Vikas Hanasoge Nataraja

Email: Vikas.HanasogeNataraja@colorado.edu
GitHub: https://github.com/vikasnataraja
Website: https://vikasnataraja.com/
LinkedIn: https://tinyurl.com/vikas-linkedin
Google Scholar: https://tinyurl.com/vnataraja

Research Interests

Satellite remote sensing of the surface and atmosphere, radiative transfer, machine learning, surface energy budget, satellite algorithm development and validation.

Education

Ph.D. in Atmospheric & Oceanic Sciences *2023 – 2027 (anticipated)*
University of Colorado Boulder, Boulder, CO GPA: 4.0/4.0

- Research Areas: Surface characterization of Arctic sea ice, improving cloud remote sensing using machine learning.
- Advisor: K. Sebastian Schmidt.

M.S. in Electrical Engineering *2018 – 2020*
University of Colorado Boulder, Boulder, CO

B.E. in Telecommunication Engineering *2014 – 2018*
Visvesvaraya Technological University, Bengaluru, India

Research Experience

Laboratory for Atmospheric and Space Physics (LASP), Boulder, CO
Graduate Research Assistant *Jan 2024 - present*
Research Affiliate *Jan 2023 - present*
Professional Research Assistant *May 2020 - Dec 2022*
Graduate Research Assistant *Dec 2019 - May 2020*

Field Campaigns

NASA ARCSIX 2024, Greenland *2024 - present*

- As a science team member of the NASA ARCSIX Aircraft Campaign, I traveled to Greenland across 2 deployments in Spring/Summer 2024 to collect data across 19 science flights of which I flew on 7 flights and operated our group's instruments, and was one of 3 lead flight planners.
- Developed a near-real time Arctic satellite visualizer with latency as low as 30 minutes by processing MODIS/VIIRS imagery for flight planning and weather forecasting use.
- Currently lead the BRDF/albedo subgroup, coordinating analysis of spectral measurements from 4 instrument teams to characterize radiative properties of sea ice across 0.4-2.2 μm wavelength range to improve satellite retrievals of the surface.

Teaching Experience

Principles of Weather (ATOC 3050) with *Dr. Mark Seefeldt*   *Spring 2024*

- Taught 25 undergraduate students about weather analysis, atmospheric physics, thermodynamics, etc., using materials that I created.

Our Changing Environment (ATOC 1060) with *Prof. Jen Kay*   *Fall 2023*

- Taught an intro-level class on climate science to 98 students from mostly non-science majors focusing on the role of the atmosphere, oceans, cryosphere, and land surface.
- Using the latest data on sea ice, El-Niño, precipitation, etc., I taught 4 times per week while assisting students with class-related material and career advice.

Principles of Weather (ATOC 3050) with Dr. Mark Seefeldt   *Spring 2023*

- Taught 50 undergraduate students weather concepts like atmospheric physics and thermodynamics 2 times per week, hosted office hours, and graded their homework.
- I created my own teaching material for my recitation classes where I incorporated data from NWS and local weather stations and passed it on to subsequent TAs and instructors.

**Scientific Programming, Data Analysis, and Visualization Laboratory
(ATOC 4815/5815)** with *Prof. Sebastian Schmidt*   *Fall 2019*

- Helped 21 undergraduate and graduate students in-class to work on gridding data, Python issues, grading their work, etc.
- Taught introduction classes on machine learning (ML) and created jupyter notebooks for hands-on practice with satellite image classification using convolutional neural networks.

Discrete Mathematics (ECEN 2703)
with Prof. Fabio Somenzi   *Fall 2019*

Programming with Mathematical Software (ECEN 2310)
with Prof. Fabio Somenzi   *Spring 2019*

Work Experience

Allvision IO, Pittsburgh, PA   *June – August, 2019*
Software Engineering Intern
Managers: Ryan Frenz & Seth Koterba

Maxwell CubeSat Program, Boulder, CO   *2018 - 2020*
Software Engineer (ADCS)
Advisors: Prof. Scott Palo & Dr. Marcin Pilinski

Publications

Nataraja, V., Hirata, K., Chen, H., Cairns, B., Thompson, D. R., Ottaviani, M., Meyer, K. G., Peterson, C., Boisvert, L., & Schmidt, S. (2025). Estimating Springtime BRDF/Albedo of Arctic Sea Ice from MODIS with Validation from NASA ARCSIX. [**in prep.**] Remote Sensing of Environment, Elsevier.

Chen, H., Schmidt, S., Massie, S., **Nataraja, V.**, Norgren, M., Gristey, J., Feingold, G., Holz, R., & Iwabuchi, H. (2023). The Education and Research Three-Dimensional Radiative Transfer Toolbox (EaR³T) – Towards the Mitigation of 3D Bias in Airborne and Spaceborne Passive Imagery Cloud Retrievals. Atmospheric Measurement Techniques, 16, 1971-2023. *Link*

Nataraja, V., Schmidt, S., Chen, H., Yamaguchi, T., Kazil, J., Feingold, G., Wolf, K., & Iwabuchi, H. (2022). Segmentation-Based Multi-Pixel Cloud Optical Thickness Retrieval Using a Convolutional Neural Network. Atmospheric Measurement Techniques, 15, 5181-5222. *Link*

Aboaf, A. P., Harrod, E. S., Zola, M., Prakash, A., Palo, S. E., Marshall, R., Pilinski, M. D., Rainville, N., Dahir, A., **Nataraja, V.**, Schwab, B., Gardell, A., & Warshaw, L. (2020). A Methodology for Successful University Graduate CubeSat Programs. In Proceedings of the AIAA/USU Conference on Small Satellites (SmallSat). *Link*

CONFERENCE POSTERS & PRESENTATIONS

[Poster] **Nataraja, V.**, Schmidt, S., Chen, H., Cairns, B., Hirata, K., Thompson, D. R., Meyer, K. G., Peterson, C., & Ottaviani, M. (2025). Estimating Springtime Arctic Sea Ice BRDF/Albedo from MODIS with Validation from the NASA ARCSIX Aircraft Campaign. *Gordon Research Conference (Radiation and Climate)*, Lewiston, ME.

[Oral] **Nataraja, V.**, Schmidt, S., Chen, H., Cairns, B., Hirata, K., Thompson, D. R., Meyer, K. G., Peterson, C., & Ottaviani, M. (2025). Estimating Springtime Arctic Sea Ice BRDF/Albedo from MODIS with Validation from the NASA ARCSIX Aircraft Campaign. *AMS Denver Summit*, Denver, CO.

[Invited; Oral] **Nataraja, V.**, Schmidt, S., & Chen, H. (2023). BRDF/Albedo Retrievals using Unsupervised Segmentation in the Arctic in the context of NASA ARCSIX. *General Assembly of the International Union of Geodesy and Geophysics (IUGG)*, Berlin, Germany.

[Poster] **Nataraja, V.**, Schmidt, S., & Chen, H. (2023). BRDF/Albedo Retrieval for Sea Ice Floes in the Arctic. *General Assembly of the Asia Oceania Geosciences Society (AOGS)*, Singapore.

OTHER TALKS

**Sea Ice Surface Characterization using ARCSIX
and Satellite Observations**
NASA ARCSIX Science Team Meeting, Boulder, CO   *May 2025*

Go with the floe - A Lagrangian Approach to BRDF/Albedo Retrieval for
Arctic Sea Ice in the context of the upcoming NASA ARCSIX Aircraft Campaign
ATOC Colloquium, CU Boulder, Boulder, CO   *Feb 2024*

**Using Imagery for Tracking Ice and Determining
Object-Anchored BRDF/Albedo**
NASA ARCSIX Science Team Meeting, Hampton, VA   *Aug 2023*

Using Machine Learning to Improve Cloud Retrievals
ATOC Colloquium, CU Boulder, Boulder, CO   *Apr 2023*

The Role of Machine Learning in Remote Sensing
CU Data Science Team Seminar Series, Boulder, CO   *Oct 2022*

Imagery-Based Machine Learning using CAMP²Ex Data
NASA CAMP²Ex Science Team Meeting, Pasadena, CA — *Jul 2022*

**Segmentation-Based Multi-Pixel Cloud Optical Thickness Retrieval
Using a Convolutional Neural Network**
NASA CAMP²Ex Science Team Meeting, Virtual — *Dec 2021*

Fellowships & Grants

- Using Multi-Spectral, Multi-Overpass Passive Satellite Imagery to Characterize and
  Investigate the Radiative Properties of Snow and Sea Ice in the Arctic — *2025 - 2028*
  NASA Cryospheric Sciences (ROSES-2023)
- 'Lead' Graduate Student Fellowship — *2023*
  Center for Teaching & Learning, University of Colorado Boulder

Awards & Honors

- Honorable Mention, Best Student Oral Presentation
  2025 AMS Denver Summit — *2025*
- ATOC Service Award
  Dept. of Atmospheric and Oceanic Sciences, University of Colorado Boulder — *2025*
- "Best Should Teach" Silver Award
  Center for Teaching & Learning, University of Colorado Boulder — *2024*
- ATOC Teaching Assistant Award
  Dept. of Atmospheric and Oceanic Sciences, University of Colorado Boulder — *2024*
- Best Student Poster Award (Atmospheric Sciences)
  Asia Oceania Geosciences Society (AOGS), Singapore — *2023*
- Best Project Award at Technovate '17 — *2017*
- Best Project Second Runner-Up Award at Sincrona '16 — *2016*

Service & Professional Responsibilities

- Reviewer, Atmospheric Measurement Techniques (AMT) — *2022 - present*
- Graduate Student Concerns Committee, ATOC — *2023 - present*
- Graduate Application Mentor, ATOC — *2023 - present*
- Reviewer, Undergraduate Research Opportunities Program (UROP) — *2024 - present*
- Member, CU Boulder NSCI Strategic Planning Committee — *2025 - present*
- Lead Teaching Assistant, ATOC — *2023 - 2024*
- Board Member & Administrator, Indian Students Association - CU Boulder — *2019 - 2020*
- Chairman, IEEE Student Branch - Bangalore Institute of Technology — *2017 - 2018*
- Placement Coordinator - Dept. of Telecommunication Engineering — *2017 - 2018*

Skills

- Programming/Scripting Languages: Python, MATLAB, Shell/Bash, Fortran
- Operating Systems: Linux, Unix, MacOS
- Packages and Libraries: TensorFlow, Keras, PyTorch, NumPy, SciPy, Pandas, Xarray, Dask, NetCDF4, HDF5, OpenCV
- Software & Utilities: Git, Anaconda, Jupyter Notebook, LaTeX, Overleaf, Microsoft Office/VSCode Suite, Google Suite
- Supercomputers: CU Boulder Alpine and Blanca, NCAR Derecho and Casper

Relevant Coursework

- Atmosphere: Atmospheric Thermodynamics and Dynamics, Synoptic Meteorology, Dynamics of the Atmosphere and Oceans, Radiative Transfer and Remote Sensing, Physics and Chemistry of Clouds and Aerosols
- Oceanography: Introduction to Physical Oceanography
- Computer Science: Machine Learning, Computer Vision
- Modeling: Climate Modeling Laboratory