

Longshore Drift

Teacher's Guide

Subject: Integrated Science (Earth-Space; Physical)

Topic: Longshore Drift

Summary: Students will measure the movement of an orange (sand particle proxy) along a beach to learn about how non-living factors (energy from wind and waves) shapes/builds/breaks down landforms.

After completing the field lab, students will be able to:

Objective(s):

1. Measure the rate of longshore drift
2. Describe physical forces that remove or deposit sand
3. Relate how the non-living factors affecting sand impact the presence of vegetation

Ecosystem(s): Beaches; Barrier Island

Equipment:

- Wooden stakes
- 30 meter tape measure
- Stopwatches
- Oranges
- Compass
- Anemometer
- GPS Units
- Equipment containers

Background:

- Vocabulary: Waves, Shoreline, Longshore current, rip current,
- Reference Material: Earthguide diagrams: Beach Profile and Nearshore Circulation
<http://earthguide.ucsd.edu/earthguide/diagrams/coasts/nearshorecirc.html>
-
- Equipment Training: GPS units

Procedure (Engage; Explore; Explain)

1. Engage the students by asking a specific question that gets to the heart of the activity: "Does the sand on the beach move? If so how?" Use the students' answers to ascertain what they already know, clarify any misconceptions, and then ask them to formulate their own hypothesis relating to their own expectations of the outcome of the lab.
2. Explain that students will measure the lateral movement of sand along the beach. Explain that because sand grains are so small and difficult to distinguish from each other, we will use an orange as a substitute or "proxy" so that we can better observe its movement.
3. The first thing the students need to determine is the orientation of the beach. To do this they should draw a line in the sand just above and parallel to the waterline. Standing on this line with a compass they can determine the direction of beach by reading the compass bearings on either end of the line. If another line is drawn toward the water perpendicular to the first line, the compass bearing of that line describes the direction the beach "faces."
4. Students will mark a starting point on the beach just above the waterline using a wooden stake. At that point they will place or throw the orange into the area where waves are breaking closest to the shoreline and begin the stopwatch.
5. Students will follow the orange as it moves in the water for 3 minutes. If the orange moves onshore and stops a student should push or re-throw it out into the water at that point. At three minutes students will place another wooden stake in the sand just above the waterline where the orange was.

6. Using the tape measure, students will measure the distance from the starting point (1st stake) to the end point (2nd stake).
7. Students should repeat steps 3-5 two more times and then calculate their average longshore drift.
8. Students should record data and answer assessment questions.
9. After completing the lab, allow the students to answer the discussion questions as a group and explain their answers relating them to the concepts, processes and skills associated with the activity. Students should record their answers individually. At this time, facilitators can introduce/explain the specific concepts and explanations in a formal manner.

Sunshine State Standards:

Science: SC.A.2.3.1; SC.B.1.3.6; SC.B.2.3.1; SC.C.1.3.1, SC.D.1.3.1,3,5; SC.H.1.3.4-7; SC.H.2.3.1

Language Arts: LA.A.1.3.3; LA.C.1.3.1,4

Mathematics: MA.A.1.3.4; MA.B.1.3.2; MA.B.2.3.1; MA.B.3.3.1; MA.B.3.3.1,2; MA.E.3.3.1

Social Studies: SS.A.6.3.2

Longshore Drift

Student Data Sheet

General Information

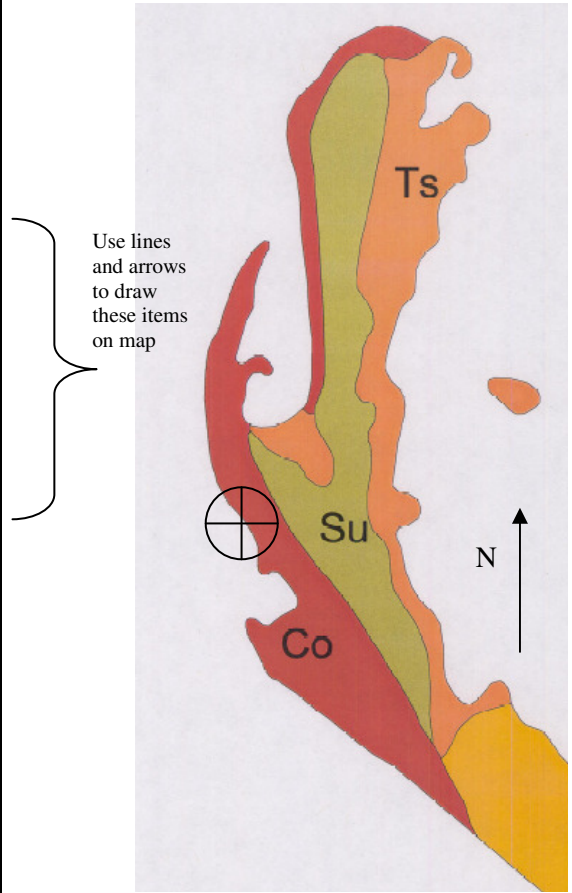
Full Name:		Date:	
School (teacher):		Start Time:	
Latitude:		Longitude:	

Student Hypothesis and Rationale

If wind generates waves and waves move sand, then the sand will move along the beach (chose one: in the direction of the waves or in the opposite direction of the waves), because _____

Field Observations/Measurements/Data

Measurement	Value and units
Location (latitude and longitude)	Lat: Long:
Tide status (rising/falling and height)	
Orientation of Beach (e.g., east-west; north-south, etc.)	
Direction of wind (direction wind is coming from)	
Direction of waves (direction waves are coming from)	
Longshore Drift: Trial 1 (distance per 3 minutes)	
Longshore Drift: Trial 2 (distance per 3 minutes)	
Longshore Drift: Trial 3 (distance per 3 minutes)	
Longshore Drift: Average (distance per 3 minutes)	



Longshore Drift

Assessment

1. What was the longest distance your orange traveled in any of your trials? What was the shortest?

Longest:

Shortest:

2. Using your average longshore drift, how far would the orange travel in 30 minutes? How far in 3 days?

30 minutes:

3 days:

3. Do your data support your hypothesis? Whether your hypothesis is supported or not, what can you infer from your observations, measurements, and results?

4. What do you think happens to the sand once it reaches the end of the island?

5. How might man-made structures (such as a jetty, pier, sea wall) affect the longshore movement of sand?

Portfolio Journal Prompt

Coastal areas and barrier islands are constantly changing. Imagine what a student 100 years from now might find if he/she came to this location to conduct the same activities that you did. Not only would the island have changed, but students would too. Write a letter to a middle school student in 2107 and describe your field experience to Honeymoon Island. Before you begin writing think about things like transportation, clothing, recreational activities pursued at the beach and other things that are likely to change.