

Air-Sea Interface and Marine Boundary-Layer Anemometers

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Award Number: N00014-07-1-0717

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.

Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE 30 SEP 2007		2. REPORT TYPE Annual		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Air-Sea Interface And Marine Boundary-Layer Anemometers				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of California, Irvine, Department of Mechanical and Aerospace Engineering, Irvine, CA, 92697-3975				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES code 1 only					
14. ABSTRACT The long-terms 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.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 5	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

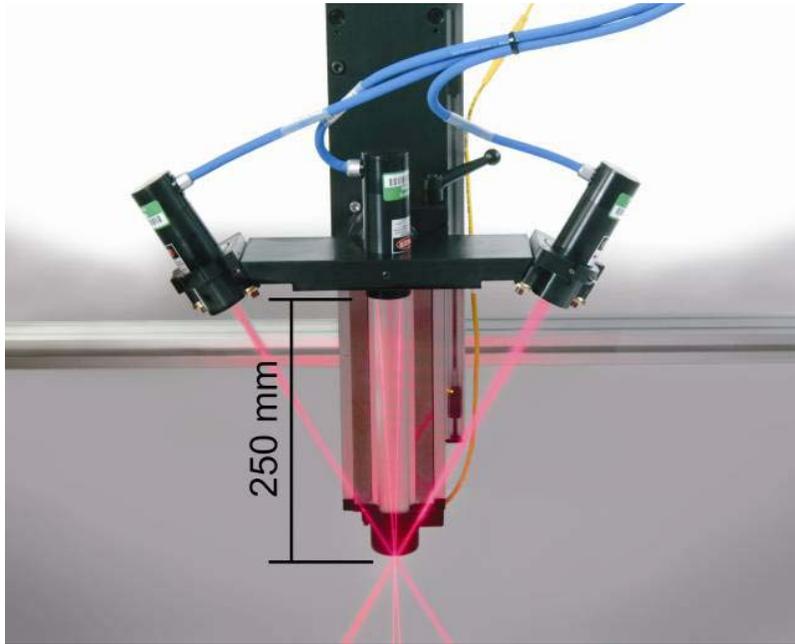


Figure 1 MSE Laser Doppler Anemometer

[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.

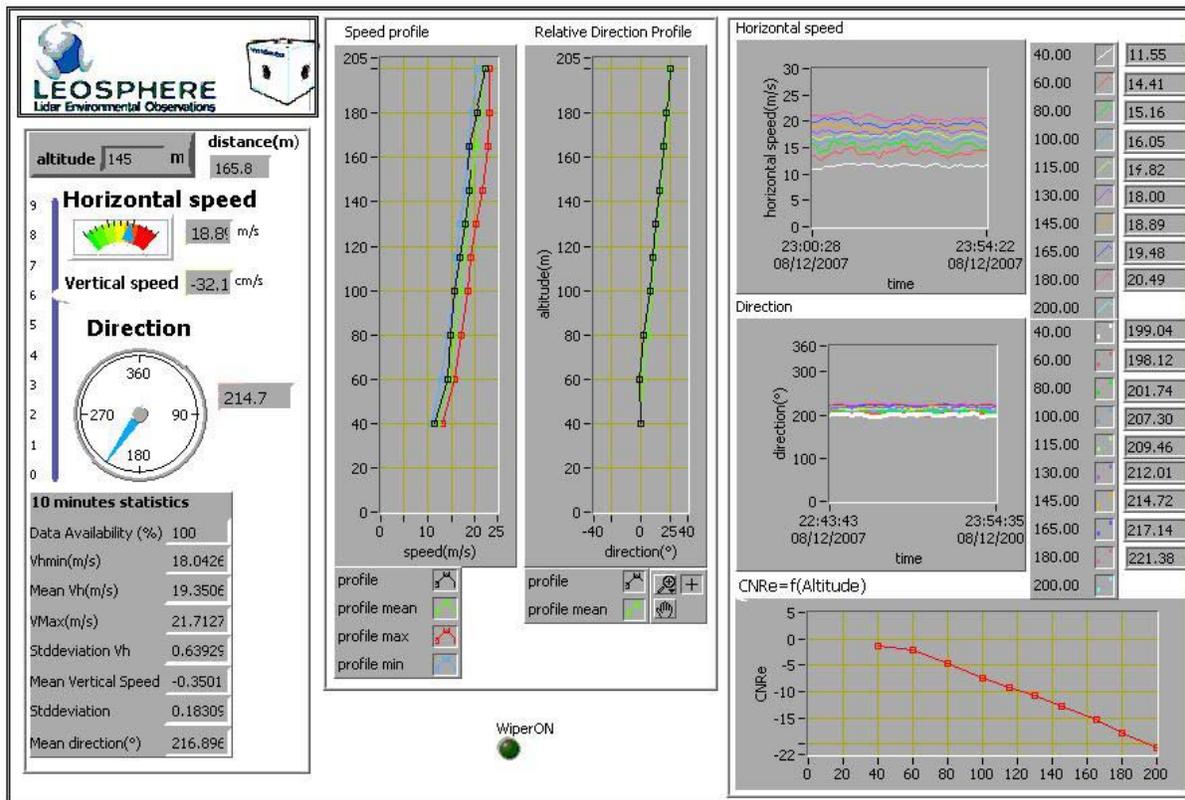


Figure 2 Sample Wind Profile Data from Leosphere Wind Lidar

[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