Showcase: Ocean Drifters—Investigating Ocean Currents

ACTIVITY 3: TRACK A DRIFTER

Use data from actual drifters to plot the drifters' tracks.

Use the YOTO Drifter Tracking Chart.

PLOT DRIFTER POSITIONS AND DRAW TRACKS

Each of these charts has data from a drifter. Choose one of the drifters. Plot each of its positions on the chart with a dot. Label the date next to each position, or give it a letter to identify it. After plotting each position, connect the points. This is a **drifter track.**

Sometimes a latitude or longitude measurement will have a minus sign (-) before the numbers. The minus sign before latitude means the point is south of the Equator. The minus sign before longitude means the point is west of the Prime Meridian.

DRIFTER #1

Date	Latitude (°N)	Longitude (°W)	Time Interval (days)
8-25-96	15°32'00"	-74°49'00"	0
8-28-96	14°40'00"	-75°48'00"	3
9-2-96	14°14'00"	-76°45'00"	3
9-5-96	14°07'00"	-77°50'00"	3
9-8-96	15°12'00"	-79°10'00"	3
9-11-96	16°44'00"	-80°04'00"	3
9-14-96	17°49'00"	-81°03'00"	3
9-17-96	18°53'00"	-82°01'00"	3
9-20-96	19°40'00"	-82°47'00"	3
9-23-96	20°02'00"	-82°58'00"	3

DRIFTER #2

Date	Latitude (°N)	Longitude (°W)	Time Interval (days)
10-4-96	28°12'00"	-80°00'00"	0
10-7-96	30°20'00"	-80°02'00"	3
10-11-96	30°51'00"	-79°49'00"	4
10-14-96	32°18'00"	-77°55'00"	3
10-17-96	32°23'00"	-78°01'00"	3
10-20-96	33°01'00"	-77°06'00"	3
10-23-96	33°18'00"	-77°03'00"	3
10-26-96	35°17'00"	-74°53'00"	3
10-29-96	37°54'00"	-69°54'12"	3
11-1-96	37°00'00"	-67°39'96"	3

1. These drifters are tracking ocean currents. What is the general location of these currents and what is the main direction they are moving? What are the names of the currents.

2. Do both drifters behave the same or differently?

3. Do you think you could predict the position of a drifter in the future? For example, where might each drifter be three days after the last position you have plotted ?

CALCULATE DRIFTER SPEED AND DIRECTION

Fill in the table below with the information you calculate. The second row for each drifter has been completed as examples. You will need to use your drifter track chart for this exercise.

1. Calculate the distance between drifter locations. On the drifter tracking chart, 1 cm = approximately 125 nm (nautical miles). A nautical mile is one minute of arc on the planet, or one minute of latitude at the Earth's equator. This unit of measurement is used by all nations for air and sea travel. A nautical mile is 1,852 meters or 1.852 kilometers. In the English measurement system, a nautical mile is 1.1508 miles, or 6,076 feet.

2. Calculate the drifter's speed. Use the formula

   Speed (nm/h) = Distance (nm) ∏ Time (h: hours)

   You will need to change the number of days in the time interval to hours. Each day equals 24 hours. To change from days to hours, use the formula:

   Number of hours = Number of days (d) x 24

3. Determine the direction the drifter is traveling during that time interval.

DRIFTER #1

Date	Time Interval (days)	Distance (nm)	Speed (nmph)	Direction
8-25-96	0	Start	Start	Start
8-28-96	3	81	1	SW
9-2-96	3			
9-5-96	3			
9-8-96	3			
9-11-96	3			
9-14-96	3			
9-17-96	3			
9-20-96	3			
9-23-96	3			

DRIFTER #2

Date	Time Interval (days)	Distance (nm)	Speed (nmph)	Direction
10-4-96	0	Start	Start	Start
10-7-96	3	125	1.7	N
10-11-96	4			
10-14-96	3			
10-17-96	3			
10-20-96	3			
10-23-96	3			
10-26-96	3			
10-29-96	3			
11-1-96	3			

AVERAGE THE DATA FOR THE DRIFTER TRACKS

Water movement in the ocean is not a steady process. The speed of the current may change from time to time. So, the speed and direction of the drifter is not regular or constant. The drifter's speed and direction will change because of ocean conditions.

When analyzing drifter tracks, it is very important to understand the concept of averaging. The length of time we use in averaging can produce very different results. For example, you have just calculated the speed of the drifter over a set of 3 day intervals. That makes each speed a 3-day average. If we made a 6-day average, we might get different results. Let's see

if the number of days used to make an average will affect the results.

In the table below, recalculate Drifter 1 and 2 speeds based on the given time intervals. To calculate distance, be sure to measure the points on the chart between the correct dates.

Then, compare the 3-day averages with the 6-day averages. Did the number of days used to calculate the average speed make a big difference? Did the direction of the drifter's movement change when you looked at the 6-day averages instead of the 3-day ones?

DRIFTER #1

Date	Latitude (°N)	Longitude (°W)	Time Interval (days)	Distance (nm)	Speed (nmph)	Direction
8-25-96	15°32'00"	-74°49'00"	0	Start	Start	Start
9-2-96	14°14'00"	-76°45'00"	6			
9-11-96	16°44'00"	-80°04'00"	9			

DRIFTER #2

Date	Latitude (°N)	Longitude (°W)	Time Interval (days)	Distance (nm)	Speed (nmph)	Direction
10-4-96	28°12'00"	-80°00'00"	0	Start	Start	Start
10-11-96	30°51'00"	-79°49'00"	7			
10-26-96	35°17'00"	-74°53'00"	15			