

An Air-Sea Interaction Buoy/Mooring System for Study of Air-Sea Interaction in the Open Ocean

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LONG-TERM GOALS

Our long-term goals are to improve understanding and simulation of physical processes in the upper ocean that influence air-sea interaction and the upper-ocean environment. The focus of this project is build key components of an air-sea interaction and surface mooring system for the study of air-sea interaction in the open ocean. The components are the surface buoy hull and the surface meteorological instrumentation package. The buoy hull and surface meteorological instrumentation package would see its first use in the upcoming ONR ASIRI (Air-Sea Interactions in the Northern Indian Ocean - Research Initiative) DRI in the Bay of Bengal. The Bay of Bengal is an interesting region from the perspective of air-sea interaction: the presence of a salinity-stratified barrier layer is believed to have important effects on the SST field and the regional atmosphere because the shallow stratification favors a relatively rapid response of the upper ocean to surface forcing. This hardware will allow us to participate in a cooperative field program that will use new and existing measurements to test, scrutinize, and improve the conceptual, theoretical, and dynamical constructs of air-sea interaction in the Bay of Bengal.

OBJECTIVES

The present effort involves:

- (1) Modification of the Modular Ocean Buoy System (MOBS) developed at the Woods Hole Oceanographic Institution (WHOI) to extend the watertight electronics well to accommodate the extra batteries and electronics needed for the telemetry subsystems and advanced instrumentation.
- (2) Fabrication of the modified MOBS buoy hull.
- (3) Fabrication of the tower for the surface buoy; the tower carries the meteorological sensors, light, telemetry antennas, radar reflector, and vane that orients the buoy with respect to the wind to provide proper exposure for the meteorological sensors.
- (4) Acquisition of one IMET system ('Improved METeorology', Hosom et al., 1995) of meteorological sensors, data logger, and data telemetry hardware.

APPROACH

The existing MOBS surface buoy (Figure 1) has been very successful in its use for the last decade of deployments around the world. This design is built up around components that fit within a standard shipping container, thus eliminating the need for special oversized arrangements and costs.

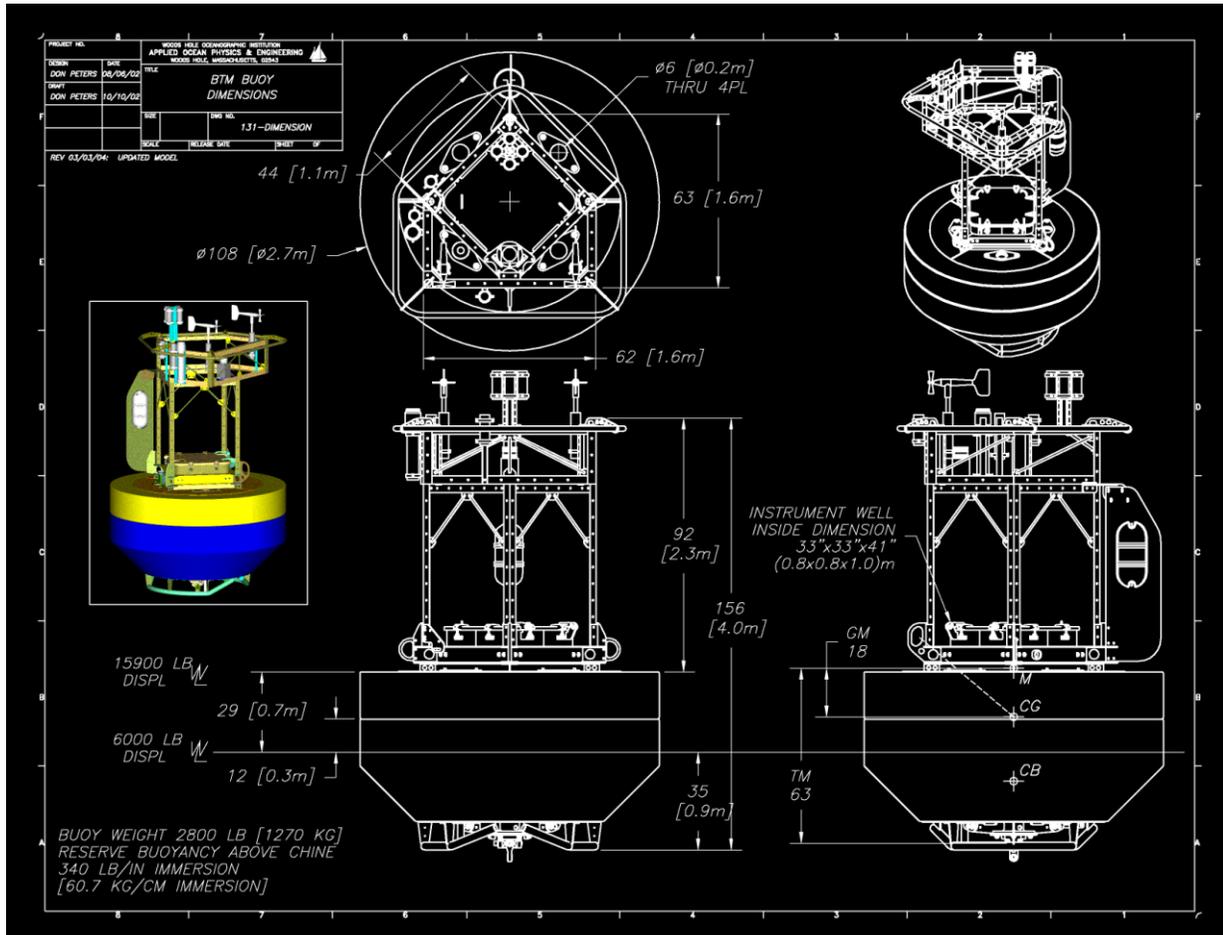


Figure 1: Technical drawing of the Modular Ocean Buoy System. The modified buoy will be identical to the one shown, except the electronics well would be made deeper to accommodate more batteries and instrument/telemetry controllers.

A number of MOBS have been fabricated over the past decade. Subcomponents are fabricated outside WHOI, and final assembly is carried out at WHOI.

The IMET system has a proven track record and its field performance has been well-documented (Colbo and Weller, 2009). We have the capability to calibrate and maintain the sensor within the Upper Ocean Process Group at the Woods Hole Oceanographic Institution. The IMET system is now produced under license by Star Engineering, and we have placed the order with Star Engineering.

WORK COMPLETED

Work on this project began in July 2013. The IMET system has been ordered. Design modifications have been made to the MOBS surface buoy hull, and fabrication has started.

RESULTS

The IMET is on order. The MOBS buoy design modification is done, enabling the start of fabrication.

IMPACT/APPLICATIONS

The fabrication of the surface buoy and acquisition of an IMET system for the buoy will enable the PIs to participate in field work in the Bay of Bengal under the ONR ASIRI DRI. Further, it is planned that by collaborating with Indian research programs coordinated with ASIRI, that the hardware built under this effort will enable a new effort to collect sustained time of surface meteorology, air-sea fluxes, and upper ocean variability in the northern Bay of Bengal.

RELATED PROJECTS

This project is closely related to the ONR award, Atmospheric Forcing and the Structure and Evolution of the Upper Ocean in the Bay of Bengal (N00014-13-1-0453; PIs J. Thomas Farrar and Robert A. Weller). We intend to employ the buoy being constructed to collect measurements of air-sea fluxes and upper-ocean evolution in the Bay of Bengal under that this project. The planned field deployment of the buoy and IMET system project is closely related to several other projects operating under the ASIRI DRI and being planned under collaboration between ONR and the Indian Ministry of Earth Sciences.

REFERENCES

- Colbo, K. and R. A. Weller 2009. The accuracy of the IMET sensor package in the subtropics. *Journal of Atmospheric and Oceanic Technology*, **26**(9), 1867-1890.
- Hosom, D.H., R.A. Weller, R.E. Payne, K.E. Prada, 1995. The IMET (Improved Meteorology) ship and buoy systems, *J. Atmos. Ocean. Tech.*, 12, 527-540.