

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:** The topic for the 2009 Meteorology Event is climate and climate change. Topics may include, but are not limited to:
- Composition and evolution of Earth's atmosphere: with emphasis on how composition can affect climate (greenhouse gasses, volcanic particulates, carbon cycle etc.).
 - Weather vs. Climate
 - Solar radiation/Earth's energy balance: Albedo, long wave radiation, solar weather etc.
 - Climatic zones: The Köppen climate classification: with emphasis on how it can be used to understand climate change.
 - Natural climatic variability: with emphasis on how they might effect climate change:
 - Effects of land masses and water bodies (plate tectonics and climate change)
 - Effects of latitude and elevation
 - Temperature changes in the cryosphere: alpine glaciers, Arctic sea ice, land-based ice caps
 - Effects of topography upon climate (mountain building)
 - Daily and annual maximums and minimums (how they can monitor climate change)
 - Oceanic and Atmospheric circulation: their impact on climate and climate change:
 - Semi permanent pressure cells and relationship to three cell model
 - El Niño, La Niña, Southern Oscillation/walker circulation
 - Thermohaline 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, Medieval Warm period, Little Ice age, snowball earth, etc.
 - Paleoproxies: Ice cores, ocean sediments, lacustrine sediments, dendrochronology, coral bleaching, and how they help us determine ancient climates.
 - Human impact on climate change: greenhouse gas variability, ozone depletion, deforestation, and desertification.
4. **REPRESENTATIVE ACTIVITY:** Examine graphs of Earth's mean global temperatures, which encompass significant events (industrialization, volcanic eruptions, solar maximums and minimums) and interpret impact on climate.



5. **SCORING:** Points will be awarded according to the quality and accuracy of responses and the quality of supportive reasoning.

RESOURCES: Science Olympiad Earth Science Resource CD, Wright Center Website

Meteorology Today: An Introduction to Weather Climate, and the Environment by C. Donald Ahrens

Meteorology: The Atmosphere and the Science of Weather by Joseph M. Moran and Michael D. Morgan

DataStreme at <http://www.ametsoc.org/dstreme/>

Weather 2010 at [http://ww2010.atmos.uiuc.edu/\(Gh\)/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/home.rxml) and <http://www.comet.ucar.edu>

http://www.metoffice.gov.uk/education/higher/climate_change.html

http://www.metoffice.gov.uk/research/hadleycentre/models/carbon_cycle/

Reference for coaches: <http://www.project2061.org/publications/guides/climate.pdf>

NATIONAL SCIENCE EDUCATION STANDARDS: Earth Science, Grades 5-8: Content Standard D: Structure of the earth system. NSES Science as Inquiry, Grades 5-8: Content Standard A: Develop Descriptions, Explanations, Predictions and Models Using Evidence.