

Sundarabalan. V. Balasubramanian

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RESEARCH INTERESTS

Ocean Satellite Remote Sensing | Aquatic optics | Water Quality | Data Science: ML/DL
 Field Measurements | Drone Images | Underwater Images

EDUCATION AND ACADEMIC POSITIONS

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| May 2025 – Present | Postdoctoral Fellow , Department of Biology, University of Massachusetts Boston. Advisor: Prof. Jarrett Byrnes |
| November 2022 – November 2023 | Postdoctoral Fellow , Goddard Earth Science Technology and Research (GESTAR-II), UMBC, USA. Advisor: Dr. Nima Pahlevan |
| March 2017 – November 2019 | Postdoctoral Fellow , Goddard Space Flight Center (GSFC), NASA/ UMD Advisor: Dr. Nima Pahlevan |
| Jan 2016 – Jan 2017 | Postdoctoral Fellow , Laboratory of Oceanology and Geoscience (LOG), ULCO, France. Advisor: Prof. Cedric Jamet |
| May 2014-Nov 2014 | Pre-doctoral Fellow , Indian Institute of Technology Madras, India Advisor: Prof. Palanisamy Shanmugam |
| 2010–2015 | Ph.D. Department of Ocean Engineering, IIT Madras, India Dissertation: Radiative transfer modelling of underwater light fields in clear and turbid waters. Advisor: Prof. Palanisamy Shanmugam |
| 2005 –2007 | M.E. Digital Communication Engineering, Anna University, Chennai |
| 2001 –2005 | B.E. Electronics and Communication Engg Anna University, Chennai |

PROFESSIONAL APPOINTMENTS

- Remote sensing scientist (November 2023– April 2025 & March 2020 - October 2022), GeoSensing and Imaging (GeoSI) Consultancy Pvt. Ltd., Trivandrum, India
- Project Associate (August 2009-June 2010), IIT Madras, Chennai, India
- Software Engineer (June 2007-July 2009), Sheeba computers, Bangalore, India

TEACHING EXPERIENCE

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| Sept- Dec 2025 | Teaching Assistant , Handling Kelp remote sensing Lab for Undergrad students, Department of Biology, Univ. of Massachusetts Boston |
| Aug- Dec 2015 | Adhoc Faculty , Handled Digital Image Processing Course for Master's students, Department of ECE, NIT Calicut, India |
| 2015 | Visiting Faculty , Handled Basic Electrical Engg, Course for Undergrad students, Department of CSE, IIIT Kurnool, India |

MENTORSHIP AND SUPERVISION

- 2025 – Present: Mentor for Ph.D. student Nivedita Priyadarshini, Department of Geosciences, Virginia Tech, Blacksburg, VA, USA
- 2023: Mentor for Sandhani, Ph.D. student, Department of Ocean Engg, IIT Madras, India
- 2020 – 2024: Supervised undergraduate interns including Catherine (2024) and Manjunath (2020) on remote sensing and image analysis projects.
- 2020 – 2025: Project Lead, Geosensing and Imaging Consultancy (GeoSI), Trivandrum. supervised junior engineers and internship students on satellite image processing and machine learning projects.

FIELD CAMPAIGNS

- Participated in **three 15-day research cruises** in the Gulf of Mannar and the Bay of Bengal, India, conducting in-situ radiometric and photometric measurements for MODIS-Aqua validation and regional bio-optical algorithm development (MODIS, OCM-2).
- Participated in **five one-day coastal cruises** offshore of Chennai, Bay of Bengal, collecting radiometric data and water-quality samples (turbidity, chlorophyll-a) to support MERIS and MODIS satellite product validation.
- Participated in **ten one-day field campaigns** on Muttukadu Lake, Chennai, performing inland-water optical measurements using spectroradiometers for remote-sensing reflectance (Rrs) and water-quality sampling under varying environmental conditions.

COMPUTATIONAL AND ANALYTICAL SKILLS

- Satellite Data Processing: SeaDAS, ACOLITE
- Radiative Transfer Modeling: HYDROLIGHT
- Programming and Data Analysis: Python, R, MATLAB, C, C++
- Machine & Deep Learning: Image classification and regression modeling

WORKSHOPS CONDUCTED

- March 2024** Organized a one-day workshop on “*Fundamentals of Machine Learning and its Applications in Ocean Color Remote Sensing*” for undergraduate students at Kalasalingam University, India.
- December 2024** Conducted a one-day winter workshop on “*Integrated Remote Sensing and Radiative Transfer Modeling Framework for Coastal Water Studies*” for Ph.D. scholars at the Department of Ocean Engineering, IIT Madras, India.

GUEST LECTURES DELIVERED

- 2024** Ocean Color Remote Sensing, Saveetha University, India.
- 2023** Mixture Density Networks (MDN) for Water Quality Parameter Retrieval over Inland and Coastal Waters, Vellore Institute of Technology (VIT), Chennai, India.
- 2019** Satellite Image Processing for Ocean Applications, Chennai Institute of Tech, India.
- 2018** Aquatic Remote Sensing, Adhiyamaan Engineering College, India
- 2017** Satellite Image Processing for Ocean Applications, Rohini Engineering College, Chennai, India.

ONGOING WORK

1. Ashapure, A., O'Shea, R., **Balasubramanian, S. V.** "Aquaverse: A Machine Learning-Based Atmospheric Correction Framework for Inland and Coastal Waters",
2. **Balasubramanian, S. V.**, Byrnes, J., et al. "Hyperspectral Modeling of Kelp Forests from PRISMA Satellite Data Validated with UAV Imager"
3. Nivedita, P. K., **Balasubramanian, S. V.**, Manoochehr, S., Susanna, W., and Ashutosh. T. "Mixture Density Network-Based retrieval of Chlorophyll-a from multispectral imagery in the optically complex Chesapeake Bay"
4. **Balasubramanian, S. V.**, Byrnes, J., et al. "Deep Learning Framework for the Classification and Segmentation of Underwater Kelp Images"

PUBLISHED REPORTS

IOCCG (2025). Intercomparison of Atmospheric Correction Algorithms Over Optically Complex Waters. Jamet. C., and **Balasubramanian, S.V** (ed.), Reports of the International Ocean-Colour Coordinating Group, No. 21, IOCCG, Dartmouth, Canada.

PUBLISHED DATASET

1. Werther, M., Gurlin, D., Burggraaff, O., & **Balasubramanian, S. V. (2025)**. Datasets and models used in the manuscript "On the generalization ability of probabilistic neural networks for hyperspectral remote sensing of absorption properties across optically complex waters" [Data set]. In *Remote Sensing of Environment* (v1.0, Vol. 328, Number 114820). Zenodo. <https://doi.org/10.5281/zenodo.14893798>
2. Lehmann, M K; Gurlin, D; Pahlevan, N; Alikas, K; Anstee, J M; **Balasubramanian, S V**; et al., (2022): GLORIA - A global dataset of remote sensing reflectance and water quality from inland and coastal waters [dataset]. *PANGAEA*, <https://doi.org/10.1594/PANGAEA.948492>

REFEREED PUBLICATIONS

1. Werther, M., Burggraaff, O., Gurlin, D., Saranathan, A. M., **Balasubramanian, S.V.**, et al., (2025). On the generalization ability of neural networks for hyperspectral remote sensing of absorption properties across optically complex waters. *Remote Sensing of Environment*, 328.
2. **Balasubramanian, S.V.**, et. al., (2025), "Mixture density networks for re-constructing historical ocean-color products over inland and coastal waters: Demonstration and validation", *Frontiers in Remote Sensing*, 6.
3. Saranathan, A. M., Pahlevan, N., Werther, M., Odermatt, D., **Balasubramanian, S.V.** (2024). Assessment of probabilistic neural networks for the dual estimation of water quality indicators and uncertainties from multi- and hyperspectral observations. *Frontiers in Remote Sensing*, 5.
4. Sandhani, C. G., Shanmugam, P., **Balasubramanian, S.V.**, and Sannasiraj, S.A., (2024). "Influence of the Bubbles on the Hyperspectral Reflectance and Watercolour Products," in *IEEE Access*, 12.
5. Pahlevan, N., **Balasubramanian, S.V.**, et. al., (2024), "A Retrospective Analysis of Remote-Sensing Reflectance Products in Coastal and Inland Waters" *IEEE Geoscience and Remote Sensing Letters*, 21.
6. Maciel, D. A., Pahlevan, N., Barbosa, C. C. F., Martins, V. S., Smith, B., O'Shea, R. E., **Balasubramanian, S. V.**, Saranathan, A. M., Novo, E. M. L. M., (2023), Towards global long-term water transparency products from the Landsat archive. *Remote Sensing of Environment* 299, 113889.

CURRICULUM VITAE

7. Moritz K, L, Pahlevan, N., **Balasubramanian, S.V.**, et. al., (2023), “GLORIA - A globally representative hyperspectral in situ dataset for optical sensing of water quality”, *Scientific Data* 10 (1).
8. Pahlevan, N., Mangin A, **Balasubramanian, S.V.**, et. al., (2021), “ACIX-Aqua: A global assessment of atmospheric correction methods for Landsat-8 and Sentinel-2 over lakes, rivers, and coastal waters”, *Remote Sensing of Environment* 258, 112366.
9. **Balasubramanian, S.V.**, Pahlevan, N., et. al., (2020), “A robust remote sensing technique for the estimation of suspended sediment concentration over inland and coastal waters”, *Remote Sensing of Environment* 246, 111768.
10. Pahlevan, N., Chittimalli, S, K., **Balasubramanian, S.V.**, and Vellucci, V (2019), “Sentinel-2/Landsat-8 product consistency and implications for monitoring aquatic systems”, *Remote Sensing of Environment* 201, 47-56.
11. Pahlevan, N., **Balasubramanian, S.V.**, Sarkar, S., and Franz, B. (2018), “Towards long-term aquatic science products from heritage Landsat missions”, *Remote Sensing* 10, 1337 .
12. Sayoob, V., Shanmugam, P., and **Balasubramanian, S.V.** (2018), “Monte Carlo simulations of the backscattering measurements for associated uncertainty”, *Optics Express* 26, 21258-21270.
13. Pahlevan, N., Sarkar, S., Franz, B., **Balasubramanian, S.V.**, and He, J., (2017), “Sentinel-2 MultiSpectral Instrument (MSI) data processing for aquatic science applications: Demonstrations and validations”, *Remote Sensing of Environment* 201, 47-56.
14. **Balasubramanian, S.V.**, and Shanmugam, P. (2016), “Modeling of underwater light field fluctuations in coastal oceanic waters: Validation with experimental data”, *Ocean Science Journal* 51, 67-86.
15. **Balasubramanian, S.V.**, and Shanmugam, P. (2015), “Modelling of underwater light fields in turbid and eutrophic waters: application and validation with experimental data”, *Ocean Science* 11, 33-52.
16. Gokul, E., Shanmugam, P., **Balasubramanian, S.V.**, Arvind, S., and Chauhan, P. (2014). Modelling the inherent optical properties and estimating the constituents' concentrations in turbid and eutrophic waters, *Continental Shelf Research* 84: 120–138.
17. **Balasubramanian, S.V.**, Shanmugam, P., Manjusha, S.S. (2013). Radiative transfer modeling of upwelling light field in coastal waters, *Journal of Quantitative Spectroscopy and Radiative Transfer*; 121:30-44.
18. Shanmugam, P., Suresh, M., **Balasubramanian, S.V.**, (2013). OSABT: An Innovative Algorithm to Detect and Characterize Ocean Surface Algal Blooms, *IEEE Journal of selected topics in applied Earth observations and Remote Sensing*; 6:1879–1892.
19. Shanmugam, P., **Balasubramanian, S.V.**, Ahn, Y.H., Ryu, J.H. (2011). A New Inversion Model to Retrieve the Particulate Backscattering in Coastal/Ocean Waters. *IEEE transactions on Geoscience and remote sensing*; 49:2463-2474.
20. Shanmugam, P., Ahn, Y.H., Ryu, J.H., **Balasubramanian, S.V.**, (2010). An Evaluation of Inversion Models for Retrieval of Inherent Optical Properties from Ocean Color in Coastal and Open Sea Waters around Korea. *Journal of Oceanography*; 66:815-830.

ORAL/POSTERS PRESENTATIONS AT CONFERENCES

- 2023 – USA – IOCS, Florida
2023 – USA – NASA (CCE) Joint Science Workshop, Maryland
2018 – USA - AGU Fall meeting, Washington DC
2018 – Croatia - Ocean Optics conference, Dubrovnik
2018 – USA - Ocean Science Meeting, Portland
2016 – Canada - Ocean Optics conference
2012 – Netherland - NIOZ Royal Netherlands Institute for Sea Research