Lavanya Ashokkumar, PhD

Research Scientist
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I am a data scientist and educator specializing in Earth Science, with a research background in remote sensing, geospatial techniques, and glaciology. My work focuses on developing and automating remote sensing processes for geospatial applications, including glacier dynamics, numerical modeling, and machine learning techniques to estimate global sea-level change.

In addition to research, I am an experienced educator in Earth Science. I have served as a lecturer, equivalent to Assistant professor of Teaching for Earth Science courses and have mentored students at the University of Alabama in Huntsville (UAH). With a combined experience in research and teaching following my Ph.D., I am dedicated to advancing scientific understanding and fostering the next generation of Earth scientists.

Academic qualifications

PhD - Glaciology and Remote sensing   2013 – 2017
Swansea University UK
Thesis: Understanding long-term glacier dynamics in the Himalayas using remote sensing.
Advisors: Prof Adrian Luckman, Prof Bernd Kulessa.

Master of Science – Remote sensing   2010 – 2012
College of Engineering Guindy, Anna University Chennai, India
Thesis: Improved band selection and fusion of hyperspectral image.
Advisor: Prof Sanjeevi Shanmugam. CGPA: 9/10

Bachelors in engineering (Geo-Informatics/ Geomatics)   2003 – 2007
College of Engineering Guindy, Anna University Chennai, India
Thesis: Location based services: An open-source approach for GIS
Advisor: Prof Thirumalaivasan. CGPA: 8.5/10

Work experience (Research and teaching)

Research Scientist   Dec 2024 -
Lab of Applied Sciences, ESSC   present
NASA MFSC Impact Project
University of Alabama in Huntsville

- Lead Developer and metadata curator in NASA's Earth data project 'Analysis and review of the CMR project'
- Responsible for analyzing and evaluating metadata quality from the

NASA's Earth Observing System Data and Information System (EOSDIS). EOSDIS maintains around 12 Distributed Active Archive Centers (DAAC) and ingests data at 8.5 TB daily since 2012.

- With continued growth in satellite data products, as a part of ARC team, we provide support and analyze the metadata parameters from the DAAC centers.
- Responsible for automating the quality checks using 'PyQuARC' and QuARC, an open-source software that provides detailed assessments for over 40000 earth observation data products.
- Read the latest media news on the ARC team's progress.

Lecturer - Equivalent to Assistant prof of teaching   2022 – 2024
Department of Atmospheric and Earth Science
University of Alabama in Huntsville

Roles and responsibilities: Teaching faculty and Earth Science faculty advisor
- Co-developed and taught 100, 300, 400 and 500 level courses in Environmental Earth Science and Geographic Information system (GIS) for bachelor's and master's degree program in Atmospheric and Earth Science.
- Advisor for students 20+ in Earth system science (ES track) – Mentoring undergraduate students for career development and graduate school.
- Faculty lead for GIScience organization – Coordinating and organizing university and college level (College of Science) outreach activities for student retention, engagement, academic skill development and career planning.
- Research in geospatial programming, numerical modeling and remote sensing-based data analysis and machine learning.
- Co-developed and submitted proposals for national funding agency (NSF) for outreach and K-12 education in Earth Science.

Postdoctoral Research Associate   2018– 2022
University of Arizona, Tucson
- Developed a numerical model to estimate global sea-level rates (SLR) from melting glaciers in the Arctic.
- This is one of unique models in Glaciology developed from a combination of remote sensing and mathematical techniques to quantify ice loss (mass balance) and sea-level rates.
- The model has several steps that includes initialization, optimization of model parameters for present-day conditions of mass balance and future projections.
- The sea-level rates are estimated until the end of the century until 2100, under CMIP5 and CMIP6 climate emission scenarios.
- The global sea level rates are computed for glaciers in the Arctic, which includes Gulf of Alaska, Canadian Archipelago, and other glaciers in the Arctic region. The outcome of the model is projected rates of future sea-level rates and its associated uncertainties. The importance of SLR has significance globally, and vulnerable regions of coastal Arctic.
- The model is open-accessible available on GitHub and GitLab, and is reproducible for other glaciers across the world, following the standards in

Cryosphere community.

Postdoctoral Researcher (Visitor status) Jun 2017 –
Swansea University, UK Feb 2018
Topic: Time series analysis of glacier surge mechanism using Sentinel-1 dataset.
- Glacier velocities were generated from ESA's Sentinel-1 optical satellites using Gamma remote sensing software.
- The scripts were written in C shell to automate the process of generating glacier velocities by intensity-based feature tracking.
- Time series of glacier velocities were generated for multiple time periods for tidewater or outlet glaciers in Greenland.

Graduate Research Associate Nov 2012–
Swansea University, UK May 2017
Thesis: Understanding long-term glacier dynamics in the Himalayas using remote sensing.
- Glacier velocities were generated from optical and synthetic aperture radar (SAR) from different satellite missions including NASA Landsat 1-8, ENVI, ASTER, Envisat.
- Time series of glacier velocities was generated for the period 1975 – 2016 for ~150 glaciers in the Himalayas.
- This is one of the earliest studies in Glaciology that presented longest time series of glacier velocities for challenging topography, Himalayas.
- The relationship between glacier dynamics (ice flow) was established with climate variables such as temperature, precipitation and meteorological parameters.
- Geostatistical relationship was established using multi-variate analysis to explore the impact of climate on ice flow movement or velocities over the last 25 years.

Teaching assistant 2016
Swansea University, UK
Courses taught:
GEG236: The Earth from Space: Monitoring Global Environmental Change
GEG208: Introduction to Geographic Information Systems
GEG111: Geographical Writing Skills and Personal Development Planning
GEG236: Approaches to Physical Geography – Talk about preparing for the undergrad dissertation.

Junior Research Fellow 2010 – 2011
Anna University, College of Engineering Guindy, Chennai, India
- Worked on the project titled 'Feature extraction of lunar features using multi-sensor image fusion approaches', funded by the Space application center (ISRO, India).
- Major task included algorithm development for image fusion for better spatial interpretability and extraction of lunar features.

- Processing of hyperspectral image dataset.

Programmer Analyst   2007 –2008
Cognizant technology solutions, Chennai, India

GIS Intern   2006 – 2007
Red planet consulting, Chennai, India.
- Developed a stand-alone mobile application using open-source GIS application.
- Efficient use of Dijkstra's algorithm to provide shortest path to the nearest hospital.

Awards, grants and media

- NASA ROSES 2024. SERVIR. Submitted on Oct 2024.
- NSF EPSCoR Research Infrastructure Improvement-Focused EPSCoR Collaborations Program. "Accelerating Community-Centric Energy Transformation through AI-driven Digital Twinning for Climate-Aware Resilience". Submitted as Co-I with Dr Leiqiu Hu Award No. 2418359. 2024. (Media news). Program website.
- UAH Seed fund "Use of AI and GIS to improve healthcare access in North Alabama" with Dr. Jerome Baudry. 2023.(Media news).
- NASA ROSES 2021 Cryosphere – Declined.
- Polar Science Early Career Community Office (PSECCO) Conference Travel Grant for AGU Fall Meeting 2022. (**$670**)
- Women in Data science – Tucson, University of Arizona. April 2021. Third place.
- Postdoc speed talk competition, University of Arizona. First place. March 2020 (**$2000**).
- Travel support by NASA and UW (**$1500**) for ICESat-2 Cryospheric Science Hackweek, University of Washington, Seattle, July 2019.
- Chevening Scholarship for dissertation writing and support – 2015 (**$10000**)
- **Commonwealth Scholarship and Fellowship** for PhD in Remote sensing, Commonwealth commission at the UK and MHRD, India (2012–2016). Funding for 3.5 years. (**$20000** annually)
- Travel Grant (**£750**) by the International Glaciological society for the International Glaciological Symposium in High Mountain Asia, Nepal, March 2015.
- Travel Grant for Young Scientist (~ **$1000**) awarded by the Council of Scientific and Industrial Research (CSIR), Government of India for the Conference 'AI in Space: Intelligence beyond planet earth', Spain, June 2011.
- Master Research funded by Indian space Research organization (ISRO- DOS), PLANEX for the project "Developing tools and techniques for lunar information extraction using multi-sensor image fusion". (Funding for 1 year).

Publications (Google Scholar)

9. **Ashokkumar**, Lavanya and Christopher, Sundar (2025). Analyzing environmental disparities in PM2.5 concentration across Alabama – A geostatistical perspective. (Pending submission).
8. **Ashokkumar**, Lavanya and Harig, Christopher (2024). 21st century estimates of mass loss rates from glaciers in the Gulf of Alaska and Canadian Archipelago using a

GRACE constrained glacier model. *The Cryosphere*. https://www.the-cryosphere-discuss.net/tc-2019-325 (Submitted to Journal of Glaciology).

7. **Ashokkumar, L**., Luckman, A, Harig, C., Kulessa, B, Bevan, S and Greene, C (2024). Contrasting patterns of dynamic response to climate, inferred from 145 glaciers in the Himalayas. *Frontiers in Remote sensing*. (In Progress).

6. Yuvaraj, D., Jayachandran, K and **Ashokkumar**, L (2022). Performance of spectral indices for soil properties: a case study from Redland farm, south Florida. *Modeling Earth Systems and Environment*. doi: https://doi.org/10.1007/s40808-022-01371-0

5. **Ashokkumar**, Lavanya (2017). PhD thesis. Recent variability in Himalayan glacier dynamics using remote sensing. Swansea University, UK.

4. **Ashokkumar**, L., & Shanmugam, S. (2014). Hyperspectral band selection and classification of Hyperion image of Bhitarkanika mangrove ecosystem, eastern India. Proceedings Volume 9239, Remote Sensing for Agriculture, Ecosystems, and Hydrology XVI; 923914. https://doi.org/10.1117/12.2067483

3. **Lavanya, A**., & Sanjeevi, S. (2013). An improved band selection technique for hyperspectral data using factor analysis. Journal of the Indian Society of Remote Sensing, 41(2), 199-211. http://dx.doi.org/10.1007/s12524-012-0214-7

2. Suresh Kumar R., **Lavanya A.,** Vani K. and Sanjeevi S. (2012). Fusion based approach for automatic lunar-crater detection. Acta Futura: Journal of Advanced Concepts, 5, 163–172. http://dx.doi.org/10.2420/AF05.2012.163

1. Tamililakkiya, V, Vani K, **Lavanya A**, Anto M, (2011). Linear and non-linear feature extraction algorithms for lunar images. Signal & Image Processing. http://dx.doi.org/10.5121/sipij.2011.2414

Non-peer reviewed proceedings

- **Ashokkumar, L**. "Modeling the sea-level estimates for Arctic glaciers using the GRACE constrained satellite observations". Sea Level Rise Seminar. NASA Goddard Institute for Space Studies. 2024. Link. (Invited).

- **Ashokkumar,** L, Weinberg L, Zachary L, Schreiber E, Taitt, A and Dryak M (2022). "Progress and challenges by early career polar scientists (USAPECS) in addressing inclusivity, diversity, equity, and accessibility." AGU Fall Meeting 2022 (Oral).

- **Ashokkumar**, L. Future projections of global sea-level estimates. Grace Anne Stewart Speaker Series, University of Alberta. Dec 2021. Link (Oral – Invited).

- **Ashokkumar, L.** Global estimates of sea-level rates from glaciers. Women in Data Science -Tucson, University of Arizona. April 2021. (Oral - Invited).

- **Ashokkumar** (2021). Global estimates of glacier mass balance. Seminar series by the International Glaciological Society. March 2021. Link (Oral).

- **Ashokkumar,** Luckman, Harig, Kulessa and Bevan (2020). Contrasting response pattern between glacier dynamics and climate in the Himalayas. Northwest Glaciologists Meeting, University of Montana, Oct 2020. (Oral)

- **Ashokkumar** and Harig (2019). Sea-level estimate from glaciers in High Mountain Asia using GRACE constrained model/Mass and sea-level estimates from Alaska and Canadian Archipelago using a GRACE constrained model until the end of 21st century. Northwest Glaciologists Meeting, Oregon State University, Oct 2019. Link (Oral)

- **Ashokkumar** and Harig (2018). Regionally variable mass loss rates in Greenland estimated from GRACE and their link to observed and modelled climate. AGU Fall Meeting, Washington DC, Dec 10 – 14, 2018.

- **Ashokkumar**, Lavanya; Luckman, Adrian and Kulessa, Bernd. Glacier dynamics in the Himalayas over the last four decades using satellite remote sensing. International Symposium on Glaciology in High-Mountain Asia. 2015. (Oral).

- Ashokkumar, L. Glacier dynamics in the Himalaya and its influence based on South Asian climatic conditions. Commonwealth regional network meeting. Cardiff University, 2014. Link (Oral – Invited).
- Ashokkumar, Lavanya
- **Lavanya Ashokkumar**, Adrian Luckman and Bernd Kulessa. Spatial and temporal dynamic change in Karakoram glaciers, IGS British branch meeting, Bristol, 2014.
- **Lavanya Ashokkumar**, Adrian Luckman and Bernd Kulessa (2013). Analysis of glacier velocities across Karakoram Himalayas over the past decade using Landsat 7–8, IGS British branch meeting 2013, Loughborough UK.
- **Lavanya.A,** Sanjeevi.S and Vani. K. (2012). "Dimensionality Reduction of lunar hyperspectral data using Band Index and separability measures". Proceedings of National Symposium on Signal and Image Processing. Gandhigram Rural University. (Oral)
- **Lavanya, A**., Sanjeevi, S. and Vani, K. (2011). Hyperspectral Data Mining – A Feature Selection Technique for Mineral Abundance Mapping on the Lunar Surface. AI in Space: Intelligence beyond planet earth, IJCAI 2011, Spain.
- Suresh Kumar, R., **Lavanya, A**., Vani, K. and Sanjeevi, S. (2011). Texture Based Automatic Lunar-crater Detection and Mapping in Chandrayaan - 1, Image Data. AI in Space; Intelligence beyond planet earth, IJCAI 2011, Spain.
- Lavanya, A and Suganya, B. (2006). "Hurricane Mapping and Damage Assessment". 9th International Conference and Exhibition on Geographical Information, Technology and Applications. Map India 2006, India (Oral).
- **Lavanya, A** and Suganya, B. (2005). "Rehabilitation of wastelands in a drought prone area using remote sensing". *AGNI 2005*. Awarded the Best Student paper. Anna University, India. (Oral).

Professional Membership

Member of American Geophysical Union	2018 – present
Member of Geological Society of America	2020 - 2022
Member of International Glaciological Society, UK	2013 – 2017
Member of Indian Society of Remote Sensing	2011 - 2012

Science outreach, leadership and service

2022 - 2024	Co-chair at USAPCES (US Association of Polar Early Career Scientists) ARCUS – Judge for Travel award for ECR.
2020 - 2021	SARSEF – Judge for Special Science category award for high school category, Tucson - invited ARCUS – Judge for Travel award for ECR.
2019 - present	Mentorship co-coordinator of Association of Women Geoscientists, Southern Arizona Chapter. Board member of USAPECS Board member of IARPC Early Career group SARSEF – High School category judge in Earth science. Sam Hughes Elementary School – Judge/ organizer for the selection of best science projects.
2012 – 2017	PhD Commonwealth Scholar, Wales regional network member.
2006 – 2008	Member of Geoinformatics Engineer, Anna University.

Outreach grants and talk

a.   Commission of Status of women, 2021 (**$1406**) – University of Arizona.
b.   E-zen grant award for outreach activities, 2020 (**$1500**) – Geological Society of America.
c.   Presentation, Science talks, active participation and member of Commonwealth Wales Regional Networks, UK (2012 – 2016).
d.   Talk on 'Mass balance and glacier velocities in the Himalayas', College of Science Lecture series, Swansea University. March 2016. (Oral)
e.   Talk on 'Tracking the dynamic nature of the Himalayan glaciers using Remote sensing' at Postgraduate Research Conference, Cardiff University, June 2014. (Oral)
f.   Seminar on 'Recent techniques in remote sensing and GIS' at B.S. Abdur Rahman Crescent University, Chennai (2012) (Invited).