Conference on Remote Sensing and Spatial Information Technologies for Transportation

Products and Results: Foundations for the Future

Organized By:
Transportation Research Board

Sponsored By:
U.S. Department of Transportation Research and Special Programs Administration

Co-Sponsored By:
AASHTO
NASA

Images Courtesy of spaceimaging.com

December 10-12, 2000
National Academy of Sciences
2101 Constitution Avenue, Washington, D.C.
Dear Conference Participants:

Transportation agencies at all levels face unprecedented challenges today. Increasing demands are being placed on these agencies to preserve the existing transportation system and to take on new missions. To accomplish these expanding responsibilities, transportation agencies must better understand customer expectations, manage staff and financial resources differently, and adapt to new technologies and business practices. A variety of advanced technologies are available to enhance planning, designing, managing, operating, and maintaining all modes of transportation.

Aerial and satellite remote sensing represents one area experiencing rapid development. The U.S. Department of Transportation has initiated a major research program focusing on transportation related applications of aerial and satellite remote sensing. The program includes funding four university consortia and a series of related technology application projects in remote sensing.

The Transportation Research Board (TRB), the U.S. Department of Transportation, the American Association of State Highway and Transportation Officials (AASHTO), and the National States Geographic Information Council (NSGIC) are sponsoring a conference to facilitate an ongoing dialogue between funded researchers and transportation professionals. The Conference is Sunday through Tuesday, December 10-12, 2001 at the National Academy of Sciences Building in Washington, D.C.

This conference presents an excellent opportunity for transportation (1) enhance communication between the transportation and remote sensing communities, (2) highlight US DOT/NASA Remote Sensing for Transportation Program, (3) develop a common understanding of current successful remote sensing transportation applications, and (4) craft Strategies for remote sensing implementation in transportation. Remote sensing professionals will learn the types of products and support transportation professionals need.

I hope you can participate in this challenging event!

David Ekern  
Conference Chair  
Assistant Commissioner  
Minnesota Department of Transportation
Remote Sensing and Spatial Information Technologies for Transportation

Products and Results: Foundations for the Future

Preliminary Program

Preliminary

Monday, December 10, 2001

8:00 am – 12:00 pm

Roundtable for States and Metropolitan Planning Organizations on Remote Sensing Strategies

Dave Gorg, Minnesota DOT and Roger Petzold, FHWA

1:00 pm – 5:00 pm

Technology Buffet

The Technology Buffet assembles poster and computer displays showcasing: (1) the projects and Application Guidebooks of the four University Consortia, (2) Technology Application Projects funded by the U.S. Department of Transportation, and (3) other remote sensing applications in transportation. The Buffet opens during the workshops on Monday. Project staff will be available to discuss details of their work during lunch Tuesday and during the reception Tuesday.

Workshops

These workshops will all be held during the 1:00 pm to 5:00 pm period. The exact length of each workshop have not yet been determined.

1:00 PM – 5:00 PM

WORKSHOP: INTRODUCTION TO REMOTE SENSING

This workshop will provide an overview of remote sensing for those transportation professionals unfamiliar with the technology. It will acquaint the audience with the technologies used to acquire imagery and how the image data is changed into information products for use in a transportation application. While no fee is charged for the workshop, attendance should be indicated on the registration form to assure space. This is essentially the same workshop offered last year at the Conference on Remote Sensing and Spatial Information Technologies for Transportation.

Moderator: Roger King, Mississippi State University

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<th>Remote Sensing Process</th>
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<th>Techniques to Process Remote Sensing Data</th>
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Carolyn Merry, Ohio State University

Applications of Remote Sensing
4:00 PM – 5:00 PM

Chuck O’Hara, Mississippi State University

A FAST-TRACK APPROACH TO NEPA STREAMLINING AND ENVIRONMENTAL ASSESSMENT: TECHNOLOGY DEMONSTRATION PROJECT

Karen Schuckman, Senior Vice President, EarthData Technologies, LLC

The National Map, A Framework for Institutional Interoperability, Joel Morrison, Ohio State University

SUCCESSFUL PUBLIC AND PRIVATE PARTNERSHIPS FOR PROCURING AND UTILIZING REMOTE SENSING IMAGERY

Part 1 1:00 PM – 3:00 PM
Moderator: Val Noronha, University of California, Santa Barbara

The case of Pima County, Arizona
Jim Altenstadter, Deputy Executive Director, Pima County Association of Governments

Part 2 3:00 PM – 5:00 PM
Moderator: Roger King, Mississippi State University

Examples from North Carolina and Iowa.
Steven Mah, Vice President, Commercial Applications, ITRES Inc.
Karen Schuckman, Senior Vice President, EarthData Technologies
Keith Johnston, State Photogrammetric Engineer, North Carolina Department of Transportation

The commercial vendors will provide tips on how to specify imagery from remote sensing providers. ITRES is an established world leader in hyperspectral imaging and remote sensing instrumentation, with special expertise in electro-optics and charge coupled device (CCD) technology. EarthData offers a suite of instruments for remote sensing measurements. These include optical, lidar, and radar technologies. Both vendors offer complete services from collection to final product. Also, both vendors have performed numerous contracts for private companies, research and educational institutions, and government groups, both internationally and domestically. Finally, Keith Johnston will talk about his experiences using imagery from these two companies in an application in North Carolina.

Applying Remote Sensing Technology to Airports, Michael McNerney, DMJM Aviation, and Randy Murphy, Grafton Technologies, Inc.

1:00 pm – 5:00 pm

The forecast demand for air travel in the near future can only be met by increased aircraft operations at existing or future runway improvements. To maintain a high degree of operational efficiency and safety while making airside and landside improvements, the FAA and airports are increasingly relying on GIS, CADD and other spatial technologies. Remote sensing technologies, specifically LIDAR and high-resolution satellite or airborne imagery, are helping to fulfill the growing need for spatial data at airports. This half-day workshop will present the results of some recent projects at airports that have utilized remote sensing and GIS technology, discuss the findings of important research in this area, review the standards initiatives that will facilitate further adoption of remote sensing technologies and offer some insights into the future of remote sensing at airports. Airport staff, state aviation officials, FAA personnel and anyone with an interest in spatial data at airports are welcome to attend.

Instructors include:
Dr. Michael T. McNERNEY – Dr. McNerney is the Chairman of the AAAE Airport GIS Committee and TRB Aircraft/Airport Capability Committee. He is an experienced airport engineer and has been a pioneer in the application of GIS and spatial data at airports.

Randy Murphy – Mr. Murphy is the founder of Grafton Technologies, a firm dedicated to the advancement of spatial technologies for airports. He has led a NASA funded investigation of the use of high-resolution satellite imagery at airports and is currently working under a DOT grant to apply these technologies to regional planning around airports.

Lieutenant Commander William Kearse or Lieutenant Jeff Hagan – LCDR Kearse, the former Manager of the NGS’s Aeronautical Survey Program, or LT Hagan, the current program manager, have begun several initiatives to investigate how remote sensing can be applied to meet national aviation requirements.

Grady Tuell and Ramesh Shrestha (invited) – Mr. Tuell and Mr. Shrestha from the University of Florida have conducted research into the use of LIDAR as a means to identify obstructions to navigable airspace at airports.

Carol Brandt (invited) – Ms. Brandt is the Manager of the Bureau of Transportation Statistics. She will discuss BTS’s mission as a national provider of spatial data and how BTS can be instrumental in the dissemination of remotely sensed data to airport users.

Bob Niedermair (to be invited) – Mr. Niedermair is the chair of the FAA’s National Airspace System Information Architecture Committee’s GIS Working group. He will discuss the importance of spatial data to the FAA and how remote sensing can be used to support FAA activities.

Conference

Tuesday, December 11, 2001

8:30 am – 9:30 am

Opening Session
Welcome, Robert E. Skinner, Executive Director, Transportation Research Board (TRB)
Setting the stage, David S. Ekern, Minnesota DOT and Conference Committee Chair
Building the Foundation for 21st Century Transportation- RSPA Administrator, invited
Remote Sensing and Challenges- Courtney Stadd, NASA, invited
DOT Program Progress - Building RS Foundation for Transportation Applications- K. Thirumalai, Research and Special Programs Administration, U.S. DOT

9:30 am – 11:00 am

Environmental Streamlining, Overview of Remote Sensing Products and Results
Moderator: Ian MacGillivray, Director, Research Management, Iowa DOT
MISSISSIPPI STATE UNIVERSITY CONSORTIUM, NATIONAL CENTER ON REMOTE SENSING IN TRANSPORTATION – ENVIRONMENT, Roger King

This project will collect and process high spatial resolution multispectral Imagery data for deriving environmental parameters in support of environmental investigations required under the National Environmental Policy Act.

Uses advanced airborne remote sensing technologies and fusion of data to produce verifiable spatial data products for streamlining environmental impact permitting process and fast-track corridor mapping for highway design.


11:00 am — 11:30 am  
Break

11:30 am — 1:00 pm

**Transportation Planning, Overview of Remote Sensing Products and Results**

Moderator: Randy Halvorson, Minnesota DOT, Director – Program Delivery, Minnesota DOT

**THE OHIO STATE UNIVERSITY CONSORTIUM, NATIONAL CENTER ON REMOTE SENSING IN TRANSPORTATION – FLOWS, Joel Morrison**

Bridgewater State College “Remote Sensing Applications in Transit”, Lawrence J. Harman

Applies remote sensing and imagery interpretation to plan and manage the transit infrastructure in the fast growing area of southeastern Massachusetts, particularly the tourist destination of Cape Cod.


Applies leading-edge remote sensing technologies to operational transportation planning requirements, utilizing advanced change detection and spectral feature extraction methods.

1:00 pm — 2:00 pm  
*Lunch and Technology Buffet*

Meet with project staff to find the keys to success in remote sensing.

2:00 pm — 3:30 pm

**Infrastructure and Engineering, Overview of Remote Sensing Products and Results**

Moderator: John Conrad, Chief Engineer/Deputy Director, Washington State DOT

**UNIVERSITY OF CALIFORNIA, SANTA BARBARA, NATIONAL CENTER ON REMOTE SENSING IN TRANSPORTATION – INFRASTRUCTURE, Michael Goodchild**
Tetra Tech ASL, “Facilitating the Operational Efficiency and Growth of Intermodal Freight Traffic: Application of Remote Sensing Technology to the Alameda Corridor, Los Angeles, CA” William Lyte
Applies remote sensing technology to corridor analysis in Alameda Corridor to help monitor freight and intermodal management and monitor rail infrastructure in southern Los Angeles County, CA

Demonstrates the application of remotely sensed data to planning projects involving five transportation types: roads, railroads, airports, water ports and transmission systems. Demonstrates automated techniques for the delivery of remotely sensed digital imagery to the desktops and software environments for transportation professionals.

3:30 pm 4:00 pm Break

4:00 pm 5:30 pm

**Transportation Lifelines and Hazards, Overview of Remote Sensing Products and Results**
Moderator: Walter H. Kraft P. E., Vice President, Parsons Brinckerhoff Quade & Douglas, Inc., Parsons Brinckerhoff/Farradyne
UNIVERSITY OF NEW MEXICO CONSORTIUM, NATIONAL CENTER ON REMOTE SENSING IN TRANSPORTATION – HAZARDS, Stan Morain

AERIS, Inc, “Airborne Ground-Penetrating Radar to Support Monitoring of Pipeline Safety and Performance”
Applies advanced image enhancement techniques to analyze pipeline and oil spill data and optimizes a radar configuration for assessing the feasibility of the system for detecting pipeline failure in the field. The results will provide functional capability to detect pipeline and spill detection as a function of altitude, slant range and angle of incidence.

5:30 pm 7:00 pm Reception and Technology Buffet.
Meet with project staff to find the keys to success in remote sensing.

**Wednesday, December 12, 2001**

8:30 am 9:30 am

**Remote Sensing Industry Forecast**
James R. Plasker, Executive Director, the American Society for Photogrammetry and Remote Sensing (ASPRS)
ASPRS, together with NASA and several other collaborating organizations, is in the midst of producing a Ten Year Remote Sensing Industry Forecast. The study will include Commercial market projections for data collection (space-based and aerial), data processing, tools and support services, value-added reselling, and other product lines by market segment, as well as projections of educational and workforce demands and research and development trends. Plasker will present the current status and findings.

9:30 am 10:00 am  Break

10:00 am 12:00 pm  
**The State of Remote Sensing in Transportation**

Moderator: David S. Ekern, Minnesota DOT

Representatives from several transportation and remote sensing sectors will reflect on what they have heard in the sessions and the Technology Buffet and recommend steps to improve the implementation of remote sensing. This is an opportunity to frame issues for the 2001 TRB Remote Sensing conference. The session will end with audience discussion.

*Discussants:*

1. John Conrad, Chief Engineer/Deputy Director, Washington State Department of Transportation
2. Ian MacGillivray, Director, Research Management, Iowa Department of Transportation
3. Walter H. Kraft, Vice President, Parsons Brinckerhoff/Farradyne
4. Jeff Tayman, Director of Research and Information Systems, San Diego Association of Governments
5. Lawrie Jordan, President, ERDAS
6. John Jensen, Carolina Distinguished Professor, University of South Carolina
7. David Fletcher, President, GEODIGM
8. Randy Halvorson, Assistant Director - Program Delivery, Minnesota Department of Transportation

*Audience Discussion and Recommendations*

12:00 pm  Adjourn

Note: Conference Steering Committee meets to review conference, draft recommendations and make plans for the 2002 meeting.
Remote Sensing and Spatial Information Technologies for Transportation

National Consortia for Remote Sensing in Transportation

National Center on Remote Sensing in Transportation – Disaster Assessment, Safety & Hazards

The focus of the Safety, Hazards and Disaster Assessment consortium’s research is on the development of analytical tools to identify, map, and assess hazards and plan for disasters as they affect transportation systems. The application of remote sensing to safety and disaster planning and assessment provides an opportunity to monitor hazards, evaluate the impacts of natural and man-made disasters, and to plan for evacuation and maintenance of transportation lifelines. Computer analysis procedures designed to extract these transportation lifelines from satellite imagery are being developed to improve the availability of emergency and disaster relief services for thousands of people who find themselves isolated by natural and man-made disasters and health emergencies. The consortium is developing methods that provide for the integration of remotely sensed imagery into evacuation planning and implementation, and to the assessment of natural and man-made disasters. The goals of this effort are to provide local, state, and national transportation agencies the tools necessary to rapidly and effectively address issues of safety, hazards, and disaster assessment using the most up-to-date methods and information available.

University of New Mexico
The George Washington University
Oak Ridge National Laboratory
The University of Utah
http://riker.unm.edu/dot/intro.htm

National Center on Remote Sensing in Transportation – Environmental Assessment

The theme of this consortium is the development of remote sensing solutions that more efficiently move transportation projects from the planning to the construction stage. Since the passage of the National Environmental Policy Review Act of 1969 (NEPA), the Clean Air Act, the Clean Water Act, the Intermodal Surface Transportation Efficiency Act, and other related legislation, transportation agencies have been obligated to process transportation projects through often rigorous and time-consuming environmental reviews. The necessity for these reviews is evident, however, how to efficiently plan alternative routes and to assess their environmental impacts is not quite as evident. Therefore, this consortium is exploring how remote sensing technology solutions may be used for streamlining the environmental assessment process and validating the usefulness of remote sensing imagery for providing the information necessary to meet environmental reviews. The end result is to more beneficially utilize a transportation agency’s time and resources during the review process and expedite moving into the construction phase with the optimum route.

Mississippi State University (RSTC)
University of Mississippi (CAIT)
Auburn University (GHCC)
NASA Marshall Space Flight Center (GHCC)
University of Alabama in Huntsville (GHCC)
Universities Space Research Associates (GHCC)
EarthWatch, Inc.
Intermap Technologies, Inc.
http://www.rstc.msstate.edu/NCRSTE/
The emphasis of this consortium is on transportation flows in three areas: traffic flow monitoring, traffic flow management and intermodal flow activities. The use of remote sensing can enhance the efficiency of many of the present practices used to determine the level of service, vehicle miles traveled (VMT), average annual daily traffic (AADT), and vehicle classifications and counts. Remote sensing can also help to determine passenger and freight flows at intermodal centers (park and ride, ports, TOFC/COFC, air/rail/bus/ferry terminals), and identify congestion points and patterns. Imagery can improve spatial accuracy, the visualization of traffic flows by the fusion of multisensor databases, and hypothesis generation.

The Ohio State University
George Mason University
University of Arizona
http://www.cfm.ohio-state.edu/info/NCRST_F/ncrst-f.html

Management of infrastructure involves systematic maintenance, operation, and renewal of assets such as pavement, bridges, pipelines, rail lines, harbors and airports. Information on the location and condition of these assets is critical to effective management. The consortium will employ both traditional and emerging technologies to build inventories of infrastructure and to improve the accuracy of map databases. Simpler methods, such as measurement of shoulder width and curvature from aerial photographs, will address the immediate needs of local agencies. At the high end, automated recognition procedures will be developed to detect distinctive patterns such as paved highways, parking lots and airports. Hyperspectral imagery will show subtle differences in material composition, thereby helping to build inventories of bridges and to examine deterioration of pavement. Fusion of LIDAR and digital photography will enable development of “as-built” databases of transportation corridors and associated infrastructure such as building footprints and elevations.

University of California-Santa Barbara
University of Wisconsin-Madison
University of Florida
Iowa State University
http://www.ncgia.ucsb.edu/ncrst/
Remote Sensing and Spatial Information Technologies for Transportation

Logistics

LOCATION

The conference will be held at the National Academy of Sciences Headquarters, which is located on the National Mall in downtown Washington, DC, with ready access to DC's tourist spots.

The National Academy of Sciences
2101 Constitution Avenue, NW
Washington, DC 20418

ACCOMMODATIONS

The conference hotel is the State Plaza, which is within walking distance of the National Academy of Sciences building.

The State Plaza Hotel
2117 E Street, NW
Washington, DC 20037
(202) 833-6965

REGISTRATION

The registration fee for the conference is $95. No fee will be charged for the Monday afternoon workshops on remote sensing but please reserve a space by indicating your plans to attend on the registration form.

FOR MORE INFORMATION:

Program: Thomas Palmerlee, TRB, (202) 334-2907, tpalmerl@nas.edu
Registration: Fred Scharf, TRB, (202) 334-2966, gfranke@nas.edu