

## CURRICULUM VITAE

### Dr. Padmanava Dash

Assistant Professor

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### EDUCATION

- 2005 – 2011 Louisiana State University, Baton Rouge, LA, USA  
Ph.D. (Oceanography and Coastal Sciences)
- 2003 – 2005 Bowling Green State University, Bowling Green, OH, USA  
Master of Science (Geology)
- 2001 – 2003 Indian Institute of Technology (IIT), Bombay, India  
Master of Science (Applied Geology)
- 1999 – 2001 Utkal University, Bhubaneswar, India  
Master of Science (Geology)
- 1996 – 1999 Utkal University, Bhubaneswar, India  
Bachelor of Science (Geology)

### PUBLICATIONS

1. [Dash, P.](#), Walker, N., Mishra, D., Hu, C., Pinckney, J., and D'Sa, E. (2011) Estimation of cyanobacterial pigments in a freshwater lake using OCM satellite data, *Remote Sensing of Environment*, 115, 12, 3409-3423. (Impact Factor: 4.607)
2. **Dash, P.**, Walker, N., Mishra, D. and D'Sa, E. J. (In Review) Atmospheric correction and vicarious calibration of Oceansat-1 OCM data, *IEEE Transactions in Geoscience and Remote Sensing*. (Impact Factor: 3.013)
3. Garcia, A. C., Bargu, S., [Dash, P.](#), Rabalais, N. N., Morrison, W. and Walker, N. (2010) Evaluating the potential risk of microcystins to blue crab (*Callinectes sapidus*) fisheries and human health in a eutrophic estuary. *Harmful Algae*, 9, 134–143. (Impact Factor: 4.280)
4. [Dash, P.](#), and Vincent R. K. (2005) Computer Animation of Cyanobacteria Blooms in Lake Erie from July-October, 2003, As Mapped from SeaWiFS Data with a New Phycocyanin Algorithm, *Proceedings of the 16<sup>th</sup> Pecora Conference on Global Priorities in Land Remote Sensing*, Sioux Falls, SD, October 23-27, 2005.
5. Anbazhagan, S., and [Dash, P.](#) (2003) Environmental case study of Cauvery river flood plain. *GIS Development*, 7, 12, 30-35.

## CONFERENCES ATTENDED

1. AGU Fall Meeting, December 5-9, 2011, San Francisco, CA. Title of the oral presentation: Atmospheric Correction, Vicarious Calibration and Development of Algorithms for Quantifying Cyanobacterial Blooms from Oceansat-1 OCM Satellite Data.
2. ASLO Aquatic Sciences Meeting, February 13-18, 2011, San Juan, Puerto Rico. Title of the oral presentation: Atmospheric Correction, Vicarious Calibration and Development of Algorithms for Quantifying Cyanobacterial Blooms from Oceansat-1 OCM Satellite Data
3. International Symposium on the A-Train Satellite Constellation, October 25-28, 2010, New Orleans, LA
4. NASA Ocean Color Research Team Meeting, May 11-13, 2010, New Orleans, LA
5. Annual Northern Gulf Institute Conference, May 16-17, 2008 Biloxi, MS. Title of the poster: Quantitative mapping of cyanobacteria blooms from Oceansat-1 OCM satellite data (**Second best poster award**).
6. Graduate Student Symposium, February 22-24, 2008 LUMCON, Cocodrie, LA. Title of the poster: Quantitative mapping of cyanobacteria blooms from Oceansat-1 OCM satellite data (**Best poster award**).
7. Fourth Symposium on Harmful Algae in the U.S., October 29- November 1, 2007, Woods Hole, Massachusetts. Title of the poster: Quantitative mapping of cyanobacteria blooms from Oceansat-1 OCM satellite data.
8. 16<sup>th</sup> Pecora Conference on Global Priorities in Land Remote Sensing, October 23-27, 2005, Sioux Falls, SD. Title of the oral presentation: Computer Animation of Cyanobacteria Blooms in Lake Erie from July-October, 2003.

## RESEARCH GRANTS (\*AUTHOR)

1. Walker, N., \***Dash, P.**, Bargu, S., and D'Sa, E. (pending) Rapid detection of cyanobacterial blooms using near real-time satellite data in an urban oligohaline estuary, Lake Pontchartrain, Louisiana, 9/1/2012-8/31/2015, \$651,067.00, NOAA.
2. Walker, N., Bargu, S., \***Dash, P.**, and Garcia, A. (not awarded) Detecting and quantifying toxic cyanobacterial blooms using Oceansat-1 OCM satellite data, 7/1/2008-7/31/2009, \$56,000.00, COYPU Foundation Trust.
3. \*Vincent, R., Leshkevich, G., **Dash, P.**, and Al-Rshaidot, M. (awarded) Development of a MODIS image product for mapping phycocyanin pigment in blue-green algal blooms (Toxic Algae), 4/1/2005-6/30/2006, \$13,253.00, NOAA Ohio Sea Grant.

## PROFESSIONAL ACTIVITIES

- Reviewer: *Remote Sensing of Environment*, 2012-present.
- Reviewer: *IEEE Transactions in Geoscience and Remote Sensing*, 2011-present.
- Research Assistant: Dept. of Oceanography and Coastal Sciences, LSU, 2005-2011.
- Teaching Assistant: Dept. of Oceanography and Coastal Sciences, LSU, 2008-2009.
- Research Assistant: Dept. of Geology, BGSU, 2004-2005.
- Teaching Assistant: Dept. of Geology, BGSU, 2003-2005.

## RESEARCH EXPERIENCE

- **Ph.D. Dissertation** (Louisiana State University):  
Quantitative mapping of cyanobacterial blooms using oceansat-1 OCM satellite data.  
Advisor: [Dr. Nan Walker](#)  
Committee: [Dr. Eurico D'Sa](#), [Dr. Sibel Bargu](#), [Dr. Nancy Rabalais](#), & [Dr. Brian Marx](#)
- **Selected Class Projects** (Louisiana State University):
  - (1) Aquatic primary productivity- a comparative study of diurnal changes in three habitat types: creeks, bayous and beaches.
  - (2) Effects of temperature, salinity, irradiance and other environmental factors on the growth rate, distribution, and toxicity of *Karenia Brevis* blooms.
  - (3) Remote Sensing and GIS for best campground selection.
  - (4) Satellite meteorology for hurricane planning using the SLOSH model (Sea, Lake and Overland Surges from Hurricanes: a computer model used to estimate what land areas will be affected by a hurricane's storm surge).
  - (5) A comparison of empirical algorithms for chlorophyll concentrations of Lake Pontchartrain.
- **M.S. Thesis** (Bowling Green State University):  
SeaWiFS algorithm for mapping phycocyanin in incipient freshwater cyanobacterial blooms.  
Advisor: [Dr. Robert Vincent](#)  
Committee: [Dr. Joseph Frizado](#) & [Dr. Enrique Gomezdelcampo](#)
- **Selected Class Projects** (Bowling Green State University):
  - (1) Production of a DRASTIC (Depth to water, net Recharge, Aquifer media, Soil media, Topography, Impact of vadose zone, and hydraulic Conductivity) map and identification of sites with highest potential for pollution using Arc GIS.
  - (2) Terrain analysis using GIS functions 'buffer', 'local', 'focal', 'block' and 'global'.
- **M. Sc. Dissertation** (IIT, Bombay): Remote Sensing and GIS for Flood plain environmental mapping of Cauvery River, Tiruchchirappalli, India.  
Advisor: [Dr. S. Anbazhagan](#)

## TEACHING EXPERIENCE

- Fall, 2008 & Spring, 2009: Introductory Oceanography (OCS 1005)  
Class size- 120
- Fall, 2004: Graduate level - Geographic Info. Systems Lab (Geol 503)  
Class size- 24
- Spring, 2004: Life Through Time (Geol 105)  
Class size- 30
- Fall, 2003: Life Through Time (Geol 105)  
Class size- 30

## RELEVANT COURSEWORK

- **Physical Oceanography** (Louisiana State University): Physics of the ocean with emphasis on dynamical problems; physical properties of sea water, marine instrumentation, flow dynamics in the earth's rotating coordinate system, water waves, and general circulation.
- **Satellite Remote Sensing** (Louisiana State University): This course focused on the theories and applications of visible, thermal, and microwave remote sensing for the study of coastal and oceanic environments. Processed and interpreted data from several passive and active sensors including NOAA AVHRR, GOES GVAR, Orbview-2 SeaWiFS, Ocean Color Monitor, MODIS, Synthetic Aperture Radar, satellite altimeters, and scatterometers.
- **Marine Optics** (Louisiana State University): This course covered the concepts of hydrologic optics, IOPs and AOPs, radiative transfer theory, absorption, scattering and attenuation in the aquatic medium, phytoplankton photosynthesis and fluorescence, bio-optical properties of coastal waters, color of coastal ocean and applications and in-water optical instrumentation.
- **Remote Sensing and GIS Applications** (Louisiana State University): A thorough training on the use of ERDAS IMAGINE software including raster and vector data analysis, image enhancement and classification techniques.
- **Satellite Remote Sensing in Biological Oceanography** (Cornell University): This course dealt with processing datasets from a variety of satellite sensors (SeaWiFS, MODIS, AVHRR, SeaWinds and Topex-Poseidon) and merging these data sets to examine biological response to changes in the physical environment. Lectures covered the fundamentals of bio-optics, pigment and primary production algorithms and the underlying physical principles leading to the measurement of sea surface temperature, ocean wind speed and ocean topography. Computer labs focused on developing the IDL programming skills needed to process, analyze and visualize satellite image data.
- **Weather Analysis and Satellite Meteorology** (Louisiana State University): This course covered diagnostic studies of surface and upper-air observational data using isoplething charts and satellite images to represent the state of the atmosphere over both land and sea; the use of satellite technology in weather forecasting including cloud identification, wind direction, storm development, and air quality.
- **Biological Remote Sensing** (Bowling Green State University): This course involved Remote Sensing applications to study biological processes. It included development of algorithms for mapping cyanobacteria, E. Coli and Coliform in freshwater systems. Vegetation mapping was covered for identification of changes in reflectance and chlorophyll fluorescence because of different types of stress such as heavy metal stress, tree diseases, and soil moisture etc.
- **Geological Remote Sensing** (Bowling Green State University): This course covered remote sensing and GIS operations such as principal component transformation, spatial filtering, supervised and unsupervised classification using ER Mapper, ENVI and ERDAS Imagine software. Remote Sensing applications to mineral, petroleum and ground water exploration were covered.
- **Environmental Remote Sensing** (Bowling Green State University): In this course satellite observations related to global climate change was covered. Environmental remote sensing applications to localized areas with indications of anthropogenic activities were emphasized.

- **Digital Mapping** (Bowling Green State University): This course covered training on the ESRI Arc GIS 8.3 software with an emphasis on management of geo-databases, Microsoft Access, Wireless GIS and GPS.
- **Geographic Information Systems** (Bowling Green State University): Raster and Vector GIS were covered involving importing shapefiles and coverages to geo-databases and manipulating geo-databases. It also included attribute table 'joins' and 'relates'.
- **Remote Sensing and GIS** (IIT, Bombay): Multispectral image processing for spatial and temporal analyses was covered. It included fundamentals of GIS using Idrisi 32 GIS software.
- **Remote Sensing special paper I & II** (Utkal University, Bhubaneswar): In this course satellite as well as aerial Remote Sensing image interpretation techniques were covered.

#### **COMPUTATIONAL EXPERIENCE**

- Programming Languages: IDL, MATLAB, PYTHON, FORTRAN-90, HTML
- Packages: SeaDAS, ENVI, ERDAS Imagine, ER Mapper, Arc GIS, SAS, MINITAB

#### **CREDENTIALS AND AWARDS**

- Travel Award, AGU Fall Meeting, San Francisco, CA (2011)
- Travel Award, ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico (2011)
- Best Poster Award, Graduate Student Symposium, LUMCON, Cocodrie, LA (2008)
- Second Best Poster Award, Northern Gulf Institute Conference, Biloxi, MS (2008)
- Travel Award, 4<sup>th</sup> Symposium on Harmful Algae in the US, Woods Hole, MA (2007)
- BGSU Outstanding Research Assistant of the year (2004)
- Representative to Graduate Student Senate (GSS), BGSU (2004).
- Representative to Student Achievement Assessment Committee, BGSU (2004).
- Awarded Merit Cum Means (MCM) scholarship in IIT Bombay (2001-2003).
- Qualified Graduate Aptitude Test in Engineering (GATE), India (2001).
- Qualified Council of Scientific and Industrial Research National Eligibility Test (CSIR-NET), India (2001).
- Junior and Senior National Merit Scholarship, Ministry of HRD, India (1994 - 1996)

#### **MEMBERSHIPS AND AFFILIATION**

- a) American Society of Limnology and Oceanography (ASLO)
- b) American Geophysical Union (AGU)
- c) Association of American Geographers (AAG)

#### **VOLUNTEER WORK**

- Session Chair: Recent Advances in Satellite Oceanography I Posters, AGU Fall Meeting, San Francisco, CA (2011)
- Volunteer: ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico (2011)
- Friends of the LSU Libraries Book Bazaar (2009)
- Home Rehab Program Community Work Day in Old South Baton Rouge (2008)
- Volunteer: Task force for building houses for the homeless, Bowling Green (2004)
- Red Cross Society Blood Donation Camp, IIT Bombay, India (2002)
- Tutored students (grades eight to ten) in Keonjhar, Orissa, India (1997-1999)

## ABSTRACT OF DOCTORAL RESEARCH

### Title: Quantitative Mapping of Cyanobacterial Blooms Using Oceansat-1 OCM Satellite Data

Cyanobacteria represent a major harmful algal group in fresh to brackish water environments. Lac des Allemands, a freshwater lake of 49 km<sup>2</sup> southwest of New Orleans, Louisiana, provides a natural laboratory for remote characterization of cyanobacteria blooms because of their seasonal occurrence. My dissertation makes a contribution to research methodology pertaining to atmospheric correction of satellite data and development of remote sensing algorithms to quantify cyanobacterial pigments.

The Ocean Color Monitor (OCM) sensor provides radiance measurements similar to Sea-viewing Wide Field-of-View Sensor (SeaWiFS) but with higher spatial resolution. However, OCM does not have a standard atmospheric correction procedure and the comprehensive suite of atmospheric correction procedures for ocean (or lake) is not available in the literature in one place. Atmospheric correction of satellite data over inland lakes, estuaries and coastal waters is also challenging due to difficulties in the estimation of aerosol scattering accurately over these optically complex water bodies. Thus an atmospheric correction procedure was developed to obtain more accurate spectral remote sensing reflectance ( $R_{rs}$ ) over Lac des Allemands from OCM data based on NASA's extensive work for SeaWiFS. Since OCM was not well calibrated, a new vicarious calibration procedure was also developed to adjust OCM radiance values to SeaWiFS radiance as SeaWiFS is well calibrated over its entire life.

Empirical inversion algorithms were developed to convert the OCM  $R_{rs}$  at bands centered at 510.6 and 556.4 nm to concentrations of phycocyanin (PC), the primary cyanobacterial pigment. For the algorithms to be uniformly valid over all areas (or all bio-optical regimes) of the lake, a holistic approach was developed to minimize the influence of other optically active constituents on the PC algorithms. Similarly, empirical algorithms to estimate chlorophyll *a* (Chl *a*) concentrations were developed using OCM bands centered at 556.4 and 669 nm. The best PC algorithm ( $R^2=0.7450$ ,  $p<0.0001$ ,  $n=72$ ) yielded a root mean square error (RMSE) of 36.92  $\mu\text{g/L}$  with a relative RMSE of 10.27%, and a mean absolute error (MAE) of 21.79  $\mu\text{g/L}$  with a relative MAE of 6.06% (PC from 2.75 to 363.50  $\mu\text{g/L}$ ,  $n=48$ ). The best algorithm for Chl *a* ( $R^2=0.7510$ ,  $p<0.0001$ ) produced an RMSE of 31.19  $\mu\text{g/L}$ , with relative RMSE = 15.70% and a MAE of 16.56  $\mu\text{g/L}$ , with relative MAE = 8.33% (Chl *a* from 9.46 to 212.76  $\mu\text{g/L}$ ,  $n=48$ ). The results demonstrate the preliminary success of using the  $360 \times 236$  m resolution OCM data to map cyanobacterial blooms in a small lake. While more field data are required to further validate the long-term performance of the algorithms, at present the algorithms may be implemented to process OCM data in an automated setup to provide timely information on the lake's bloom conditions. Similarly, retrospective processing may provide a long-term time series of bloom characteristics to document potential trends. The applicability of the algorithms can be extended to other lakes after necessary testing.

# **OUTLINE OF RELEVANT COURSES TAKEN**

| Credits                              | Course No. | Title                                      | Semester   |
|--------------------------------------|------------|--|------------|
| <b>Dissertation</b>                  |            |  |            |
| 3.0                                  | OCS 7001   | Marine Optics                              | Fall '05   |
| 4.0                                  | OCS 4372   | Estuarine Ecology                          | Fall '05   |
| 2.0                                  | OCS 7001   | Introduction to MATLAB                     | Fall '05   |
| 3.0                                  | OCS 7170   | Satellite Remote Sensing                   | Spring '06 |
| 3.0                                  | OCS 4170   | Physical Oceanography                      | Spring '06 |
| 3.0                                  | OCS 4021   | Weather Analysis and Satellite Meteorology | Fall '06   |
| 1.0                                  | OCS 4030   | Techniques of Research Presentation        | Fall '06   |
| 3.0                                  | OCS 4001   | Environmental Optics                       | Spring '07 |
| 2.0                                  | OCS 7001   | Harmful Algal Blooms                       | Spring '07 |
| 3.0                                  | OCS 7165   | Biogeochemistry of wetland and soils       | Spring '08 |
| 3.0                                  | OCS 4024   | Coastal Morphodynamics                     | Spring '08 |
| 1.0                                  | OCS 4001   | Science writing and Collaboration          | Spring '08 |
| 31.0                                 |            | 13.0: at 7000 level 18.0: at 4000 level    |            |
| <b>Minor: Spatial Statistics</b>     |            |  |            |
| 3.0                                  | GEOG 4997  | Remote Sensing and GIS Applications        | Fall '05   |
| 4.0                                  | EXST 7005  | Statistical Techniques I                   | Fall '06   |
| 4.0                                  | EXST 7015  | Statistical Techniques II                  | Spring '07 |
| 3.0                                  | EXST 7034  | Regression Analysis                        | Fall '07   |
| 14.0                                 |            | 11.0: at 7000 level 3.0: at 4000 level     |            |
| <b>Courses from other University</b> |            |  |            |
| 3.0                                  | GEOL 680   | Biological Remote Sensing (BGSU)           | Fall '04   |
| 4.0                                  | GEOL 540   | Geological Remote Sensing (BGSU)           | Spring '04 |
| 4.0                                  | GEOL 503   | Geographic Information Systems (BGSU)      | Fall '03   |
| 3.0                                  | OCS 475    | Satellite Remote Sensing (Cornell)         | Summer '06 |
| 14.0                                 |            | 14.0: Graduate level courses               |            |

## REFERENCES

1. **[Dr. Nan D. Walker](#)**  
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3. **[Dr. Deepak R. Mishra](#)**  
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5. **[Dr. Nancy N. Rabalais](#)**  
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