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SHIP TIME FOR DEPLOYMENT OF AIR-SEA INTERACTION BUOY (ASIS) IN THE GULF OF MEXICO

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LONG-TERM GOAL

The overall scientific goal of this proposed field program is to understand the measurement of normalized radar cross-section (NRCS) and underwater ambient sound to wind speed and direction and/or wind stress vector and the influence of surface waves.

SCIENTIFIC OBJECTIVES

The research objectives are:

1. To calibrate the spaceborne NASA scatterometer;
2. To validate a WOTAN sensor as a wind speed measuring device;
3. To resolve the spatial and temporal averaging issues in spaceborne scatterometry and underwater acoustic noise observations;
4. To validate the Ku-band model function over the full incidence angle and wind speed and direction range;
5. To measure all the relevant environmental parameters for possible model function improvements for scatterometry and ambient sound;
6. To test the influence of waves and non-equilibrium conditions on the air-sea fluxes of momentum, heat and mass; and
7. To examine the effects of sea state on measurements of wind on buoys at low altitude.

APPROACH

The air-sea interaction spar (ASIS) buoy system was deployed for two months about 100 km west of Tampa Bay (28° 30' N, 84° 30' W) colocated with NDBC buoy 42036 on the northeastern shelf of the Gulf of Mexico. The buoy was equipped with instrumentation obtained under a previously funded the Defense University Research Instrumentation Program (DURIP):

1. Motion package (linear and rotational accelerometers) and compass;
2. Sonic anemometer;
3. Nested arrays of capacitance wire wave gauges;
4. Fast response dry and wet bulb thermocouples;
5. Mean water and air temperature sensors;

6. Atmospheric pressure;
7. A WOTAN;
8. An ultra-sonic current meter; and
9. Four level atmospheric profiles of wind speed and temperature.

The deployment period coincided with the calibration and validation phase of the NASA scatterometer (NSCAT) on the Japanese satellite ADEOS. The ship time was used to deploy and recover the ASIS buoy system and to visit the buoy for retrieval and exchange of the data acquisition and power systems.

WORK COMPLETED

The ASIS buoy system has been deployed in early January 1997 and retrieved in early June 1997 with several short trips in between to retrieve data and check on sensors.

The acquired data of continuous timeseries at 15 Hz on 24 channels of the listed sensors and instrumentation above is currently being processed and analyzed.

RESULTS

The experiment was successful and preliminary results indicate that the ASIS system measured air-sea interaction variables and directional wave spectra during several high sea states (up to 3 m significant wave height). Also a unique data set was acquired measuring in detail the evolution of a squall line with sudden changes in wind speed and wind stress and air temperature.

IMPACT/APPLICATION

The superior stability characteristics and capability to measure high-resolution air-sea fluxes and directional wave spectra made the ASIS buoy the principal choice for the upcoming field experiment of the Shoaling Waves DRI.

RELATED PROJECTS

As part of a European-funded ERS-2 validation experiment, called FETCH, the ASIS buoy will be deployed for one month in March 1998 in the Gulf of Lyon at a TOPEX cross-over point. The measurements of the ASIS buoy will be used to study the onset and evolution of the Mistral and the sea state bias in altimetry.