

## 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

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

Sept- Dec 2025	<b>Teaching Assistant</b> , Handling Kelp remote sensing Lab for Undergrad students, Department of Biology, Univ. of Massachusetts Boston
Aug- Dec 2015	<b>Adhoc Faculty</b> , Handled Digital Image Processing Course for Master's students, Department of ECE, NIT Calicut, India
2015	<b>Visiting Faculty</b> , 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**

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

**GUEST LECTURES DELIVERED**

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

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