

Validation of a New Type of Lagrangian Drifter Using a GPS Cellular Phone

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ABSTRACT

A new type of Lagrangian drifter is developed that is suitable for observing water mass movement in coastal regions. A GPS (Global Positioning System) cellular phone is used for field data retrieval. The number of drifters used in observation is expected to increase, since these are relatively low-cost and can be used repeatedly. In order to examine the efficiency of the drifter for monitoring water mass movement in coastal regions, a field test was conducted in the Ariake Sea in October 2001. The drifter's water-following capability and the reliability of the data acquisition/transmission unit are evaluated from the test results.

INTRODUCTION

The movement of nutrients and particulate matter largely affects the ecosystem in coastal regions. Because it is water mass movement that causes the movement of these nutrients and other matter, it is important for the management of the coastal environment to observe this water mass movement. The Lagrangian drifter is one of the most suitable instruments to observe it. The temporal and spatial variability of the current structure in most coastal regions is very complicated. In order to describe and analyze such a complicated current structure, low-cost drifters are needed to increase the number of drifters. Recently, we developed a relatively low-cost drifter that uses a GPS (Global Positioning System) cellular phone. The efficiency of the drifter mainly depends on the following factors:

1. Drifter's water-following capability.
2. Reliability of the data acquisition/transmission unit.

The first factor depends on the design of the drogue. The drogue for coastal regions has been hardly tested yet, in contrast to the drogue for the open ocean. The second factor must be confirmed by being tested in real-life situations, not in a laboratory. In this study, a field test was conducted, targeting these factors, to examine the effectiveness of the drifter.

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Received March 8, 2002; revised manuscript received by the editors June 25, 2002. The original version (prior to the final revised manuscript) was presented at the 12th International Offshore and Polar Engineering Conference (ISOPE-2002), Kyushu, Japan, May 26–31, 2002.

KEY WORDS: Drifter, coastal region, water mass movement.

DRIFTER SPECIFICATIONS

Fig. 1 shows the schematic diagram of the drifter we have developed, which consists of 3 main components:

- A surface float, housing the data acquisition/transmission unit and batteries.
- A tether, which connects the surface float to the drogue, made of nylon rope 0.02 m in diameter and 0.5 m in length.

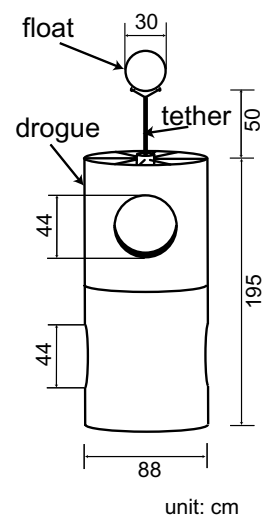


Fig. 1 Schematic diagram of drifter used in study