



See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Teams will complete tasks related to physical and geological oceanography.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:** Each team may bring four 8.5" x 11" sheets of paper that may contain information on both sides in any form from any source. Each student may bring any kind of calculator.

3. **THE COMPETITION:** Teams will be presented with **questions and one or more tasks at a workstation or timed station-to-station format**. The emphasis will be on the NGSS Science and Engineering Practices below rather than vocabulary, identification, or questions based solely on the recall of facts. Topics are limited to the following:

- a. Seawater: composition, density, variations in salinity, and sources of salts
- b. Energy inputs, outputs, transfers and conversions
- c. Water temperature, pressure, and three-layer structure of ocean water
- d. Topographic features found on continental margins, **estuaries**, ocean basins, and mid-ocean ridges
- e. Processes and features of tectonic plate motion in ocean basins, and patterns of age of the ocean floor
- f. **Distribution of chemicals (nutrients, oxygen, metals) in the ocean, vertical and horizontal structure**
- g. Formation of fringing reefs, barrier reefs, and atolls
- h. Waves: Motion, height, wavelength, period, fetch, swell, surf, and tsunamis
- i. Surface currents: Warm and cold currents; Coriolis effect, and gyres
- j. Coastal currents: longshore currents, rip currents, and upwelling
- k. **Deep ocean circulation, ocean overturning and water masses**
- l. High and low tides, spring and neap tides, and tidal currents
- m. Coastal features and processes, uplift and subsidence
- n. Oceanic tools used to collect water samples, sediments, cores, track water movement, etc.
- o. **Relationships between fisheries and ocean color**

4. **REPRESENTATIVE ACTIVITIES:**

- a. Given the water temperatures at various depths in a column of seawater, teams will construct graphs and identify and label the thermocline.
- b. Identify the signature of different water masses from a contour plot of oxygen.
- c. Identify topographic features of ocean regions using seafloor maps.
- d. Write a hypothesis to explain changes in water salinity in high latitude ocean regions.
- e. Analyze and interpret data related to water pH in selected regions that may explain changes in barrier reef formation.
- f. Given a set of vertical profiles of salinity in an estuary, identify the type of estuary (fjord, salt wedge, well-mixed, partially mixed) and discuss implications for bottom water hypoxia.

5. **SCORING:** Points will be awarded for the quality and accuracy of responses. High score wins. Ties will be broken by the accuracy and/or quality of answers to selected questions.

Recommended Resources: All reference and training resources including the **Bio/Earth CD** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>.

Next Generation Science Standards (NGSS) Science and Engineering Practices: asking questions and defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations and designing solutions, and engaging in argument from evidence and obtaining, evaluating, and communicating information. Be sure to see how all forty-six of the Science Olympiad events are aligned to NGSS at http://soinc.org/align_natl_stand