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# GEOSPATIAL

N E W S L E T T E R

## THE GEOSPATIAL MOVEMENT AT BCC!

**Welcome** to *Geospatial Newsletter, sixth edition*, reporting on geospatial technology activities at BCC. Under the stewardship of BCC President, Dr. Carole M. Berotte Joseph, the geospatial movement at BCC is getting stronger and gathering momentum. We bring you highlights of geospatial events at BCC, from May to August 2012, in this edition. [www.bcc.cuny.edu/chemistry/?page=SpatialTechnology](http://www.bcc.cuny.edu/chemistry/?page=SpatialTechnology).

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*Students explained their respective geospatial projects to visitors at the annual BCC Science Fair, 2012. Clockwise: James Carragher, Karolyn Jimenez, Leroy Brown, and Carmen Albizu*

### Student Geospatial Projects 2012 BCC Science Fair

Since 2010, students have been participating at the BCC science fairs and showcasing the results of geospatial projects. During the Spring 2012 semester, several students worked on geospatial projects with Dr. Sunil Bhaskaran, who led them in extensive training in geospatial software, project development, and time management. Projects were presented at the BCC Science Fair, which was attended by BCC faculty and students. The students received commendations and prizes from the panel of faculty reviewers.



At the BCC Science Fair (April, 2012) are geospatial project presenters, left to right: James Carragher, Darius Peacock, Karina Ramirez, Karolyn Jimenez, Carmen Albizu, and Leroy Brown.

## BCC Students Present Research Papers at the 8th Honors Conference

May 4, 2012 - Queensborough Community College

Eight students worked through the Spring 2012 semester and submitted seven research papers and presentations, which were all accepted at the Honors conference, which is the annual Honors Conference with is a

collaborative effort between Queensborough Community College, City College of New York, BCC, and NYTech. It promotes student research and provides opportunities for CUNY faculty to develop research collaborations.

### Abstracts Of Student Presentations At the 8th Honors Conference

- 1) *Network Analysis for ASAP Program in New York City*  
(Authors: Mr. James Carragher and Dr. Sunil Bhaskaran)

Abstract: The Accelerated Study in Associated Programs (ASAP) is a unique program directed to improve graduation rates of students at community colleges. Mapping the catchments of ASAP students at BCC is important for planning new marketing strategies and recruitment plans. We used advanced geocoding techniques and created push-pin maps of ASAP student locations in New York City for one semester. We created networks and routes and performed a network and route analysis to calculate the travel distance and time to BCC for each student. Results show a spatial pattern that is unique in each semester.

- 2) *Processing Multi-temporal Very High Resolution (VHR) Imagery Over New York* (Authors: Ms. Karolyn Jimenez and Dr. Sunil Bhaskaran)

Abstract: Time-series of multi-spectral-scanner (MSS) very-high-resolution (VHR) satellite imagery were acquired over New York City. The images were corrected for geometric errors and scale distortions and orthorectified. These images may be used for different studies, such as climate change modeling, change detection, meteorological modeling, feature extraction, and many others. In the next phase of our research we will analyze these images for various urban and Science Technology Engineering & Mathematics (STEM) applications.

- 3) *Classifying RapidEye by Different Per-pixel Techniques*  
(Authors: Ms. Karolyn Jimenez and Dr. Sunil Bhaskaran)

Abstract: Remotely sensed data acquired from different sensors may be used in providing valuable spatial information for different applications. Classification is a method by which pixels on an image are assigned to different user-defined classes, such as water bodies, recreational, commercial, and industrial. Classified information is useful for planning and managing the human and natural environment. There are different classification methods, all of which have their own advantages and disadvantages. We classified time-series of satellite data over New York City using different per-pixel methods. Each classification yielded different classes and was assessed individually with validated ground truth data.

- 4) *Extracting Environmental Variables from RapidEye.*  
(Authors: Mr. Leroy Brown and Dr. Sunil Bhaskaran)

Abstract: Feature Extraction (FX) is a method by which specific features are extracted from a remotely sensed database. The aim of this project is to develop feature extraction algorithms for deriving key environmental variables from satellite data. The study area is Queens, New York City. We used spatial and spectral attributes to develop algorithms to extract specific features of interest. The images were enhanced and segmented before extraction of features. The extracted features may be exported to different formats and analyzed further for different studies.

- 5) *Creating Ground-truth Data Over New York City.*  
(Authors: Mr. Leroy Brown and Dr. Sunil Bhaskaran)

Abstract: Creating a ground-truth image database is important for assessing the accuracy of satellite data classification. We used image analysis techniques and already validated online data to create shape files over selected features of importance as green areas and man-made features. The exact area of these features may be determined for further analysis. In the next phase of the project we will convert these regions of interest (ROIs) into raster format and use it for assessing our classification accuracies.

- 6) *Creating a Geodatabase for Watershed Management in the North Eastern (NE) Corridor - U.S.* (Authors: Ms. Carmen Albizu, Dr. Neal Phillip and Dr. Sunil Bhaskaran)

Abstract: The geodatabase is the common data storage and management framework for ArcGIS. It combines "geo" (spatial data) with "database" (data repository) to create a central data repository for spatial data storage and management. It can be leveraged in desktop, server, or mobile environments, and it allows one to store GIS data in a central location for easy access and management. In this project, we created a geodatabase for performing spatial analysis of watersheds in the North Eastern Corridor of the United States. Different map features were acquired from a wide range of sources and organized into points, lines, and polygons. Topology and metadata were created for each specific feature class.

7) *Calculating Service Areas for Police, Emergency, and Hospital Services in New York City*. (Authors: Mr. Leroy Brown, Ms. Karolyn Jimenez, Ms. Alba Alvira, Ms. Karina Ramirez, Ms. Cathiana Ocess, and Dr. Sunil Bhaskaran)

Abstract: Urbanization leads to increased population and changes in the urban landscape, which demands assessment and appraisal of different



Students Leroy Brown and Carmen Albizu appear with their posters at the 8th Honors Conference, Queensborough Community College.

services. Calculating the service areas for agencies, such as Police, Emergency, and Hospital services, is an important process for allocation of resources, such as staff and equipment. In an urban center, like New York, changes in the physical and human landscape are rapid, which constantly alters the demand for services. By using 'Network Analysis' algorithms, we modeled different types of data in calculating service areas for the Police, Emergency, and Hospital services.



At the 8th Honors conference are, left to right, students Leroy Brown and Carmen Albizu, Mentor Dr. Sunil Bhaskaran, Dean Michelle Cuomo, and QCC Professor Ed Haansen.

## Student-Authored Book On Image Analysis

In the summer 2012, students Leroy Brown and Karolyn Jimenez assisted Dr. Sunil Bhaskaran in developing image analysis procedures using RapidEye satellite data over New York City. The results of this research and analysis will be used for writing a book on image analysis, to be co-authored by undergraduate students. This will be the first book aimed at informing students in community colleges about image analysis of satellite data.



Dr. Sunil Bhaskaran addresses a gathering of students, faculty, and staff at the Roscoe Brown Student Center. The seminar focused on geospatial technology and career opportunities.

## Seminar On Geospatial Technology - Roscoe Brown Student Center May 2012

Dr. Sunil Bhaskaran delivered a talk at the Roscoe Brown Student Center, focusing on geospatial technology, career opportunities, and research. The seminar was attended by students and faculty from different departments.



Dr. Sunil Bhaskaran clarifies a question from a student after the seminar.



Dr. Bhaskaran is flanked by Professor Eugene Adams and Mr. Eric at the Geospatial Seminar organized by NCEA.

## Follow-Up Meeting On The Proposed BCC NOAA-CREST Geospatial Center

A meeting was held in the Chemistry Department to follow up on the proposed BCC Geospatial Center of Crest Institute [BGCCI]. Guidelines set by BCC President Dr. Carole M. Berotte Joseph at the inaugural meeting were used to determine key components of the memorandum of understanding [MoU] from the National Oceanic and Atmospheric Administration-Cooperative Remote Sensing Science and Technology Center [NOAA-CREST]. Interim Vice President Dr. Howard Wach and Professors Neal Phillip and Kamal Ismail attended the meeting, where Dr. Sunil Bhaskaran delivered a presentation outlining progress and key components of the proposed MoU between BCC and NOAA-CREST.

**Geospatial applications in sociological studies** by Mr. Robert Baskerville, Sociology department faculty, met with Dr. Sunil Bhaskaran and held discussions on potential applications of geospatial technology in sociology. Mr. Baskerville and Dr. Bhaskaran are planning collaborative research on understanding geographic distributions of foreclosures and its implications to economic policy in the Mount Vernon region.

## University Research Collaborations Within The U.S.

**Dr. Bhaskaran collaborates with faculty from University of Missouri and Nebraska Lincoln on cutting-edge research** of Determination of shadows from satellite data is critical for various reasons, such as accurate identification of features, classification, and analysis. Dr. Bhaskaran, in collaboration with colleagues from the Department of Math and

Computer Sciences, University of Missouri and Nebraska Lincoln, has been researching this topic for several months. The team has developed innovative algorithms to identify shadows from high resolution images. Their results have been organized and submitted to a peer-reviewed international journal.

## Bcc Research Collaborations With International Universities/Institutes/Centers

**Normalized Differential Vegetation Index (NDVI) techniques to map vegetation:** Dr. Bhaskaran has been working with a team of international collaborators from the University of Delhi, India, and King Khalid University, Kingdom of Saudi Arabia, on the applications of NDVI methods to assess vegetation of cover. The results of the research have already been submitted to an international peer-reviewed journal.

**Hyperspectral applications for mapping urban environments**  
Dr Bhaskaran submitted a paper with faculty from the University of New Delhi, India, and Charles Sturt University, NSW, Australia. The paper describes applications of hyperspectral remote sensing data for mapping urban environments.

**Research collaboration with the Council for Scientific and Industrial Research (CSIR)** The Cooperative Remote Sensing and Science Technology Center (CREST) have invited Dr. Sunil Bhaskaran to be a co-investigator on an international research project on coastal vulnerability of South African coastlines. The project will be led by the Principal Investigator (PI) from CSIR in Durban, South Africa. The CSIR is one of the leading scientific and technology, research, development, and implementation organizations in Africa. It undertakes directed research and development for socio-economic growth.

## 2012 Research Publications In Geospatial Technology Applications (including submitted, in-press, and accepted articles)

Ejaz, Alam, Javed Mallick, Sunil Bhaskaran, and Atiqur Rahman. "Spatio-temporal Assessment of Vegetation in the Upper Catchment of Kosi River Basin using MODIS Dat." *Journal of the Indian Society of Remote Sensing*. Springer Publications (2012) (In review).

Bhaskaran, S., A. Rahman, R. Dehaan, and \*E. Nez, "Processing and Analysis of Hyperspectral Data for Extracting Specific Urban Feature." *Journal of the Indian Society of Remote Sensing*. Springer Publications (2012) (In review).

Bhaskaran, S., \*E. Nez, \* Karolyn Jimenez, and S. Bhatia. "Rule-based Classification of High Resolution Imagery over Urban Areas in New York City." *Geocarto International*. Taylor & Francis (2012) (In review).

\*Jimenez, K., \*Aboubaker Kaba, and S. Bhaskaran. "Research Experiences in Geospatial Science and Technology Projects at the Bronx Community College." *Perspectives on Undergraduate Research and Mentoring (PURM)*. (2012) Undergraduate research and faculty supervision. (In Addressing Comments).

Bhaskaran, S., S. Devi, S. Bhatia, and A. Samal. "Mapping Shadows from Very High Resolution Satellite Data Using HSV and Edge Detection Techniques." (2012) (Submitted).

Bhaskaran, S., N. Phillip, J. Molina, M. Seliger, and R. Khanbilvardi. "Rapid Assessment of a City's Solar Energy Potential using Very High Resolution (VHR) Spaceborne Data." (2012) (Under Preparation).

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## GEOSPATIAL NEWSLETTER

If you have any interesting information related to Geospatial Technology please send it to us. We will be more than happy to include it in the next edition of the newsletter. Email your stories or facts to

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