

# Sankar Manalilkada Sasidharan, Ph.D.

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## RESEARCH INTERESTS

My expertise is in understanding the influence of land use land cover, hydrology, and climate on water quality via dissolved organic matter (DOM), nutrients, pathogens, and trace element loading into the water bodies. My research focuses on understanding the natural and anthropogenic processes affecting the water quality, phytoplankton dynamics (Imaging FlowCytobot & FlowCAM), dissolved organic matter, and acidification in various aquatic environments. I am proficient in watershed biogeochemistry, water quality studies, statistical data mining, computer programming (*R&MATLAB*), and GIS.

## EDUCATION

- Mississippi State University**, MS-State, Mississippi August 2019  
Ph.D. in Earth and Atmospheric Sciences  
GPA:4.00/4.00  
Dissertation title: *Characterization of dissolved organic matter and determination of its biogeochemical significance in coastal and inland water bodies*
- Texas Tech University**, Lubbock, Texas May 2016  
MS in Geosciences  
GPA: 3.75/4.0  
Dissertation title: *Characterization and Surface Reactivity of Corundum in Aqueous NaCl Media*
- Kansas State University**, Manhattan, Kansas August 2013  
MS in Geology  
GPA: 3.88/4.0  
Dissertation title: *Geochemical Significance of Arsenic and Manganese Toxicity in Groundwaters from Murshidabad district, West Bengal, India*
- Indian Institute of Technology (IIT-ISM)**, Dhanbad, India May 2002  
MSc in Applied Geology  
GPA:3/5
- University of Kerala**, Trivandrum, India April 2000  
BSc Geology

## RESEARCH & WORK EXPERIENCE

**Postdoctoral Research Associate**, Harte Research Institute (HRI), TAMUCC 2021-Present

The research includes the implementation of a harmful algal bloom (HAB) monitoring program in Matagorda Bay and San Antonio Bay (Texas) using high-frequency water sampling and an automated, real-time HAB sensor (Imaging FlowCytobot).

**Postdoctoral Associate**, Geosystems Research Institute (GRI), MS-State 2019-2021

Research focuses on using an autonomous surface vehicle (ASV) with a suite of chemical and biological sensors, including an Imaging FlowCytobot (IFCB) and a multichannel logger to study water quality parameters, phytoplankton dynamics, colored dissolved organic matter, and ocean acidification. Additionally, I am also using a Flow Imaging Microscopy (FlowCAM) for the identification and characterization of aquatic phytoplankton species. My research is also focused to detect, model, and map the hazardous organisms, chemicals, and munitions in rivers, lakes, and coastal waters of the USA.

**Research Assistant**, Mississippi State University 2016-2019

Developed a methodology to evaluate the rate of disintegration of dissolved organic matter (DOM) in different environmental settings under the influence of sunlight and bacteria. Estimated the seasonal changes in DOM- trace element-nutrient chemistry in the bays and the estuaries of the southern US. Studied the effect of DOM and nutrients input on ocean acidification over the oyster reefs of the Northern Gulf of Mexico. Performed chemical characterization of DOM from the major and minor lakes in the state of Mississippi using Parallel Factor Analysis (PARAFAC), then created a classification model based upon DOM composition, nutrient budgets, water chemistry, and land use-land cover using multivariate statistics.

**Research Assistant**, Texas Tech University 2013-2015

Performed the characterization of corundum nanoparticles ( $\text{Al}_2\text{O}_3$ ), using SEM-EDX, XRD, TEM, TGA, and BET surface area. Then performed potentiometric titrations to estimate the dissolution and surface charge of  $\text{Al}_2\text{O}_3$  nanoparticles in aqueous NaCl media under various pH conditions. Conducted experiments to estimate the adsorption of arsenic onto iron-coated quartz nanoparticles.

**Guest Researcher**, NSLS, Brookhaven National Laboratory (BNL) 2011-2013

Performed solid-state speciation studies of arsenic ( $\text{As}^{3+}$  and  $\text{As}^{5+}$ ) in aquifer sediments using beamlines X11A, X15B & X27A.

**Research Assistant**, Kansas State University 2011-2013

Identified the sources of organic matter and its effect in controlling the distribution of Arsenic in the groundwaters of Bengal Basin, India. Estimated the surface water-groundwater interaction using oxygen isotope ( $\delta\text{H}$ - $\delta^{18}\text{O}$ ) and organic matter.

**Geologist**, Geological Survey of India 2005-2011

Performed Geological Mapping, Mineral exploration and drilling, core logging, Beach management, wave dynamics measurements, Paleo-tsunami studies, groundwater

contamination studies, geochemical mapping, preparation of technical reports, and management of field camps.

**Editorial Assistant**, Gondwana Research Journal 2004-2005  
Proof-reading of geoscience articles, journal production, and supply, fieldwork

**Project Fellow** Indian Institute of Technology (IIT-ISM) 2003-2004  
Petrological studies of ore-bearing rocks, fluid inclusion studies, preparation of project report

## TEACHING EXPERIENCE

### ***Earth and Atmospheric Sciences, Mississippi State University, MS***

**GG1123** Survey of Earth Science II (Historical geology) Spring 2016- Spring 2019

**GG1121** Survey of Earth Science II-Lab Spring 2016-Spring 2019

**GG1113** Survey of Earth Science I (Introduction to geology) Spring 2017

**GG1111** Survey of Earth Science I Lab Spring 2017

**GG 8633** Water Biogeochemistry (TA) Spring 2019

### ***Geosciences, Texas Tech University, TX***

**GEOL 1101** Physical Geology Laboratory Spring 2014-Fall 2014

**GEOL 3324** Structural Geology lab for Petroleum Engineers Fall 2014-Spring 2015

### ***Geology, Kansas State University, MS***

**GEOL 103** Geology Laboratory Fall 2011-Spring 2013

## PUBLICATIONS (\*Total citations = 149, [scholar.google.com](https://scholar.google.com))

### *PEER REVIEWED*

1. Paul, V., **Sankar, M S.**, Vattikutti, S., Dash, P., Arslan, Z. (2020). Pollution Assessment and Land Use Land Cover Influence on Trace Metal Distribution in Sediments from Five Aquatic Systems in Southern USA, *Chemosphere*, 263, 128243.
2. **Sankar, M S.**, Dash, P., Lue, Y H., Mercer, A., Turnage, G., Shoemaker, C M., Chen, S., Moorhead, R J. (2020). Land use and land cover control on the spatial variation of dissolved organic matter across 41 lakes in Mississippi, USA, *Hydrobiologia*, 847 (4), 1159–1176.
3. **Sankar, M S.**, Dash, P., Lue, Y H., Paul, V., Mercer, A., Arslan, Z., Varco, J J., Rodger, J C. (2019). Dissolved organic matter and trace element variability in a blackwater-fed bay following precipitation, *Estuarine, Coastal and Shelf Science*, 231, 106452, 1-16.
4. **Sankar, M S.**, Dash, P., Sigh, S., Lu, Y H., Mercer, A., Chen, S. (2019). Effect of Photo-biodegradation and Biodegradation on the Biogeochemical Cycling of Dissolved Organic Matter Across Diverse Surface Water Bodies, *Journal of Environmental Sciences*, 77, 130-147.
5. Singh, S., Dash, P., **Sankar, M S.**, Silwal, S., Lu, Y H., Shang, P., Moorhead, R J. (2018). Seasonality in Dissolved Organic Matter Delivery to the Lower Pearl River Estuarine Waters: Effects of Hydrologic Conditions and Photochemistry, *Estuaries and Coasts*, 42,439–454
6. **Sankar, M S.**, Vega, M A., Defoe, P P., Kibria, M G., Ford, S., Telfeyan, K., Neal, A., Mohajerin, T J., Hettiarachchi, G M., Barua, S., Hobson, C., Johannesson, K., Datta, S. (2014). Elevated arsenic and manganese in groundwaters of Murshidabad, West Bengal, India, *Science of The Total Environment*, 488-489, 570-579.
7. Mohajerin, T J., Neal, A., Telfeyan, K., **Sankar, M S.**, Ford, S., Yang, N., Chevis, DA., Grimm, D A., Datta, S., White, C D., Johannesson K H. (2013). Geochemistry of Tungsten and Arsenic in Aquifer Systems: A

Comparative Study of Groundwaters from West Bengal, India, and Nevada, USA, *Water Air Soil Pollution*, 225:1792.

8. Pal, T., **Sankar, M.S.**, Bhattacharya, A., Chirananda De. (2011) A misleading “turtle rock” from pelagic sediments of Andaman ophiolite, Andaman Islands, India. *Current Sciences*. 101 (7), 847-848.
9. Pal, T., Raghav, S., Bhattacharya, A., Bandopadhyaya, P.C., Mitra, S K., Renjit, M L., **Sankar M.S.**, Ghosh, B. (2010). The 2005–2006-eruption of the Barren Volcano, Andaman Sea: Evolution of basaltic magmatism in island arc setting of Andaman–Java subduction complex. *Journal of Asian Earth Sciences*, 39 (1-2), 12–23.
10. **Sankar, M S.** (2010). Present-day Beaches in Andaman: Implications for coastal management, *News, Geological Survey of India*, 30, 1&2.
11. **Sankar, M S.**, Dash, P., Lue, Y H., Mercer, A., Arslan, Z., Moorhead, R J (2020). Seasonal changes of trace metal-nutrient-dissolved organic matter conveyance along with coastal acidification over the largest oyster reef in the Western Mississippi Sound, USA, *Continental Shelf Research (under preparation, currently with coauthors)*
12. Sanders, L., Dash, P., **Sankar M.S.**, Lu, Y., Andrew E. Mercer, A.E., Parajuli, P., Ouyang., Y. (2020). Composition of dissolved organic matter and nutrients in streams from an intensively managed agricultural watershed, *Water (under preparation, currently with coauthors)*

#### BOOK CHAPTER

1. Datta, S., **Sankar, M S.**, Hobson, C., Neal, A., Johannesson., Haug, T J., Telfeyian, K., Yang, N. (2012). Sediment geochemistry and hydro-geochemical contrasts between low and very high arsenic affected areas west and east of river Bhagirathi, West Bengal, India, *Taylor & Francis Group, London, CRC Press 2012*; ISBN: 978-0-415- 63763-3.
2. Datta, S., Johannesson, K., Mladenov, N., **Sankar M.S**, Ford, S., Vega, M., Neal. A., Kibria, M G., Krehel, A., Hettiarachchi, G M. (2014). Groundwater-sediment sorption mechanisms and role of organic matter in controlling arsenic release into aquifer sediments of Murshidabad area (Bengal basin), India, *One Century of the Discovery of Arsenicosis in Latin America (1914-2014) As2014, Taylor & Francis Group, London; CRC Press, ISBN: 978-1-138-00141-1.*

#### CONFERENCE PROCEEDING

1. Dash, P., **Sankar M. S.**, Moorhead, R.J., Herman, J., Moorhead, J., Beshah, W., Chesser, D., Lowe, W., Simmerman,J., Turnage, G.(2021). Evaluation of Water Quality Data Collected using a Novel Autonomous Surface Vessel, *OCEANS Conference & Exposition - San Diego 2021.*
2. Simmerman,J., Chesser, D., Wes Lowe, W., Moorhead, J., Beshah, W., Turnage, G., Dash, P., **Sankar M.S.**, Moorhead,R.J., Herman, J. (2021). Evaluation of the Utility and Performance of an Autonomous Surface Vehicle for Mobile Monitoring of Waterborne Biochemical Agents, *OCEANS Conference & Exposition - San Diego 2021.*
3. Beshah, W., Moorhead, J., Dash, P., Moorhead, R.J., **Sankar M. S.**, Chesser, D., Lowe,w., Simmerman,j., Turnage, G.(2021). IoT Based Real-Time Water Quality Monitoring and Visualization System Using an Autonomous Unmanned Surface Vehicle, *OCEANS Conference & Exposition - San Diego 2021.*
4. Paul V., Vattikuti S., **Sankar M.S.**, Dash P., Berry M., Arslan Z (2020). Geochemical Assessment of Trace Metals from Varied Aquatic Systems in Southern USA, *2020-Mississippi Water Resources Conference*
5. **Sankar, M. S.**, Dash, P., Lu, Y. H., Mercer, A. E., Arslan, Z., Sanders, S. L., Wickramarathna, S., Ragland, R., Chen, S., Moorhead, R. J. (2019). Variation in dissolved organic matter, trace metals, and acidification parameters in the western Mississippi Sound, *25<sup>th</sup> biennial conference, CERF 2019, USA.*
6. Katkar, A., Dash, P., **Sankar, M. S.**, and Moorhead, R. J. (2019). Effects of coastal acidification on the oyster reefs in the western Mississippi Sound, *25th biennial conference, CERF 2019, USA.*

7. Dash, P., Devkota, M., **Sankar, M. S.**, Beshah, W., Mercer, A. E., Ambinakudige, S. 2019. Influence of river input on the carbonate chemistry of northern Gulf of Mexico, 25th biennial conference, CERF 2019, USA.
8. **Sankar, M. S.**, Dash, P., Lu, Y. H., Mercer, Turnage, G., Shoemaker, C M., Chen, S. (2019). Influence of land use and land cover on dissolved organic matter composition across 41 lakes in Mississippi, Mississippi Academy of Sciences 2019 Summer Student Science Symposium (**1<sup>st</sup> Prize for Poster Presentation, Ecology division**)
9. **Sankar, M S.**, Dash, P., Lu, Y.H, (2019). Dissolved organic matter biogeochemistry and its effect on ocean acidification over an oyster bed in the western Mississippi sound, MS, USA. *Mississippi Academy of Sciences* 83rd Annual Meeting, 21-22 February 2019 (Oral Presentation).
10. **Sankar, M S.**, Dash, P., Lu, Y.H, Paul, V., Mercer, A., Arslan, Z. (2018). Application of multivariate statistics to geochemical and precipitation data to evaluate dissolved organic matter-trace element variability in a Coastal Bay, *AGU Fall Meeting* 10-14 December 2018 (Poster).
11. **Sankar, M S.**, Dash, P., Lu, Y., Arslan, Z. (2018). Biogeochemical evaluation of dissolved organic matter and trace elements over an oyster Bed in the Western Mississippi Sound using multivariate Statistics, *AL-MS Bays and Bayous Symposium* 28-29 November 2018 (Oral Presentation).
12. **Sankar, M S.**, Dash, P., Singh, S., Lu, Y. (2017). Effect of photodegradation and biodegradation on the concentration and composition of dissolved organic matter in diverse water bodies, *AGU Fall Meeting*, 11-15 December 2017 (Poster)
13. **Sankar, M S.**, Dash, P., Paul, V., Singh, S., Lu, Y., Arslan, Z., Varco, J., Phipps, S., Rodgers. J R. (2017). The Nature of dissolved organic matter and its effect on biogeochemical cycling of toxic trace metals in Weeks Bay Estuary, *SEDAAG 2017, 72nd Annual Meeting; Southeastern Division of the AAG*. Starkville, MS, USA (Oral Presentation).
14. **Sankar, M S.**, Ridley, M K. (2015). Characterization and surface reactivity of Corundum in aqueous NaCl media, *Geological Society of America*, South-Central Section - 49th Annual Meeting, At Stillwater, OK, USA, 47(1) (Poster).
15. **Sankar, M S.**, Mladenov, N., Ford, S., Mohajerin, T J., Telfeyan, K., Neal, A., Datta, S. (2013). Hydrochemistry and organic matter characterization of Arsenic polluted regions, Murshidabad, West Bengal, India, *ICOETE, Athens, Georgia, USA* 2013 (Oral Presentation).
16. **Sankar, M S.**, Datta, S. (2013). Hydrochemistry and organic matter characterization of Arsenic polluted Regions, Murshidabad, West Bengal, India, *18th Annual K-State Research Forum*, March 27, 2013, KS, USA (**3<sup>rd</sup> Prize for Oral Presentation**)
17. **Sankar, M S.**, Johannesson, K., Mohajerin, T J., Neal, A., Ford, S., Datta, S. (2013). Study of High Arsenic and Fluorides in Groundwaters in parts of Eastern India: Geochemical and Health implications and Future Sustainability Needs, *GeoGen2013 – Towards sustainable drinking water supply in developing countries*, Addis Ababa, Ethiopia, February 5th- 7th, 2013 (Poster).
18. **Sankar, M.S.**, Telfeyan K., Ford S., Neil A., Mohajerin, T J., Mladenov, N., Johannesson K., Datta S. (2012). Field-scale investigation of geochemical parameters controlling high and low arsenic occurrence in Murshidabad District, West Bengal: India, *22nd M V Goldschmidt*, Montréal, Canada (Poster).
19. **Sankar, M.S.**, Datta, S. (2012). Study of high fluorides in groundwater in parts of eastern India: Geochemical and Health implications, *Geological Society of America*, South-Central Section - 46th Annual Meeting, 44 (1), 32 (Oral Presentation).
20. Adhikari, P., Dash, P., **Sankar, M S.**, Nagpal, S., Sudedi, N., Ariunbold, G O. 2017. A Spectroscopic Study of Dissolved Organic Matter Under Storm Flow Conditions, *SEDAAG 2017, 72nd Annual Meeting; Southeastern Division of the AAG*. Starkville, MS, USA.
21. Li, Y., **Sankar, M S.**, Yan, W., Ridley M. 2014. Connecting Surface Chemistry and Redox Activity of Iron-Impregnated Mineral Oxides, *Goldschmidt 2014 Abstracts*, 8-13 June, Sacramento, CA, USA.

22. Kibria, M G., Hossain, M., Bhattacharya, P., Ahmed, K M., Von Bromssen, M., Jacks, G. Kirk, M F., **Sankar, M S.**, Telfeyan, K., Ford, S., Neal, A., Haug, T. J., Johannesson, K., Datta, S. 2013. Investigation of sediment geochemistry in areas with elevated arsenic in groundwater of Matlab, Bangladesh and Murshidabad, India, Goldschmidt 2013 Abstracts. August 25-30, Florence, Italy.
23. Ford, S., Telfeyan, K., **Sankar. M S.**, Mohajerin, T J., Neal, A., Johannesson, K., Datta, S. 2012. Empowering local villagers from West Bengal to understand the extent of Arsenic Contamination and locate Alternative solutions, Geological Society of America, Annual Meeting in Charlotte, Vol. 44, No. 7, p. 119.
24. Telfeyan, K., **Sankar, M S.**, Datta, S., Ford, S., Johannesson, K. 2012. Arsenic Speciation and Distribution Controls throughout Murshidabad, West Bengal, India, 22nd M V Goldschmidt, Montréal, Canada.

#### *TECHNICAL/ EXTENSION REPORT*

1. Turnage, G., **Sankar, M S.**, Barrett, J R. (2020). Anchor Lake, Secondary Plant Community, and Water Quality Assessment, Geosystems Research Institute, Mississippi State University.

#### *INVITED LECTURE*

1. Biogeochemical modeling of dissolved organic matter (DOM) in Mississippi waters, Dept. Geology and Geological Engineering, University of Mississippi, 09/16/2019

#### RESEARCH GRANTS

**Sankar, M S.**, Shuo Chen, Dash, P., Lu, Y. Integrating Remote Sensing and Biogeochemical Characterizations to Determine Roles of Dissolved Organic Matter in Declining Water Quality over Oyster Reefs, Mississippi, PI, 01/10/2019-09/10/2019, \$10,000, 2019 Seed Grant Program.

#### MEMBERSHIPS & PROFESSIONAL ACTIVITIES

**Reviewer** for the Ecological Indicators (Elsevier), Estuaries and Coasts (Springer), Journal of Hazardous Materials (Elsevier), Environmental Science & Technology (ACS Publications), Journal of water and climate change; Science of the Total Environment (Elsevier), Journal of Sustainable Water in the Built Environment (ASCE), Cambridge University Press, **Judged** student presentations at CERF 2019.

**Member** of Geological Society of America (GSA), American Geophysical Union (AGU), American Association of Petroleum Geologists (AAPG), Phi Kappa Phi- Honor Society ( $\phi K\phi$ )

Served as a **graduate representative** at the Dunn-Seiler Museum, and **field guide** for short geological excursions, Department of Geosciences, MS-State

#### SKILLS

**Programming:** R, Matlab

**Modeling Software:** JMP, Sigma Plot, FlowCam Visual Spreadsheet, CO2SYS

**General:** ArcGIS, MS Office suites

**Statistical Skills:** Data mining, Machine learning, Hypothesis testing, ANOVA, MANOVA, Multivariate statistics, clustering, resampling, Parallel factor analysis (EEM-PARAFAC), MATLAB Image Processing Toolbox for IFCB data

**Instrumental:** HORIBA Fluoromax-4 Fluorometer, Perkin Elmer Lambda 850- Spectrophotometer, ABRAXIS-CAAS Toxin analyzer, Imaging FlowCytobot (IFCB), Flow Imaging Microscopy (FlowCam), XRD, SEM-EDX,

*ICP-OES, ICP-MS, TOC-analyzer, Water quality test kits (Hach® and CHEMets®), SBE-19 plus V2 Seacat-CTD sensor (Sea-Bird)*

**Laboratory:** Total digestion, Sequential extraction, Organic matter extraction, LOI test, SPM analysis

**Field:** Geological mapping, Drilling, Core logging, Water sampling, Sediment sampling, Sample processing, sample preservation, Coastal, and Marine survey

**Training:** Image FlowCytobot (IFCB) training by McLane Labs; Flow Imaging Microscopy by Yokogawa Fluid Imaging Technologies, Oceanographic sensor training by Sea-Bird University

**Languages:** Malayalam (native), English (fluent), Hindi (fluent), Bengali (fluent), Tamil (basic)

### Honors

1. First Prize Ecology, Mississippi Academy of Science, Summer Student Symposium, 2019 (\$100)
2. Travel Grant, MS-State, 2018 & 2017 (\$1650)
3. Study abroad scholarship, Texas Tech 2014 & 2015 (\$700)
4. AAPG-SWS research grant, 2014 (\$500)
5. Travel Grant, Texas Tech, 2015 (\$200)
6. GSA Travel Grant, 2015 (\$200)
7. Texas Tech University Summer research scholarship, 2014 & 2015 (\$4000)
8. Third Prize interdisciplinary presentation, KRF, Kansas State, 2013 (\$250)
9. Travel Grant, Kansas State University, 2012(\$250)
10. Paul & Deana Strunk Fellowship, Kansas State, 2011-2012 & 2012-2013 (\$4000)
11. Secured All India 14<sup>th</sup> Rank, Central Geological Service, UPSC- 2013, India
12. CSIR- National Eligibility Test award for Lectureship in India, 2002 & 2003