

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 30 SEP 1999		2. REPORT TYPE		3. DATES COVERED 00-00-1999 to 00-00-1999	
4. TITLE AND SUBTITLE Airborne Meteorological and Turbulence Instrumentation				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, Departments of Mechanical Engineering and Earth System Science, 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					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 2	19a. NAME OF RESPONSIBLE PERSON
a REPORT unclassified	b ABSTRACT unclassified	c THIS PAGE unclassified			

Airborne Meteorological and Turbulence Instrumentation

Carl A. Friehe
Departments of Mechanical Engineering and Earth System Science
University of California, Irvine
Irvine, CA 92697-3975
(949) 824-6259 fax (949) 824-2249 email: cfriehe@uci.edu
Award #: N000149910733
<http://wave.eng.uci.edu>

LONG-TERM GOALS

The long-term goals of the research are to understand and parameterize the physics of air–sea interaction and the marine boundary layer through experiments. A Defense University Research Instrumentation Proposal (DURIP) was funded to provide specialized meteorological and turbulence instrumentation for the Navy CIRPAS Twin Otter research aircraft to be used in the ONR Sea of Japan/East Sea experiment in Winter 2000.

OBJECTIVES

The objectives are to acquire high-quality instrumentation for the 3-dimensional wind vector, temperature, humidity, pressure, sea-surface temperature and other variables for the CIRPAS Twin Otter research aircraft. The main focus is on instruments for turbulence which will allow the calculation of the eddy-covariance fluxes of horizontal momentum of the wind (stress), sensible heat and water vapor (latent heat) at altitudes as low as 30m above the ocean surface. A modern GPS/inertial measurement unit is used to measure the aircraft's motion and attitude angles, required for the calculation of earth-based winds.

APPROACH

The approach, with consultation of Dr. Haf Jonsson of CIRPAS, was to develop the 5—hole radome pressure port system for the measurement of the mean and fluctuating airspeed vector (magnitude and attack and slip angles) to 20Hz. Aircraft motion will be measured to 10Hz with the GPS/inertial measurement unit. Fast-response redundant temperature sensors and Lyman-alpha and Krypton humidity sensors will be used for the sensible and latent heat flux measurements. All data will be integrated into a computer-based data acquisition system at 40Hz sample rate.

WORK COMPLETED

To date, most of the equipment has been selected, ordered and received. Some of the equipment flew on a CIRPAS stratus cloud/drizzle project of the UNSPGS and University of Miami in summer 1999 in Monterey, CA.

RESULTS

There are no results from the integrated aircraft system to date, as installation is still underway. A picture of the radome pressure-port system is shown in Figure 1.



Figure 1: CIRPAS Twin Otter 5-hole pressure port system and sensors for temperature and humidity behind radome mounting ring.

IMPACT/APPLICATIONS

The application of the DURIP funds is to instrument the CIRPAS Twin Otter aircraft for turbulence and accurate mean meteorological measurements. It will add significantly to the suite of instruments and measurement capability of the aircraft for both the Sea of Japan/East Sea and future experiments.

TRANSITIONS

Some of the instruments were used in the summer 1999 stratus/drizzle experiment of the USNPGS (Professor Q. Wang) and the University of Miami (Professor B. Albrecht).

RELATED PROJECTS

The aircraft, instrumented for turbulence and meteorological measurements, will be used in the winter 2000 ONR Sea of Japan/East Sea experiment.