



# METEOROLOGY

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Read the General Rules in the manuals and on [www.soinc.org](http://www.soinc.org) as they apply to every event.

1. **DESCRIPTION:** Participants will demonstrate a multidisciplinary understanding of the earth and planetary systems that influence climate on planet Earth. This event will place emphasis on understanding how these systems are impacting climate change past and present on our planet.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 50 Minutes

2. **EVENT PARAMETERS:** Each **team** may bring one 8.5" x 11" two-sided page of notes containing information in any form from any source. Each **participant** may bring any kind of (non-graphing) calculator, but no other resources.
3. **THE COMPETITION: Questions will be from the following topics:**
- Composition and evolution of Earth's atmosphere with emphasis on how composition can affect climate (greenhouse gasses, volcanic particulates, atmospheric carbon variability, etc.).
  - Weather vs. Climate
  - Solar radiation/Earth's energy balance:
    - Albedo, long and shortwave radiation (in context of Daisy World Model)
    - Solar weather, insolation, solar output, sunspots, solar maximums and minimums
    - Daily and annual maximum and minimum temperatures
  - Climatic zones: The Köppen climate classification system with emphasis on how it can be used to understand climate change
    - Understand the difference between the Köppen and Thornwaite systems
    - Understand and be able to interpret climographs
  - Natural climatic variability: with emphasis on how it might affect climate change:
    - Effects of land masses and water bodies on climate
    - Effects of latitude and longitude and elevation (topography)
    - Effects of Earth's mean temperature: with emphasis on how changes might impact Earth's cryosphere, hydrosphere, biosphere, and atmosphere systems
    - Effects of plate tectonics on climate
  - Oceanic and atmospheric circulation: their impact on climate and climate change:
    - Semi-permanent pressure cells and the three-cell model of atmospheric circulation
    - El Niño, La Niña, Southern Oscillation/Walker circulation
    - Thermohaline circulation and wind-driven oceanic currents
    - Oceanic circulation
  - Earth's celestial cycles: their impact on long-term climate change
    - Seasons
    - Milankovich Cycles: eccentricity, axial tilt, and precession
    - Solar maximums and minimums
  - Paleoclimates of Earth's geologic history
    - Pleistocene Ice Age, Younger Dryas Cold Period, Medieval Warm Period, Little Ice age
  - Paleoproxies: Such as, ice cores, ocean sediments, lacustrine sediments, dendrochronology, coral bleaching, and what information they are able to provide about ancient climates
  - Human impact: global warming, greenhouse gases, ozone depletion, deforestation, desertification and urban heat island effect
4. **SCORING:** Points will be awarded according to the quality and accuracy of responses, the quality of supporting reasoning, and correct use of scientific technique. Highest score wins. Several pre-identified questions will be used as tiebreakers.

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

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Science Olympiad  
Meteorology B - 2012

Event Manager: Katie Burns

**FOCUS FOR 2012**

According to the event rules, this year's focus is on "Earth and planetary systems that influence climate on planet Earth."

There is an emphasis on "how these systems impact climate change past and present on our planet."

**SUPPLIES**

Each team (1 or 2 people) may bring a non-programmable calculator and one 8.5" X 11" two-sided page of notes in "any form from any source".

**FORMAT**

- Written test, one test per team (no stations this year).
- Multiple choice, matching, and short answer.
- 4 tie-breaking questions, short essay or bullet-point response

**NOTES ON CONTENT**

I recommend using the rules sheet as a study checklist. Students will need to understand the key vocabulary terms from the rules sheet. They will also need to understand how these terms impact or relate to our climate. For example, students need to know the definitions of albedo, solar output, and Milankovich Cycles, as well as their relationship to the Earth's climate.

General weather terminology is important to know, but remember, the focus of this year's event is climate and climate change.

The Audubon Weather Guide and Bio/Earth CD will be the primary sources for test questions. Other web sources will be used as necessary, especially with regard to generating questions with a historical context.