

## **Ocean Layering: Density, Salinity, Temperature, and Circulation**

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### **Day 3 Overview: North Pacific Vertical Layers**

Warm up: 10 min

Info: 10 min

Activity: 25 min

Conclude: 10 min

**Warm up:** How are the surface and the deep parts of the ocean different?

Student answers:

They have different temperatures and salinities

The surface of the ocean moves faster

Currents near the bottom are caused by changes in ocean density, and currents near the surface are caused by winds.

Temperature at the surface can be hot or cold but temperature near the bottom is always cold

There are many answers. This question tries to get the students to synthesize some of what they have learned.

**Info:** North Pacific vertical glider sections

See '03c.slides.glidern' (<http://earthref.org/cgi-bin/erda.cgi?n=1018>)

See '03t.slides.glidern' (<http://earthref.org/cgi-bin/erda.cgi?n=1022>)

Goal: explains how a different type of ocean measurements are made using an underwater robot.

Transition: Yesterday we looked at slices through the whole ocean. Today we are going to look at a slice through just one region in more detail.

**Activity:** North Pacific vertical layers

See '03t.activity.nplayers' (<http://earthref.org/cgi-bin/erda.cgi?n=1019>)

See '03c.handout.nplayers.figs.color' (<http://earthref.org/cgi-bin/erda.cgi?n=1016>)

or '03c.handout.nplayers.figs.gray' (<http://earthref.org/cgi-bin/erda.cgi?n=1015>)

See '03c.handout.nplayers.questions' (<http://earthref.org/cgi-bin/erda.cgi?n=1017>)

See '03t.handout.nplayers.answers' (<http://earthref.org/cgi-bin/erda.cgi?n=1020>)

Goal: Students interact with observations and see some of the smaller-scale features and seasonal changes in the ocean.

Transition: What do you notice when you look at the pictures?

**Conclude:** What can the different layers of temperature and salinity tell you about the ocean?

The big picture is that vertical layers can show where water has come from, where it sinks and where it rises, as well as how the ocean gets mixed. Temperature and salinity near the surface also give a lot of information about the atmosphere.