NOAA Pacific Marine Environmental Laboratory
Ocean Climate Stations Project

TECHNICAL NOTE 6

Ship Requirements for OCS Buoy Servicing

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The Ocean Climate Stations group (OCS) routinely uses charter vessels to deploy and recover oceanographic research moorings. These moorings consist of a buoy of 2.7m in diameter. A tower and instruments extend 4.24m above the water line, and a bridle with hardware ends 2.62m below the water line, making the total clearance almost 7m. Weight in air is approximately 1800kg. The buoy well contains electronics, alkaline batteries, and a $60ft^3$ charged gas cylinder of compressed air (UN1956). The upper 700m of the mooring line is wire rope, with scientific instruments at regular intervals. The anchor is two stacks of train wheels, with a total weight in air of up to 3750kg.

Any ship used to deploy these moorings must have the following deck equipment:

- A crane with a SWL of at least 3,000kg (6,600lbs) and a reach that extends outboard, for use in the deployment of the surface buoys. Cranes with a SWL less than 4,000kg (9,000lbs) will require the use of a tipping plate or stern A-frame to deploy the anchor.
- A capstan with a 0.46m diameter drum or larger, capable of 40m/min line speed at continuous duty. Must be able to pull 200 – 300kg tension for up to 5,000m of line, and have the ability to let out the mooring line under tension.
- Fairleads and pad eyes on deck for turning blocks, with SWL of at least 3,000kg.

The following capabilities are also desirable:

- A stern A-frame with a SWL of 4,500kg (10,000lbs), height of 7.6m (25ft) and width of at least 3.7m (12ft) at the base. The A-frame would be used for recoveries and for line routing to facilitate instrument addition and removal.
- Additional tuggers, capstans, cleats and turning blocks. Baxter bolts for flexibility in deck layout are ideal.
- Ability to declutch prop or otherwise silence ship for acoustic release comms.

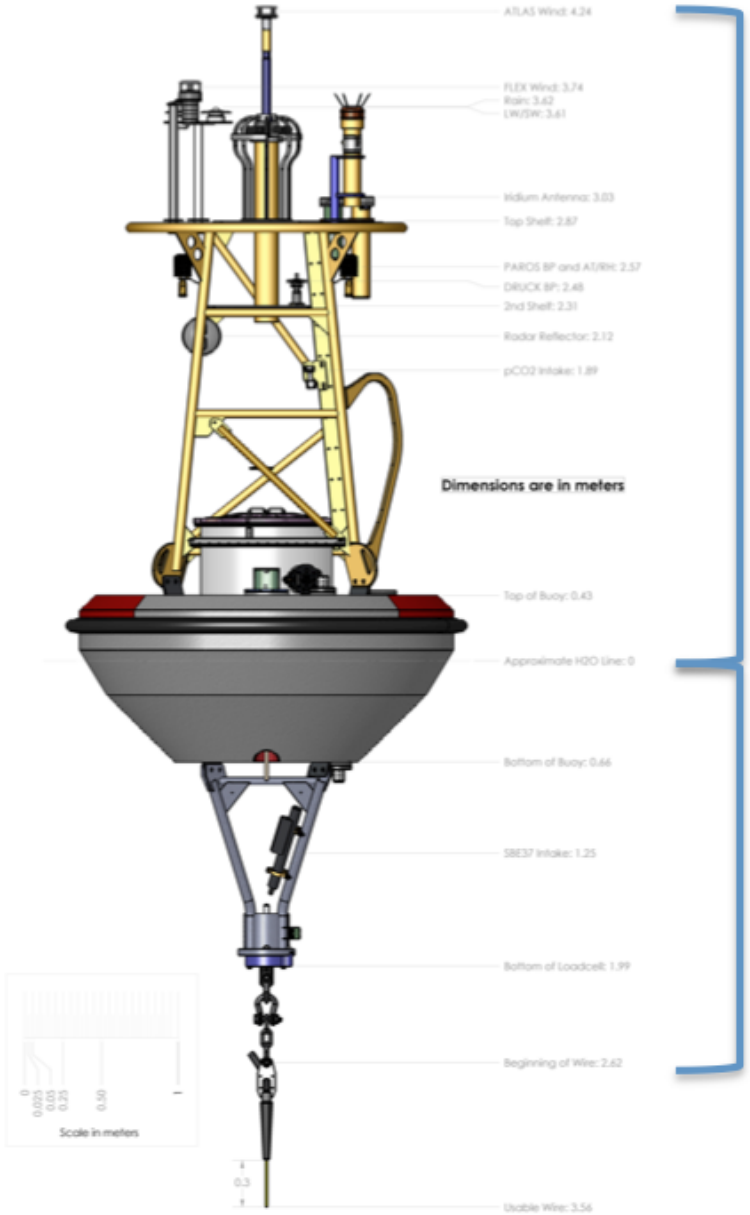
Recovery and deployment operations require sufficient deck space for two of these buoys (an area of approximately 3m x 6m (10ft x 20ft) for each), so that one buoy can be recovered before the replacement is deployed. Additional space of approximately $20m^2$ will be necessary for mooring hardware and spools of line. It is preferable to have crane access to the spools, so they can be lifted into position. Small work areas in both wet and dry lab space is also required.

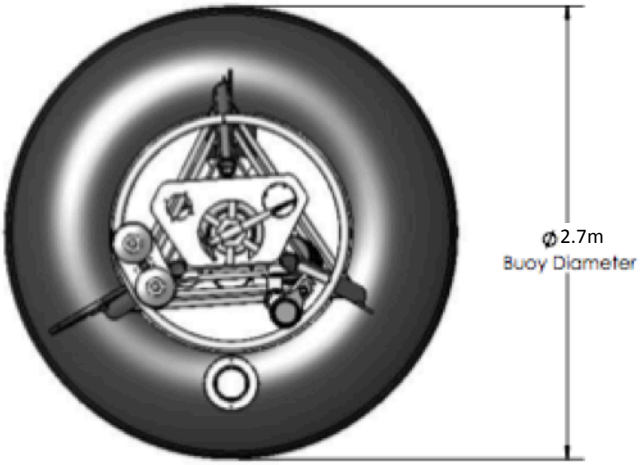
Small boat operations are often necessary for the recovery of a buoy, and may also be required during deployments, if personnel need to get on the buoy for last minute repairs. A RHIB is desirable for buoy access, with the ability to carry 3-4 people, in seas to 2m.

Other scientific features that would be nice to have aboard include:

- A CTD capable of reaching at least 500m depth for performing comparison casts at the deployment site.
- An ADCP continuously logging throughout the cruise.
- A depth sounder with plotting software to allow on-site generation of bathymetry plots. The system should be capable of acquiring data beyond 6,000m.
- A suite of meteorological instruments for comparison with buoy measurements, such as air temp, RH, BP, true wind speed and direction (compensated for ships steaming motion).
- Positioning system with accuracy better than 10m.

Favorable weather conditions are necessary for buoy operations, for safety and to prevent damage to the buoy and sensors. If scheduling permits, the day of getting underway should be flexible, to be onsite in weather conditions with seas of 2m or less, and winds 15 knots or below.





Buoy weight in air:
1800kg