

Air-Sea Interface and Marine Boundary-Layer Anemometers

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LONG-TERM GOALS

The long-term goal is to further the understanding of air-sea interactions processes including momentum, heat, water vapor and trace gas exchange under various meteorological and oceanographic conditions.

OBJECTIVES

The objective of this grant, a Defense University Research Instrumentation Program (DURIP) award, is to provide new, innovative instrumentation for air-sea interaction measurements from platforms such as the Research Platform R/P *FLIP*. The specific instrumentation obtained under this DURIP will provide wind and turbulence measurements from very near the sea surface (Laser Doppler Anemometer (LDA), 3-component) up through the marine atmospheric boundary layer (Wind Lidar). In addition, a GPS-inertial motion sensing unit will provide the complete velocity and orientation angles of the platform.

APPROACH

Three instruments were ordered under the DURIP award: A custom Laser Doppler Anemometer of small size; a vertical profiling Wind Lidar; and the motion sensing unit.

The LDA is from Measurement Science Enterprises, Inc. It consists of three laser beams which intersect at a small (1mmx1mmx1mm) volume. Velocity components will be obtained from the Doppler shift from the ubiquitous small (~1 micron) salt aerosols over the ocean.

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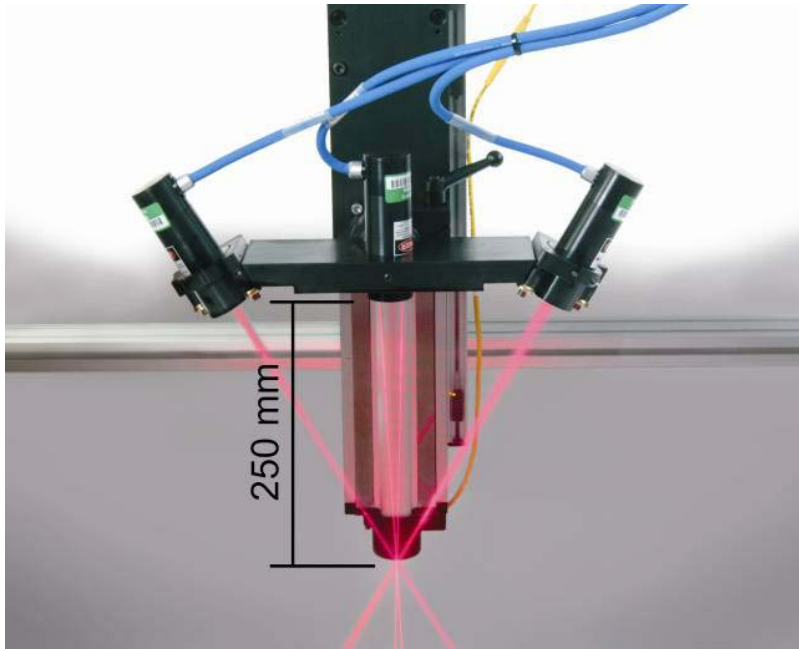


Figure 1 MSE Laser Doppler Anemometer

[Figure 1: Photograph of the MSE Laser Doppler Anemometer showing the 3 lasers with beams intersecting in a small volume.]

The Wind Lidar is from Leosphere, France. The lidar is contained in a small weather-proof container with the eye-safe beam pointing upwards. Profiles from ~40 to 200m above the unit are obtained once per second.

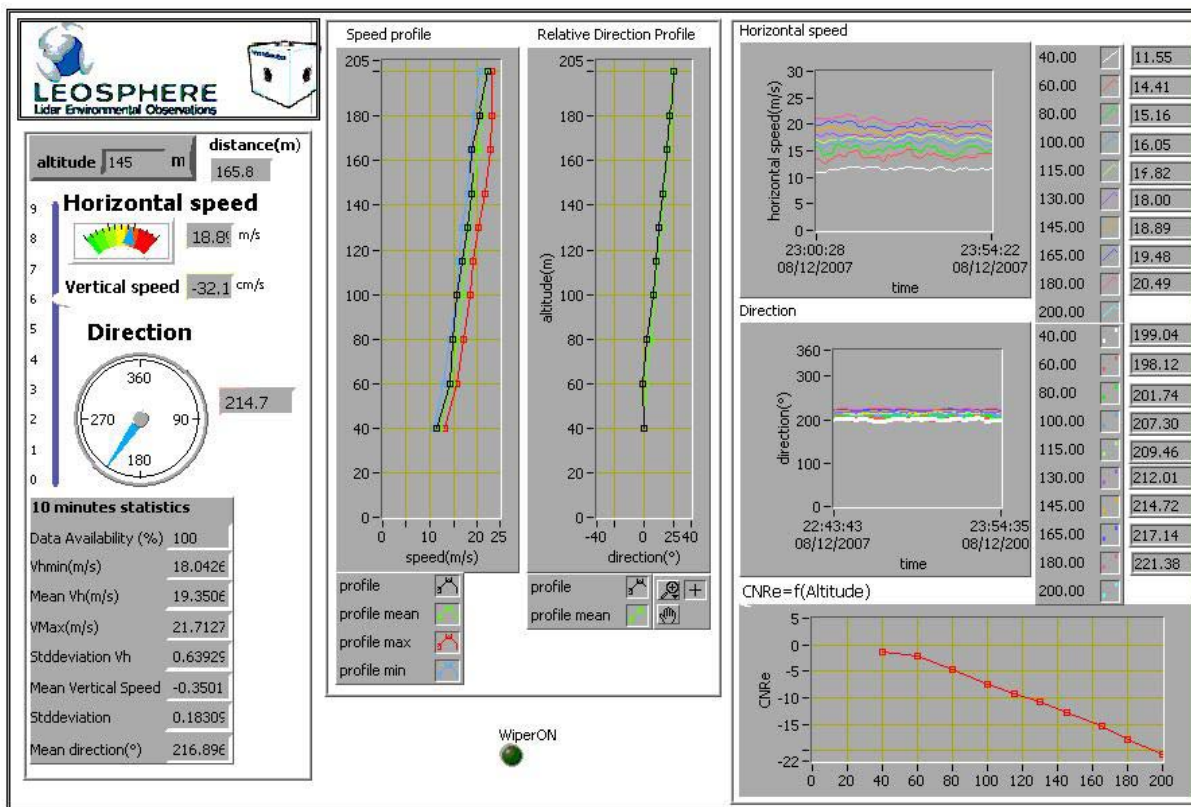


Figure 2 Sample Wind Profile Data from Leosphere Wind Lidar

[Figure 2: Sample screen display of wind profile data from 40 to 200 meters height as obtained from the Leosphere Wind Lidar instrument.]

The motion unit is from Oxford Systems. This system has two GPS antennas to provide good heading data in low dynamic environments like a moored R/P *FLIP*. The unit also provides 1 and 100 Hz synchronization pulses tied to the GPS time clock for distribution to other data systems.



***Figure 3 Oxford Systems GPS-Inertial Measurement System
[Figure 3. Photograph of the Oxford Systems GPS-
Inertial Motion Measurement System (w/o two GPS antennas.)***

WORK COMPLETED

The three instruments have been ordered.

RESULTS

There are no results at this time; the instruments have not been received.

IMPACT/APPLICATIONS

The initial application of these instruments will be in the ONR High Resolution Wind-Wave Departmental Research Initiative, FY2007-FY2011.

TRANSITIONS

Not applicable.

RELATED PROJECTS

ONR High Resolution Wind-Wave Departmental Research Initiative, FY2007-FY2011.

REFERENCES

Not applicable

PUBLICATIONS

Not applicable

PATENTS

Not applicable

HONORS/AWARDS/PRIZES

Not applicable