

Coastal Zone 2003

Workshop Outline

LIDAR Surveys for Coastal Hazards and Resource Mapping

July 14, 2003

Section 1.0 - Introduction

1.1 Scope of workshop – what it is and what it is not.

Introduce participants to the use of topographic Light Detection and Ranging (LIDAR) for assessing coastal environments. The workshop will discuss various coastal applications and the advantages and limitations of LIDAR. Participants will gain an appreciation of what is required in planning, acquiring, and processing a successful coastal LIDAR survey.

It does not include “hands-on” data manipulation or distribution of software routines.

1.2 About us

1.3 About you

1.3.1 Individuals introduce themselves: name, affiliation, background, have you used lidar data? If yes, for what purpose?

1.4 Review agenda

Section 2.0 - Lidar Basics

2.1 Types of lidar

2.1.1 Space

2.1.2 Ground

2.1.3 Air

2.2 How airborne topographic lidar works

Section 3.0 - The lidar advantage – sample applications

3.1 Storm erosion

3.2 Shoreline mapping

3.3 Geomorphic changes

3.4 Mapping vegetation line

3.5 Wave studies

3.6 Habitat mapping

3.7 Storm surge modeling

3.8 Education

Section 4.0 - Survey planning

- 4.1 Identify GPS base station locations
- 4.2 Aircraft considerations
- 4.3 Survey parameters
 - 4.3.1 Survey area dimensions
 - 4.3.2 Aircraft altitude and ground speed
 - 4.3.3 Point spacing requirements
 - 4.3.4 Flight pattern
- 4.4 Calibration/Ground truth target selection
- 4.4 Navigation
- 4.5 Mission Timing
 - 4.5.1 Weather
 - 4.5.2 Daylight
 - 4.5.3 Air traffic
 - 4.5.4 Water levels
 - 4.5.5 GPS constellation

Section 5.0 – Basics of the Global Positioning System (GPS) and Geodesy for Lidar Applications

- 5.1 GPS background
- 5.2 GPS signal types
- 5.3 GPS solutions
- 5.4 GPS errors
- 5.5 Geodesy and Surveying
- 5.6 Reference Systems/Reference Frames
- 5.7 Ellipsoid and Geoid
- 5.8 Local Datums
- 5.9 Map Coordinate Systems
- 5.10 Map Projections and Grids

Section 6.0 - Conducting Survey

- 6.1 GPS base station occupation
- 6.2 Aircraft operations
- 6.3 Survey methodology
- 6.4 Calibration overflight
- 6.5 Preliminary processing/data completeness
 - 6.5.1 GPS data check – preliminary aircraft trajectory
 - 6.5.2 Tape decode – look for errors in IMU and range files
- 6.6 Coverage check
- 6.7 Ground truth data collection
 - 6.7.1 Target selection
 - 6.7.2 Conducting ground kinematic survey

[Section 7.0 - Application Demonstration – conducting surveys along the Texas Gulf Coast](#)

- 7.1 Coastal GPS network
- 7.2 Ocean shoreline survey
- 7.3 Marsh survey
- 7.4 Ground survey

[Section 8.0 - Processing Data](#)

- 8.1 GPS base station solutions - two week delay for precise ephemerides
- 8.2 GPS aircraft trajectory solutions
- 8.3 Inertial navigation solutions (INS)
- 8.4 Calibration and bias estimation
- 8.5 Generation of all-point datasets (x,y,z, and intensity)
- 8.6 Geoid correction
- 8.7 Data editing
- 8.8 Gridding and image generation

[Section 9.0 - Application Demonstration - extracting a shoreline from lidar data](#)

[Section 10.0 - Data Classification](#)

- 10.1 Sample from one commercially available software package
- 10.2 Description of data classification research at UT Austin
- 10.3 Examples
 - 10.3.1 Copan Ruinas, Honduras
 - 10.3.2 Austin, Texas
 - 10.3.3 Matagorda Island, Texas

[Section 11.0 – Select Application](#)

[Section 12.0 - Question and answer period and time to look at posters](#)