meteorology and atmospheric composition to snow cover: A comparative study over High-Mountain Asia and Andes**. Lightning Talk and Poster at 2021 International Global Atmospheric Chemistry (IGAC) Project Science Conference, (virtual).

13. *C Roychoudhury*, C He, R Kumar and AF Arellano (2021). **Exploring the association of meteorology and atmospheric composition to snow cover changes: A case study over High-Mountain Asia and Central Andes**. Lightning Talk at 2021 MAC-MAQ Conference, (virtual).
14. *C Roychoudhury*, C He, R Kumar, MK Shrivastava, JM McKinnon , AF Arellano (2021). **Model simulations and satellite data analysis of aerosol impacts to snow cover over High Mountain Asia**. Oral Talk at 2021 Fall Meeting, AGU, New Orleans, LA.
15. JM McKinnon, *C Roychoudhury*, B Gaubert, RR Buchholz, AF Arellano (2021). **Spatio-temporal Pattern Analysis of Trace Gases and Aerosol Abundance Using PCA, SOMs, and Convolution Autoencoders**. Oral Talk at 2021 AGU Fall Meeting, and 2022 AMS Annual Meeting.
16. C He, R Kumar, MK Shrivastava, *C Roychoudhury*, AF Arellano (2021). **Brown carbon climatic impacts over High Mountain Asia: WRF-Chem model implementation and application**. Presented at 2021 AGU Fall Meeting (virtual).
17. D Das, D Strauss, *C Roychoudhury*, E Swenson, S Paul, G Fang, P Sinha, A Roy Chowdhury (2020). **Oceanic and Atmospheric factors contributing towards the rapid intensification of tropical cyclones in a warming climate: A diagnostic study of Super Cyclone AMPHAN over the Bay of Bengal**. Poster at 2020 AGU Fall Meeting (virtual).
18. D Das, *C Roychoudhury*, S Paul, F Khan, S Chaudhuri (2020). **Impact of ENSO on Tropical Cyclone Season over North Indian Ocean**. Oral Presentation at the International Virtual Conference on Earth's Changing Climate: Past, Present & Future, Society of Earth Scientists (virtual).
19. F Khan, D Das, *C Roychoudhury*, S Chaudhuri (2018). **Role of geo-potential height in estimating the variablity in Indian Summer Monsoon Rainfall: A comparative study with NCEP-NCAR Reanalysis and CFSR**. Poster Presentation at 2018 TROPMET National Symposium, Indian Meteorological Society.
20. *C Roychoudhury*, R Ray (2018). **Impact of climate change on butterfly population over a metropolis of India**. Oral Presentation at 2018 TROPMET National Symposium, Indian Meteorological Society and BIOSPECTRUM-2018, India.

Technical Skills

Programming Python, GrADS, IDL, MATLAB, QGIS/ArcGIS, LaTeX, Linux, HPC.
Modeling WRF-Chem, CESM/CESM-SCAM

Honours & Awards

i) Recipient of John & Margaret Harshbarger Scholarship, University of Arizona (2024).
ii) Recipient of Sol Resnick Scholarship, University of Arizona (2023).
iii) Recipient of Galileo Circle Scholarship, University of Arizona (2022).
iv) Rank 1 in MSc in Atmospheric Science (2019) and eligible for INSPIRE-Fellowship under DST, Government of India.

Journal Reviewer

i) Geophysical Research Letters (Wiley).
ii) Theoretical and Applied Climatology (Springer).