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RESEARCH INTERESTS

- Remote sensing of land, water, atmosphere, and urban environments
- Urbanization impacts on climate, land use, and biodiversity
- Environmental hazards and disasters
- Climate impacts on ecosystems and species distributions
- Geospatial data science and computational ecology
- Statistical and machine learning modeling for Earth observation data

TECHNICAL SKILLS

- **GIS & Remote Sensing:** ArcGIS Pro, QGIS, Google Earth Engine, ENVI, SNAP, remote sensing workflows for optical, radar, and thermal sensors (MODIS, VIIRS, Landsat, Sentinel)
- **Programming & Tools:** Python (NumPy, Pandas, SciPy, scikit-learn, rasterio, geopandas), MATLAB, GDAL/OGR, JavaScript, SQL, Git
- **Data Analysis:** Time series analysis, regression and correlation, spatial statistics, machine learning for classification and prediction, QA/QC workflows
- **Other:** Technical writing, stakeholder communication, collaborative research leadership

EDUCATION

2023 **B.Sc. (Hons), Double Major in Geographic Information Sciences and Geography**
University of Toronto
Completed: Aug 2023

RESEARCH POSITIONS

2025 **Project Lead**, NASA FIRMS Wildfire Analysis
Independent Research
- Designed and implemented a full-stack wildfire detection and validation system leveraging NASA FIRMS near real-time data from MODIS, VIIRS, and Landsat sensors.
- Developed a Python backend with SQL/PostGIS databases to automate ingestion, cross-sensor validation, and classification of fire detections into confidence levels.
- Built a React-based frontend for interactive fire monitoring, integrating geospatial visualization and user-defined alerting features.
- Deployed cloud-based servers to manage large-scale data processing and ensure near real-time performance of the alerting pipeline.

2024 **Project Lead**, NASA DEVELOP National Program
NASA Langley Research Center, Earth Science Division | Boston, MA
- Selected to return as Project Lead to manage a team of researchers analyzing harmful algal blooms in Narragansett Bay, Rhode Island, using Earth observation data.
- Led MATLAB-based statistical analyses of large water quality datasets, delivering actionable insights for EPA decision-making.
- Directed team meetings and stakeholder communications, ensuring accurate results and effective presentation of findings to partners and broader audiences.

2024 **Researcher**, NASA DEVELOP National Program

NASA Langley Research Center, Earth Science Division|Boston, MA

- Conducted research in collaboration with the National Park Service, analyzing river ice phenology and its effects on caribou migration patterns.
- Spearheaded the integration of radar data analysis into the project, performing regression and correlation analyses to quantify seasonal ice changes and their ecological impacts.
- Communicated findings through a technical report, poster, and multiple presentations to scientific and stakeholder audiences.

2023 **Undergraduate Researcher**, Praneeta Mudaliar's Lab

University of Toronto, Dept. of Geography, Geomatics and Environment|Mississauga, ON

- Conducted in-depth research to develop a comprehensive database of U.S. higher education institutions managing undeveloped natural lands, collaborating with a team of four students.
- Led spatial data analysis and visualization efforts, creating choropleth maps and performing statistical analyses to derive insights from large, complex datasets.
- Presented findings at the Summer Undergraduate Research Fair, showcasing data-driven insights derived from empirical research, and effectively communicated the results to a broad audience, emphasizing the significance of the dataset and its implications for land management practices.

PROFESSIONAL POSITIONS

2025 – **Geospatial Justice Facilitator**, Trubel&Co

Environmental Justice Workshops |Remote

- Facilitated workshops and initiatives focused on geospatial equity and environmental justice.
- Supported participants in applying GIS and spatial analysis to understand social and environmental impacts.
- Developed educational materials and tools to help organizations integrate geospatial insights into decision-making.

2023 – 2025 **Solutions Architect**, Q Spark Group

Modernize Data Management|Remote

- Provided data consulting services, specializing in data governance and reference data management, helping clients modernize data systems and optimize workflows for improved decision-making.
- Leveraged Langchain and machine learning techniques to develop automated solutions for email generation, enhancing communication efficiency.

2023 **Cybersecurity Analyst**, University of Toronto

Information Technology Services|Toronto, ON

- Improved Security Incident Response (SIR) workflow, streamlining processes for more efficient reporting to managers and executives, leading to faster incident resolution.
- Monitored and responded to 10,000+ email inquiries on security incidents and phishing reports, utilizing SIEM, Microsoft 365 Threat Hunter, Cloud Security App, and Azure to mitigate threats.
- Conducted proactive threat-hunting using known indicators of compromise (IOCs) to identify and address malicious activity, enhancing system security.

2021 – 2022 **Data Analyst Intern**, AdvantAge Ontario

IT Innovations and Data Strategy|Remote

- Utilized Power BI, MS Excel, and PowerPoint to analyze and visually represent time series data trends for the Long-Term Care funding index, applying statistical tests to validate findings and support data-driven decision-making.
- Interpreted and presented comprehensive data and research spanning over 20 years to the CEO and board members, aiding informed decision-making and strategic communication with the press.
- Investigated statistical methodologies to validate data and propose actionable solutions aimed at improving service delivery quality for members.

NASA TECHNICAL REPORTS

2. Naeem, M., Giordano, I., Rowen, C., Millay, S. Using Earth Observations to Identify Trends in Harmful Algal

Blooms in Narragansett Bay. **NASA DEVELOP Technical Report.** NASA Langley Research Center, 2024. (Professional Review). Available Online

1. Naeem, M., Sarro, C., Silver, B., Mitchell, L. Using NASA Earth Observations to Identify Recent Changes in River Ice Phenology and Its Impacts on Caribou Migration. **NASA DEVELOP Technical Report.** NASA Langley Research Center, 2024. (Professional Review). Available Online

FIRST AUTHOR CONFERENCE PRESENTATIONS

3. Naeem, M., Sarro, C., Silver, B., Mitchell, L (Dec 11, 2024). Using NASA Earth Observations to Identify Recent Changes in River Ice Phenology and Its Impacts on Caribou Migration. Oral. **American Geophysical Union Annual Meeting.** Washington, DC, USA.

2. Naeem, M., Sarro, C., Silver, B., Mitchell, L (Dec 11, 2024). Using NASA Earth Observations to Identify Recent Changes in River Ice Phenology and Its Impacts on Caribou Migration. Oral. **Northeast Arc Users Group.** Burlington, VT, USA.

1. Naeem, M., Salad, A., Al-Ghazali, T., Strzechowska, Z (Aug 16, 2023). More than Education. Exploring the Role of Institutions of Higher Education in Land Conservation. Poster. **Summer Undergraduate Research Fair.** Mississauga, ON, CA.

INVITED TALKS

Mar 27, 2024	NASA Goddard Earth Sciences Division, NASA DEVELOP Closeout. Greenbelt, MD, USA.
May 6, 2024	National Park Service, Science for Lunch. Remote.
Aug 2, 2024	EPA's National Health and Environmental Effects Research Laboratory, NASA DEVELOP Closeout. Narragansett, RI, USA.

TECHNICAL PROJECTS

Aug 2025 — Remote Sensing Analysis of Historic Aerial Photography

- Developed a Python-based pipeline to process and mosaic thousands of historical aerial photographs (JPEGs) into georeferenced basemaps for environmental and socioeconomic analysis.
- Utilized Rasterio, Shapely, and GDAL to parse metadata, reproject imagery into a unified coordinate system, and generate seamless mosaics from overlapping image footprints.
- Implemented pixel-level averaging and quality control routines to resolve radiometric inconsistencies and ensure reliable outputs from noisy archival datasets.
- Demonstrated expertise in remote sensing automation, geospatial data science, and large-scale environmental data processing for historical Earth observation archives.

Aug 2024 — Harmful Algal Bloom Detection

- Analyzed satellite imagery and large water quality datasets in MATLAB, running algorithms and performing statistical tests such as regression and correlation analyses to identify trends in harmful algal bloom occurrences in Narragansett Bay, RI.
- Ensured data accuracy by developing and debugging MATLAB scripts, implementing rigorous quality control measures, and validating results against satellite imagery and in situ data, delivering reliable insights to inform EPA's environmental monitoring and decision-making efforts.

Mar 2024 — Alaska River Ice Phenology and Ecological Impacts

- Integrated radar and optical satellite data to monitor river ice dynamics in Alaska and their effects on caribou migration patterns.
- Performed statistical analyses, including regression and correlation, to quantify seasonal changes in ice cover and link them to ecological behaviors.
- Presented findings through technical reports, posters, and oral presentations, supporting stakeholders' understanding of climate impacts on Arctic ecosystems.

Sep 2023 — 5G Cell Tower Analysis

- Utilized Python and ArcGIS to conduct geospatial analysis, identifying optimal locations for deploying 5G cell towers based on strategic criteria.
- Employed a data-driven approach to justify the selection of strategic locations for 5G cell tower deployment. Emphasized factors such as improved network coverage, reduced interference, and enhanced service reliability to ensure the effectiveness of the 5G network.

Aug 2023 — Pakistan Flood Extent and Impact Analysis

- Analyzed Landsat, Sentinel-1, and Sentinel-3 satellite imagery to map flood extent across Pakistan following the 2022 monsoon season and compared it to the flood extent in 2010.
- Calculated NDWI and NDVI in ArcGIS Pro and Python to quantify water spread and assess impacts on cropland, urban areas, and natural ecosystems.
- Generated GIS maps visualizing flood extent and affected areas to support reporting and environmental impact assessments.

Feb 2023 — Analysis of Physical Changes in the Colorado River

- Successfully utilized remote sensing tools such as Normalized Difference Water Index (NDWI), true color composites, and supervised classification methods to assess and monitor changes in the Colorado River's water flow and land cover over a span of nearly four decades
- Investigated the significant decrease in the Colorado River's water flow, identifying the role of environmental injustice and climate change, thereby contributing to the broader understanding of critical environmental issues.

VOLUNTEER & LEADERSHIP WORK

2022 – **Front End Developer**, Muslims Achieving Excellence (MAX)

- Contributed to MAX, a non-profit celebrating Muslim excellence and diversity, by designing and developing the UI/UX for their new scholarship fund website using JavaScript and React.
- Improved website functionality and accessibility, ensuring an intuitive user experience aligned with organizational goals.

2019 – 2022 **Vice President & Co-founder**, Women in Science & Computing - University of Toronto

- Led the establishment of the Women in Science and Computing Club at the University of Toronto, fostering a supportive community and empowering women pursuing careers in STEM fields.
- Orchestrated a program to help students work on a side project with the help of upper-year mentors.

2019 – 2020 **Director of External Relations**, STEM Fellowship - University of Toronto

- Built a community-driven network to support experiential learning opportunities for students in STEM, fostering collaboration and growth.
- Established partnerships with organizations like TechGirls Canada and hErVolution, securing mentorship opportunities and resources to empower underrepresented groups in STEM

PROFESSIONAL AFFILIATIONS

American Geophysical Union (AGU)
Women+ in Geospatial