

Horizontal Water Movement Using Drifters

Objective

To have students analyze horizontal water movement using drifters.

Correlations

National Science Education Standards

Grades 5-8: A, B, E, G

Grades 9-12: A, B, E, G

California State Science Education Standards

Grade 6: 2b, 4d, 7b

Grade 7: 4f, 7a

Grade 8: 1a-d, 2d, e, 8c, d, 9f

Grades 9-12: Physics 1a-h, 2d, Earth Sciences 5a-d, f, g

Ocean Literacy Principles and Fundamental Concepts

Introduction

The ocean is in constant motion. Winds drive the currents on the surface of the ocean. The strength and variability of surface currents help form our weather over short and long time scales, impacting climate, and environments for all life on Earth. Data from drifters, buoys and satellites provide observations about speed and direction of currents. Storms can cause deviation of normal current patterns. Surface currents can vary considerably in both strength and in depth. Nearshore winds can cause upwelling resulting in plankton production. El Nino conditions can result in a loss of upwelling, loss of plankton production and severely impact fisheries.

Understanding and tracking ocean currents are economically important for shipping and fisheries, ecologically important to understand population distribution and environmentally critical in looking at impacts of pollution. Surface currents transport not only nutrients and planktonic organisms effecting the distribution of life but also redistribute pollution that enters the ocean.

Ocean surface currents also play a large role as they influence weather patterns along the coast as well as inland. As we understand the influence of human activities on the warming the atmosphere, it is imperative that we understand the role that the ocean and its surface currents play in shaping weather and climate.

Materials

- Access to a stretch of water at least 15 meters in length along a pier, jetty, or stretch of land
- Method of measuring and marking off a given distance (meter tape, tape measure or yard stick, use landmarks or boat(s) or a pier, etc.)
- Bottle drifter, 1 per team (e.g. pop bottle filled with sand - so that the bottle floats just below the surface of the water - with a long string or rope attached so that you don't lose it)
- Timing device, such as a wrist watch or stop watch
- Compass
- Wind gauge
- Student worksheet

Procedure

1. On land, measure and mark off a known distance along the shoreline, an anchored boat, a pier, jetty, etc. Select a starting point and mark it as "point A". Move at least 15 meters along the shoreline, jetty, etc. and mark the end "point B". Measure and record the actual distance between point A and point B in meters. Measure and record wind speed and direction.
2. Lower bottle drifter (with attached string!) in the water at point A.
3. Use a timing device to record the time it takes for the bottle to move from point A to point B.
4. Use a compass to determine the general direction the bottle went. Remember, current direction is the direction it is going (as opposed to wind which gets reported as the direction that it is coming from).
5. Record your data in the worksheet below.
6. Calculate the speed of the current.
7. Repeat steps 2 and 3 two more times and calculate an average current speed.



Drifter Tracking Data Worksheet

Date: _____ Time _____ Wind speed _____ Wind direction _____

Station Name: _____ Tidal height _____

Latitude: _____ °N, Longitude: _____ °W

Team Members: _____

Trial Number	Distance (m)	Time Interval from A to B (min)	Speed (m/sec)	Direction
1				
2				
3				
			Avg= m/sec	