

# **A Spatio-Temporal Decision Making System for Coastal Change Monitoring and Coastal Management**

Ruijin Ma<sup>1</sup>, Tarig Ali<sup>2</sup>, Xutong Niu<sup>1</sup>, Vasilias Velissariou<sup>1</sup>, Kai-chien (Kevin) Cheng<sup>1</sup>, Chung-Yen Kuo<sup>1</sup>, Xian Xu<sup>3</sup>, Ahmed Elaksher<sup>1</sup>, Ron Li<sup>1</sup>, Keith W. Bedford<sup>1</sup>, C. K. Shum<sup>1</sup>, J. Raul Ramirez<sup>2</sup>, Aidong Zhang<sup>3</sup>

<sup>1</sup>Department of Civil and Environmental Engineering and Geodetic Science, The Ohio State University

<sup>2</sup>Center for Mapping, The Ohio State University

470 Hitchcock Hall, 2070 Neil Avenue, Columbus, OH 43210-1275

<sup>3</sup>Department of Computer Science and Engineering, State University of New York at Buffalo

201 Bell Hall, Buffalo, NY 14260-2000

Email: (ma.106, ali.50, niu.9, velissariou.2, cheng.168, kuo.70, elaksher.1, li.282, bedford.1, ckshum)

@osu.edu; ramirez@cfm.ohio-state.edu; (azhang, xianxu)@cse.buffalo.edu

URL: <http://shoreline.eng.ohio-state.edu/research/diggov/DigiGov.html>

## **Abstract**

This demonstration will be presented at the 2003 National Conference on Digital Government Research to accompany a short paper entitled "Integration of Multi-Source Spatial Information for Coastal Management and Decision Making". The demonstration presents the two-year outcomes of our Digital Government project "Digitalization of Coastal Management and Decision Making Supported by Multi-Dimensional Geospatial Information and Analysis" that aims to develop technologies to enhance operational capabilities of federal, state, and local agencies responsible for coastal management and decision making. The pilot test site is along the Lake Erie coastline from Port Clinton to East Cleveland, Ohio. Research strategies are currently being applied to a new test site in Tampa Bay, Florida. The demonstration includes the following sections.

### **1. A Videotape of the Project Progress**

A videotape will be presented at the conference showing the latest techniques we have developed and the spatio-temporal coastal data and data integration that have been performed for the pilot sites.

### **2. A Web-based Data Inventory Systems**

After completion for Lake Erie, a data inventory system for Tampa Bay and is being implemented using ArcIMS technology. The existing data for Tampa Bay are listed on a web site. Users are able to check available data including USGS DEM, USGS DOQQ, USGS DLG, NOAA shorelines (MHW and MLW), bathymetry, and gauge station data. The software system allows users to display some basic coastal data and query related metadata.

### **3. Spatio-temporal Coastal Data Integration and Analysis**

Integration and analysis results using spatio-temporal coastal data including spaceborne imagery, airborne photographs and in situ data for coastal mapping and coastal changes are presented through 3D visualization software. Images, derived shorelines, coastal terrain models, digital orthophotos, and water surface models are employed to demonstrate the quality of the data and the capability of various sensors for the coastal monitoring tasks.

### **4. A Software System for Coastal Spatial Management and Decision-making**

The system consists of three subsystems: an on-site mobile spatial subsystem, a shoreline erosion awareness subsystem, and a coastal structure permitting subsystem. The developed system has been tested along the southern Lake Erie shore. The on-site mobile spatial subsystem is used for on-site analysis and evaluation. The coastal structure permitting subsystem is used as a decision-making tool. The shoreline erosion awareness subsystem is used as an evaluation tool for coastal residents in Sandusky, and now in Painesville, OH.