Standard hull with CODE floats and sails attached. Drifters can be field-rigged as either surface-following or deep-drogued.

Left to right: mini hull, mini hull with conductivity/temperature sensor option, and standard hull.

GPS / IRIDIUM DRIFTER
BRIGHTWATERS MODEL 121

OVERVIEW. The Model 121 GPS / Iridium Drifter is a current following (Lagrangian) drifting buoy. It is released in a body of water and moves with the currents over a period of hours to months. Onboard electronics acquire a time series of positions using the Global Position System (GPS) as the drifter moves. Positions and optional sensor data are telemetered over the worldwide Iridium satellite network and delivered to the end user using email, a web browser, or ftp.

The onboard GPS receiver automatically uses corrections provided by Satellite Based Augmentation Systems to enhance position accuracy in areas of the world served by SBAS. Bidirectional satellite communication allows the drifter to be reconfigured after deployment. This allows the same deployment to serve multiple missions or adapt sampling based on changing conditions.

Precision Lagrangian flow data provided by the Model 121 is useful in current measurement, larval fish studies, oil spill or floating debris tracking, discharge dispersement calculations, and similar studies. The Model 121 represents the seventh generation of Brightwaters drifters and incorporates refinements from more than 20 years of research, development, testing, and customer feedback.

PHYSICAL CHARACTERISTICS. The drifter design is similar to the Coastal Ocean Dynamics Experiment (CODE) drifter developed at the Scripps Institute of Oceanography. This design (also known as a Davis or SCULP drifter) provides excellent coupling to the surface layer and exhibits little wave rectification. An optional conversion kit allows the drifter to be changed in the field to a deep-drogued configuration.

Two sizes of drifter hull are available. Either size can be easily hand deployed or retrieved by one person:

- The “standard” size hull is approximately 1 meter (40 in.) tall excluding the antenna mast and weighs about 11 Kg (24 lbs). The standard hull is recommended for longer deployments of weeks to months or where the classic 1 meter high by 1 meter wide CODE form factor is desired.
- The “mini” size hull is approximately 0.5 meters (20 in.) tall excluding the antenna mast, weighs about 7 Kg (15 lbs), and has a battery capacity about one-third of the standard hull. When rigged as a surface drifter, the mini hull has a “Half CODE” form factor of ½ meter high by 1 meter wide. The mini hull is recommended for shallow environments, for minimizing surface drag when using deep drogues, and for shorter deployments of hours to weeks.

GPS. The Model 121 features a 12 channel GPS receiver and records position to 0.001 minute of latitude and longitude (1.8 meters). Absolute accuracy of the position is better than 15 meters worldwide. In areas served by one of three Satellite Based Augmentation Systems (WAAS in North America, EGNOS in Europe, and MSAS in East Asia) absolute accuracy is better than 3 meters 2DRMS.

OPTIONAL SENSORS. Temperature: -10 to +40C, resolution 0.01C. Stock accuracy is better than +/-0.5C. Typical postprocessed accuracy with optional individual calibration 0.05C.

Conductivity / temperature: -10 to +40C, resolution 0.01C. 0-60 mmho/cm, resolution 0.01 mmho/cm. Full digital sensor with individual calibration yields typical postprocessed accuracy of 0.05C and 0.05 mmho/cm.

Other analog and digital sensors available upon request.

TELEMETRY AND COMMAND DOWNLINK. The drifter uses the Iridium satellite system's Short Burst Data (SBD) service for communication of data and commands. When scheduled, the drifter sends stored data to the end user. Positions can be sent individually as soon as they are taken for time critical tracking, or can be aggregated and sent in bursts for greater efficiency. In either case, typical latency from the time the drifter powers the Iridium transmitter until the end user receives data is less than two minutes. If a communications session fails for any reason, the drifter will automatically retain the data and transmit at a later time.

Full access to the drifter's extensive command set is available via the Iridium downlink. This allows a drifter to be reconfigured after deployment. For example, when released in an estuary where high time and space resolution is required, a drifter can be set to determine position every five minutes and transmit every position immediately. Once the drifter moves offshore, it can then be reconfigured remotely to maximize deployment endurance by taking data once an hour and transmitting a block of positions twice per day.

DATA DISTRIBUTION. The drifter ships provisioned for the Iridium system. Brightwaters offers an economical full turnkey service including Iridium satellite usage, data decoding, and storage. Results can be accessed via email, ftp push, or password-protected web.

SIMPLE SETUP AND OPERATION. Although the satellite downlink allows extensive tuning of drifter operational parameters, the drifter can also be operated using two magnetic switches on the outer hull. A "beep code" audible through the case allows personnel without a computer to monitor and confirm proper drifter operation before deployment.

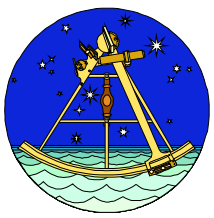
DEPLOYMENT ENDURANCE. Mini hull size with typical setup: greater than 28 days at 5 minute position interval. Standard hull size with typical setup: greater than 1 year at 30 minute position interval. Note that for continuous deployments greater than 250 days optional physical packaging is suggested as mechanical wear of the standard CODE package may become the limiting factor of endurance.

SERVICEABILITY. Unlike most competing products, our drifters are designed to be reused. Although Brightwaters offers complete refurbishing services, most routine maintenance can be accomplished by the end user. External parts such as sails or floats are easily replaced if damaged. The drifter hull can be opened to change batteries. Replacement battery packs are simple to make locally or can be ordered from Brightwaters. Many of our customers have used the same drifters for years for multiple research projects.

CUSTOM MODIFICATION. The design of the Model 121 lends itself well to custom modification of hardware and software to meet individual user's requirements. Generous uncommitted analog and digital interface capability is available to integrate additional sensors. Alternative physical packaging configurations such as WOCE SVP, Draper LCD, or extremely robust "crash cage" and "baseball bat" hulls are possible. There is no minimum quantity for custom modifications, and our wide previous experience often allows us to customize at surprisingly modest cost.

A HISTORY OF INNOVATION. Brightwaters Instrument Corporation has been building autonomous drifting buoys for more than twenty years, with current products representing a seventh generation of design. Innovations developed at Brightwaters have been adopted across the drifter industry. Continuous design improvements reflect Brightwaters' commitment to offer the most technically advanced drifters in the world.

Brightwaters Instrument Corporation has supplied affordable semicustom and full custom scientific and oceanographic equipment to governments, universities, and the private sector since 1990.



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