**Temperature Over Time**

**Overview & Concepts**

In this module, students will investigate whether Earth is warming. First, they will review the causes of seasonal and daily temperature changes at different latitudes and locations. They will then analyze a variety of temperature data to compare temperature trends over different time periods (from decades to centuries) and over different spatial scales (from local to global). These investigations will help you answer whether the recent rise in Earth’s global mean temperature (GMT) is unusual.

When students complete this module, they will be able to

* Explain how Earth’s tilt and orbit cause the seasons and the variation in temperature at different latitudes.
* Differentiate between the factors that cause changes in temperature.
* Explain the main factors, other than latitude, that cause variations in temperature at different locations.
* Compare and contrast temporal (time-based) temperatures trends.
* Compare and contrast spatial (geographic-based) temperatures trends.

**Science Standards (Next Generation Science Standards, Sunshine State Science Standards, and Climate and Energy Literacy Principles)**

See website for standards addressed in the module.

**Suggested Scope and Sequencing of Module**

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| Module Content | Guided Reading/Note-Taking, and PowerPoint Presentation (Why Temperature Varies) |
| Inquiry Lessons | Does the Area of Earth’s Surface Receiving Sunlight Vary at Different Latitudes?  The Reasons for the Seasons  Heat Capacity: Does Land or Water Absorb and Lose Heat Faster?  The Egg in the Bottle: How Differences in Air Pressure Cause Wind  Ocean Currents |
| Module Content | Guided Reading/Note-Taking, and PowerPoint Presentation (Methods for Measuring Temperature and Temperature Change Over Geologic Time) |
| Investigations | 4.1 How Has Temperature Changed Over Time?  Exploration 1: Temperature Patterns Over the Past 800,000 Years  Exploration 2: Temperature Patterns 50,000 and 10,000 Years Ago  Exploration 3: Temperature Patterns Between 2,000 Years Ago and the Late 19th  Century  4.2 How Has Temperature Changed Since the Industrial Revolution?  Exploration 1: Temperature Anomaly Patterns for the Past 125 Years  Exploration 2: The Temperature Trend for the Past 125 Years  Exploration 3: Recent and Past Warming Trends  4.3 How Has Temperature Varied Regionally?  Exploration 1: A Comparison of Change in Land and Ocean Temperatures  Exploration 2: A Comparison of Northern and Southern Hemisphere Temperatures  Exploration 3: A Comparison of Regional Temperature Anomalies |
| Argumentation Practice | Arguing about Temperature Change – The Driver of Climate |
| Evaluation | Pre and Post Quiz Questions, Inquiry Lesson, Guided Reading/Note-Taking, and Argumentation Practice |