

## Density Webquest

### Objectives

1. To investigate stratification and vertical mixing using data from the Ocean Observing Systems.
2. To compare methods of determining stratification and/or vertical mixing using field data vs. observing system data.

### Correlations

National Science Education Standards:

Grades 5-8: A2, B2, D1, E2

Grades 9-12: A2, B4, D1, E2, F6

California State Science Education Standards:

Grade 6: 3a, 7b

Grade 7: 7a, 7b

Grade 8:

Grades 9-12: Earth Sciences: 5d; Investigation and Experimentation: 1a-d

Ocean Literacy Principles and Fundamental Concepts:

---

### Introduction

Stratification and vertical mixing of water are important features of the coastal ocean. Temperature and salinity each affect water density, and differences in temperature and salinity between surface and bottom waters can lead to stratification of water due to the different densities. As the temperature and/or salinity changes over time, the water density also changes and can result in vertical mixing of water throughout the water column. Temperature and salinity can be measured using automated devices on bouys, or manually using water samples collected from a boat.

### Materials

Computer

Internet access

### Part A

1. In your web browser, go to: [http://www.ndbc.noaa.gov/maps/Southwest\\_inset.shtml](http://www.ndbc.noaa.gov/maps/Southwest_inset.shtml)
2. Click on the observing buoy(s) that are reporting salinity and temperature data from both the surface and the bottom of the water column.

3. Record your observations for the following using the buoy nearest to the field trip site (if available):

Current surface salinity \_\_\_\_\_

Current surface temperature \_\_\_\_\_

Current bottom salinity \_\_\_\_\_

Current bottom temperature \_\_\_\_\_

4. What other information can you obtain from the observing system?

### **Part B**

Let's compare our results from the field trip to the real-time data available from Ocean Observing Systems.

1. Which method of data acquisition provided a more comprehensive view of vertical mixing/stratification at the time of sampling?

2. Which method provided a better long-term analysis of mixing/stratification over time?

## **Assessment**

Which method would you use if:

1. you wanted to know if the water in an estuary was stratified at a certain depth?
2. you wanted to predict if there was going to be a turn-over event in the estuary or along the coast?
3. you wanted to see if upwelling was occurring along the coast?
4. you wanted to see if there might be a fish kill caused by low oxygen bottom waters?