Woods Hole Oceanographic Institution

Upper Ocean Processes Group

Technical Note

Drifter with Near-Surface Temperature Array

The WHOI discus buoy deployed in the Arabian Sea is outfitted with a near-surface temperature array consisting of six Richard Brancker Research Ltd. model XX-105 temperature recorders. The instruments are mounted to the side of the discus hull and parallel to the buoy bridle at nominal depths of .25, .5, 1.0, 1.5, 2, and 2.5 meters. Each instrument has a multi-plate radiation shield similar to that found on an air temperature sensor to prevent direct heating by incoming solar radiation.

The affect of the discus buoy hull on the near-surface temperature structure is not well understood. The temperature sensor array is alligned with the wind vane of the buoy and is, therefore, usually oriented down wind of the buoy hull. Flow past a moored buoy can create turbulence and mixing around the hull. There is concern that surface flow turbulence created by the hull may disturb the temperature structure. If this is the case, measurements made alongside the hull may not be representative of the temperature structure in the adjacent undisturbed water.

To address this concern a similar set of temperature measurements was made from a freely drifting buoy that was designed to minimize any disturbance of the temperature structure. The drifting measurements were made in close proximity to the Arabian Sea discus buoy so that the two data sets could be compared.

The buoy used for supporting the drifting temperature array was a modified three-ball radio float. The radio float has an aluminum pipe frame with three 17" glass balls attached to it which provide approximately 150 pounds of buoyancy. The radio float is normally used as a recovery aid at the top of subsurface moorings. In its normal configuration it has a submersible radio and light that are pressure-switch activated and turn-on when they come to the surface, signaling that the top of the mooring is on the surface. For the drifting temperature array a 3" PVC pipe was added to the side of the float to which the temperature recorders were attached. The pipe was located to the side so as to minimize any shadowing from the three glass balls. The drifter array was outfitted with the same type of temperature recorders with multi-plate radiation shields as was on the discus buoy. Figure 1 shows the temperature array attached to the three ball radio float. The temperature recorders were placed at .25, .5, 1.0, 1.5, 2.0, 2.5 meters depth which were the same nominal depths as the discus buoy mounted recorders. The actual depths of the discus buoy mounted sensors depend on the mooring tension and to what extent the hull is pulled underwater. The depths of the sensors and proper ballasting were checked by placing the drifter in a large tank in Woods Hole. An OAR radio and light, as well as a submersible Argos satellite transmitter, were attached to the aluminum frame.

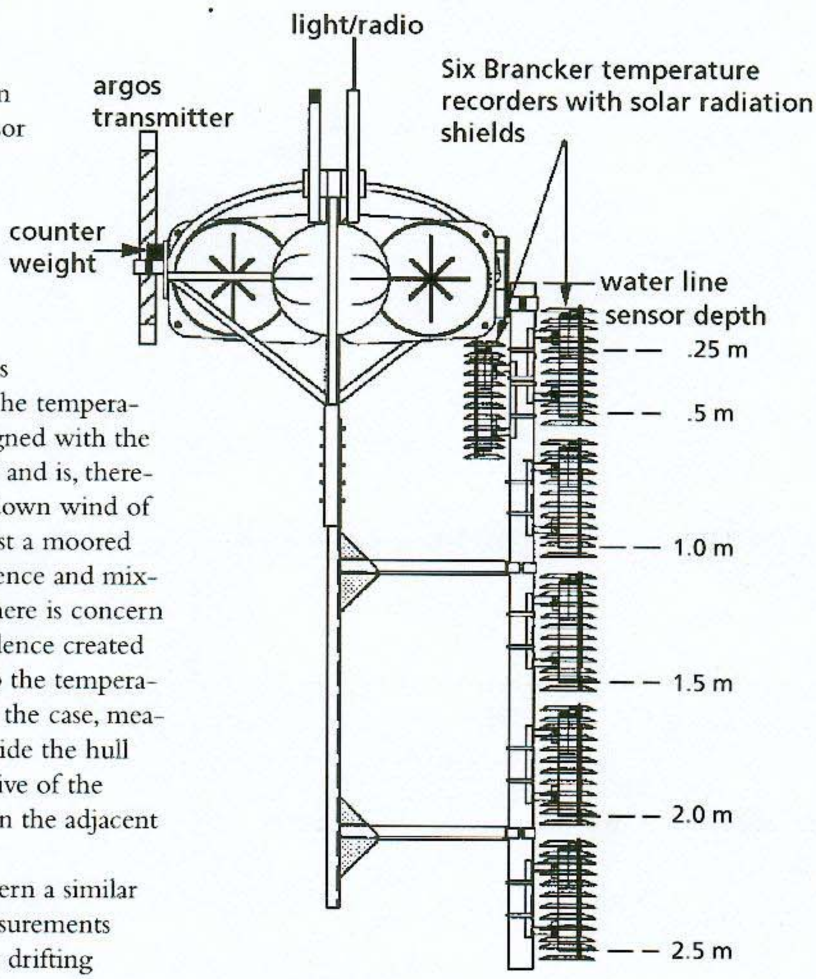

Figure 1: Drifting near-surface temperature array deployed during R/V Thomas Thompson cruise number 46 in the Arabian Sea.

Three 12-hour long experiments were conducted with the drifting temperature array (a.k.a. DrifTAr) during R/V *Thomas Thompson* cruise number 46. The drifter was deployed approximately .25 miles away from the discus buoy just as the sun was coming up (approximately 0200 UTC) and remained in the water until sunset (approximately 1400 UTC). During the DrifTAr experiments, range and bearing measurements were made to the drifter and the WHOI discus buoy from the ship. The sample rate for the drifting temperature recorders was one minute. Figure 2 shows the 12-hour record from one of the three days when data was collected. This data will be compared with the buoy data to attempt to determine what affect if any the buoy hull has on this technique of making near-surface temperature measurements.

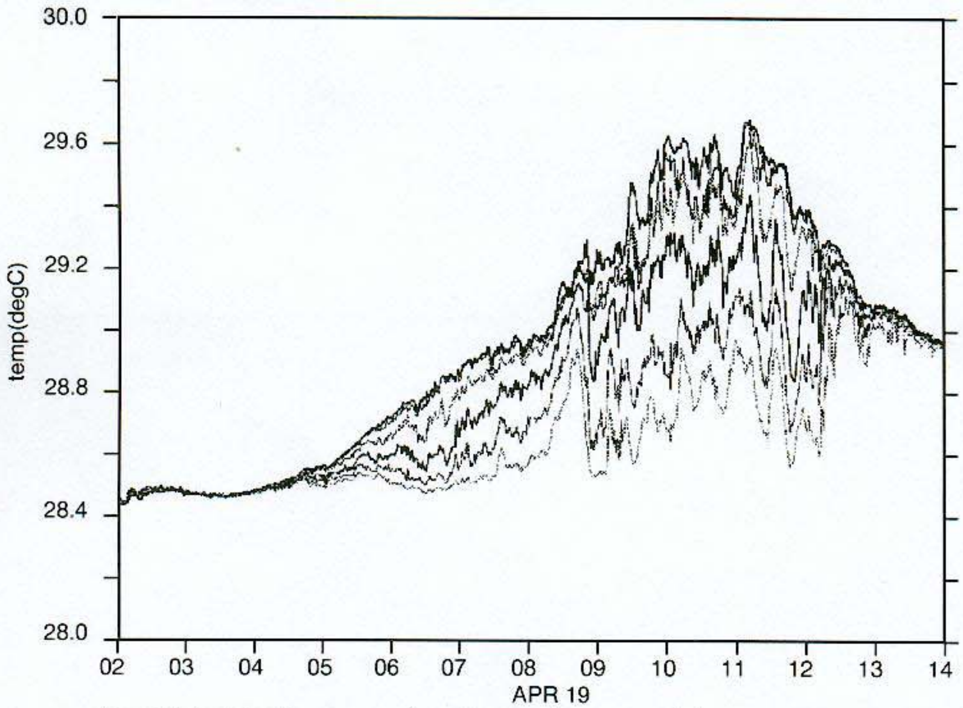

Figure 2: Arabian Sea near-surface temperature array data.

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The DrifTAr was designed, fabricated and tested by Rick Trask and Will Ostrom. Rick is currently a Research Specialist and Will is a Senior Engineering Assistant in the Physical Oceanography Department and both are members of the Upper Ocean Processes Group at the Woods Hole Oceanographic Institution.

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