NEW LAGRAGIAN DRIFTER FOR COASTAL APPLICATIONS

Francisco J Gutiérrez, Raúl García, Gabriel Navarro, Javier Ruiz
Departamento de Ecología y Gestión Costera, Instituto de Ciencias Marinas de Andalucía, CSIC, 11519, Puerto Real, Spain.

Abstract - The following article presents an innovative model of lagrangian drifter for coastal applications. Its geometry has been designed to improve three mains aspects over other existing coastal drifters: maximizing experiment life, reducing the influence of the wind drag and maximizing its vertical stability. The electronics is also a non-conventional part of the design as it has not been design on purpose, but it has been chosen from the big variety of GPS trackers existing in the market able to carry out GSM/GPRS communications with a server. This way of approaching the election of the electronics facilitates its accomplishment with industry and electronic standards.

Keywords - lagragian drifter, GPS tracker, GSM/GPRS

The design of the new lagragian drifter presented in this work has been approached from two sides: first, by electing an appropriate model of GPS tracker able to implement GSM/GPRS communications; and second, by designing a new float geometry able to solve some of the problems occurring in other type of coastal drifters.

THE ELECTRONICS

The electronics inside this new model of drifter has been meticulously chosen from the big variety of GPS trackers existing in the market. Advantages of this election are: first, this piece of electronics has been thoroughly tested at the factory, providing much more robustness to the solution compared to other existing drifters whose electronics has been developed ad hoc with no much time expending for testing, understandable fact since it is a very expensive part of the commercial product development chain; second, it has passed most of the industry quality controls accomplishing with electromagnetic radiation regulation; and third, it implements most of the necessary features for lagrangian water mass characterization.

As summary, the main requirements this piece of electronics must implement are: being able to send to a server some general NMEA commands containing the position and velocity of the device generated by the GPS modem inside it, being able to send status flags informing, for example, about the quality of the recorded data and also being able to inform about important events that can compromise the success of the experiment.

THE FLOAT

The float, made of special UV-proof polyethylene, is shown in figure 1. It consists of three main cavities, each of one aiming at a different purpose.

The lower cylindrical cavity encloses the heaviest elements of the drifter, i.e. the battery packs. Its length allows the center of gravity of the buoy to be further below from the flotation line than in some other the drifters in the market.

The second cavity, conical in shape, provides flotation to the drifter and stability against horizontal efforts like wind drag. All this vertical stability, keeping the antennas of the GPS tracker well-oriented most of the time minimizing bad GPS-fix points and improving the quality of the telecommunications signals.

The upper cylindrical cavity allows all the elements to be placed inside the float. It may be closed with a watertight lead and it encloses the GPS tracker with the antennas (GPS and GSM) keeping them at the top part of the float.

FIELD VALIDATION

In order to validate the design of the drifter, this model has been equipped with standard commercial drogues for swallow water characterization and its drifting behavior compared with the ones from some other widely-used commercial drifters. In particular, simultaneous deployments with a first-class commercial model (the Davis drifter, from Pacyfic Gire) have been performed to characterize the dynamics of the upper one-meter layer in a tidal channel reaching satisfactory results.

FUTURE WORK

Due to the fact that the submerged part of the buoy is bigger than in other drifters, it may be possible to reduce the drag area ratio of the drogues that can be used, especially for swallow waters. One of the paths that currently is being explored is the design of smaller drogues that will still make the drifter to successfully follow the water parcel it is designed to (figure 2). In parallel, it is expected to progress in the design of especial drogues to optimize the drifter behavior for other applications as oil-spill or medusa bloom tracking.

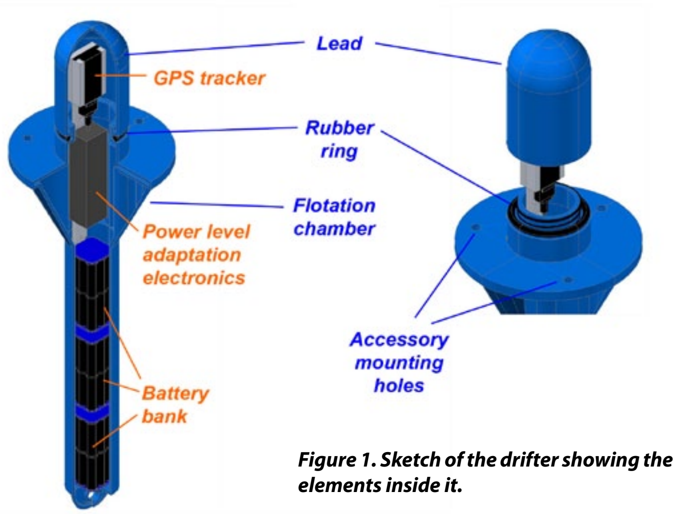

Figure 1. Sketch of the drifter showing the elements inside it.

Figure 2. Lagrangian drifter equipped with a Davis-type drogue centered at 1 m depth.