# DYNAMIC PLANET

**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**:
   a. Each team may bring **one 2" or smaller** three-ring binder, as measured by the interior diameter of the rings, containing information in any form and from any source. Sheet protectors, lamination, tabs, and labels are permitted. If the event features a rotation through a series of laboratory stations where the participants interact with samples, specimens, or displays; no material may be removed from the binder throughout the event.
   b. Each team may bring two stand-alone calculators of **any type**.
3. **THE COMPETITION**:
   a. Participants will be presented with **questions which may include one or more tasks at a workstation or a timed station-to-station format**.
   b. The participants will be expected to use process skills (e.g., communicating, classifying, inferring, measuring, observing, predicting, and using number relationships) to answer questions on the following topics:
      i. Seawater: composition, density, variations in salinity, and sources of salts
      ii. Shortwave and longwave radiation, sensible and latent heat fluxes, geothermal heat, and heat transport
      iii. Water temperature, pressure, and the three-layer structure of ocean water
      iv. Topographic features found at continental margins, estuaries, ocean basins, and mid-ocean ridges
      v. Processes and features of tectonic plate motion in ocean basins and patterns of age of the ocean floor
      vi. Distribution of chemicals (e.g., nutrients, oxygen, metals) in the ocean, as well as vertical and horizontal structure
      vii. Formation of fringing reefs, barrier reefs, and atolls
      viii. Waves: Motion, height, wavelength, period, fetch, swell, surf, and tsunamis
      ix. Surface currents: Warm and cold currents, Coriolis effect, and gyres
      x. **Division C Only:** Ekman and geostrophic balances
      xi. Coastal currents: longshore currents, rip currents, and upwelling
      xii. Deep ocean circulation, ocean overturning, and water masses
      xiii. High and low tides, spring and neap tides, tidal currents, and tidal resonance
      xiv. Coastal features and processes, uplift and subsidence, and influence on sea level rise
      xv. Oceanic tools used for research (e.g., collection of water samples, sediments, cores, and tracking water movement)
      xvi. Relationships between fisheries and ocean circulation (e.g., upwelling, El Niño, Pacific Decadal Oscillation)
4. **REPRESENTATIVE ACTIVITIES**:
   a. Given the water temperatures at various depths in a column of seawater, teams will construct graphs to identify and label the thermocline.
   b. Use a downloaded dataset of oxygen to identify water masses and pathways of circulation.
   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 water pH data from selected regions where barrier reef formation is changing.
   f. Given a set of vertical profiles of salinity in an estuary, identify the type of estuary (e.g., fjord, salt wedge, well-mixed, partially-mixed) and discuss implications for bottom water hypoxia.
   g. Relate trends in coastal flooding at specific locations to global sea level rise and local subsidence.
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:** The Science Olympiad Store (store.soinc.org) carries the Dynamic Planet and Bio/Earth Science CDs; other resources are on the event page at soinc.org.

**This event is sponsored by National Oceanic and Atmospheric Administration (NOAA)**