Testing and Evaluation of the Mobile Inspection Platform

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LONG-TERM GOALS

To develop test and evaluate a Mobile Inspection Package (MIP) capable of surveying ship hulls, seawalls and pilings, and seafloors. The MIP will use a suite of complimentary sensors combined with a survey quality navigation system allowing the data to be geodetically referenced.

OBJECTIVES

- Evaluate the performance of the MIP and its base components
  - USF Laser Line Scanner (ROBOT)
  - DIDSON sonar
  - Video laser image scaling system (ISS camera)
  - Navigation performance

- Develop meaningful data products for daily operations
  - 3D sun shaded (TIN) model
  - 2D intensity images
  - Video frame images with laser scaling object size and area estimates
  - DIDSON sonar data
  - Navigation plots

- Develop operational procedures focusing on ease of use and system automation
- Packaging of topside equipment for field operations with the goal of simplification and automation
- Create manuals for operation and maintenance of the system
- Establish training methods and procedures

APPROACH

USF will first mount the components of the MIP on the ROV *Rosebud* to facilitate rapid testing while simultaneously upgrading ROVEX to accommodate the MIP. After ROVEX has been outfitted with the MIP, evaluation of the MIP sensors and development of data products will continue. Operations will be conducted in real world conditions, that being in harbors and just outside of the ship channel. The topside equipment will be packaged and configured for cleaner and easier operation. From the operational experience, manuals for operation and maintenance as well as training procedures will be developed.

WORK COMPLETED

- Laser line scanner, ISS camera and navigation data was collected and processed for evaluation.
- From the above data, 3D sun shaded (TIN) model, 2D intensity images, video frame images with laser scaling object size and area estimates, and navigation plots were developed (Figures 1,2, and 3).
- The topside equipment was simplified and refined to minimize space consumption.
- Manuals for maintenance and operation and training procedures are being developed.

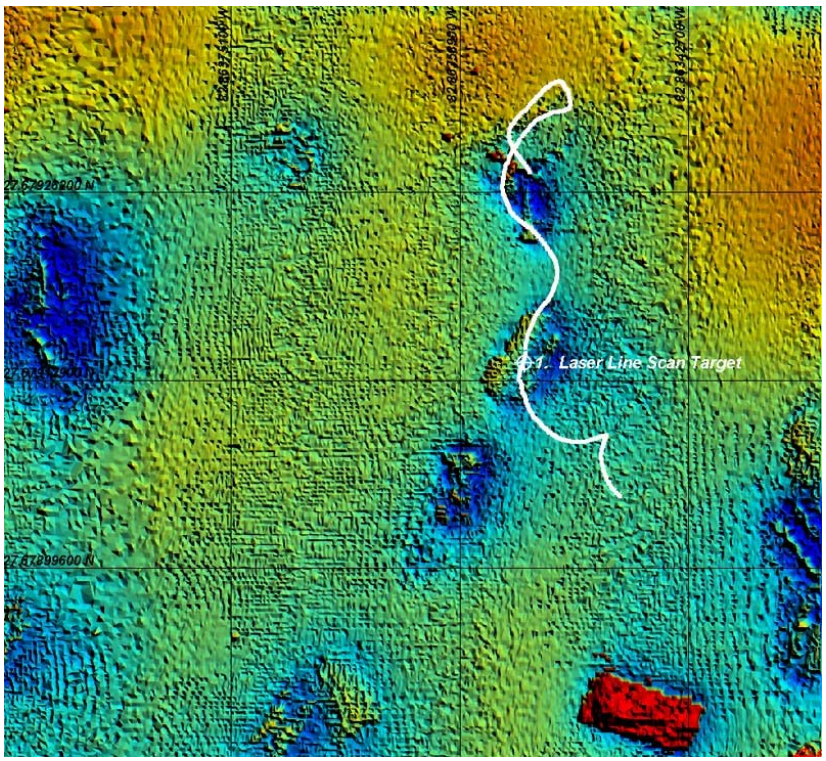

Figure 1. A section of the underwater track created by the vehicle ROVEX supporting the MIP configured with the USF Laser Line Scanner. The navigation path is plotted over a Multibeam survey produced by USF (Naar, D.F.,et al. 1999). Each square in the grid is approximately 15 meters on each side. The large red object located at the lower right of the image is an M60 tank. The results of the laser line scan over some construction rubble is displayed in figure 2 below.

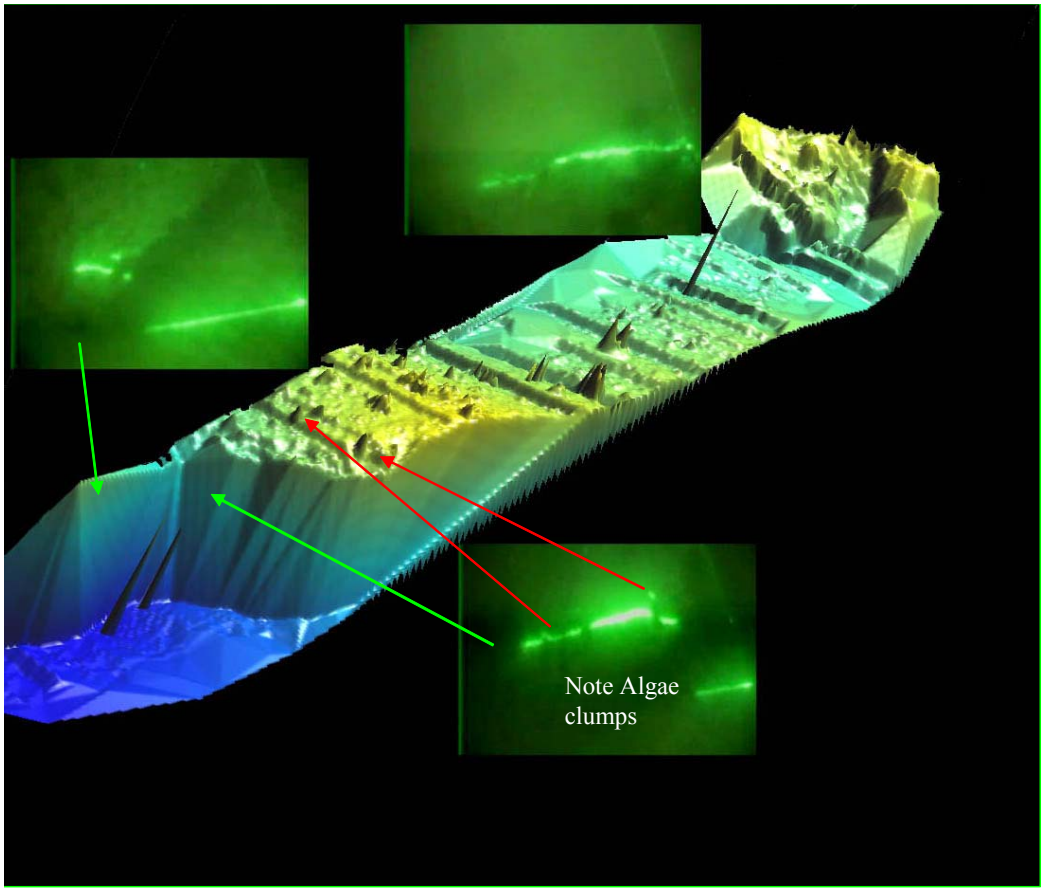

Figure 2. Laser Line Scanner data shown with video camera stills of line passing over bridge rubble. Laser swath is approximately 80cm wide by 5.5m long. Note the detail picked up by the laser, especially the small algal "clumps"

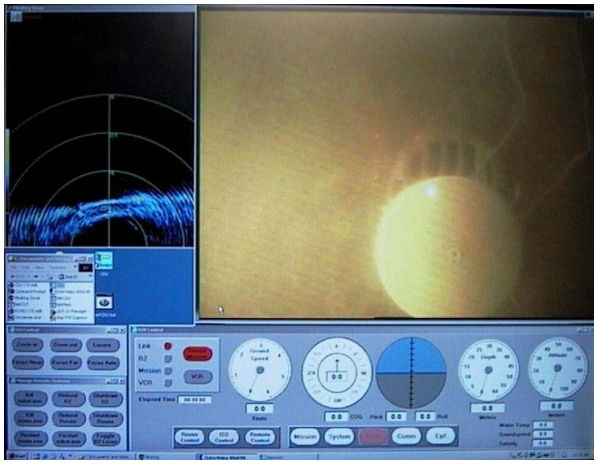

Figure 3. GUI interface displaying ISS camera output. This shot shows a mine that was placed on a ship's intake grate unbeknownst to the operations crew. The lasers seen in red scaled the object as 6" in diameter, which was verified later.

ONGOING TASKS

- Because the DIDSON sonar has not been delivered yet, no data has been collected for processing and evaluation. Additionally, the associated documentation is ongoing.

RELATED PROJECTS

This project is for the Testing and Evaluation of the Mobile Inspection Platform. Related projects would include ONR# N00014-03-1-0708, Development of a Mobile Inspection Platform, N00014-02-1-0859, Advanced Underwater Port Security Systems, ONR# N00014-02-1-0719 and ONR# N00014-02-1-0825, Autonomous Underwater Vehicle for Homeland Defense.