



Monster Storms: Exploring the Powerful Forces of Weather

Become weather forecasters, fly into the eye of a hurricane, and chase tornadoes through Tornado Alley, while exploring the use of cutting-edge technology to reduce property damage and loss of life. Includes connections to engineering design and math with STEM Professionals:

Anthony Guillory - Airborne Science Manager, National Aeronautics and Space Administration (NASA)

Robbie Hood - Atmospheric Scientist, National Aeronautics and Space Administration (NASA)

Tim Samaras - National Geographic Emerging Explorer

Jason Dunion - Research Meteorologist, National Oceanic and Atmospheric Administration (NOAA)

Shirley Murillo - Research Meteorologist, NOAA

- **Mission 1: Profiling the Suspects - Trouble Brewing in the Earth's Atmosphere**
- **Mission 2: The Plot Condenses- Air and Water**
- **Mission 3: The Chase - On the Run in Tornado Alley**
- **Mission 4: The Hunt - Flying Into the Eye**
- **Mission 5: The Recovery - Living with Monster Storms**

Cross-Curricular Connections

Reading & Writing for Technical Subjects:

LST.1: Read and comprehend science and technical texts independently and proficiently and write effectively for a variety of discipline-specific tasks, purposes, and audiences

LST.2: Extract and construct meaning from science and technical texts using a variety of comprehension skills

LST.2.2: Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.

LST.2.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

LST.3.1: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to texts and topics.

LST.4.1: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

LST.7.1: Conduct short research assignments and tasks to answer a question (including a self-generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Literature Selections: *Night of the Twister* by Ivy Ruckman, *Cayman Gold* by Richard Trout, *The Cay* by Theodore Taylor

Math: Creating and Analyzing Graphs, Ratios, Analyzing Data, Algebraic Expressions, Scale

Social Studies: Environment and Society, Geography, Human and Environmental Interactions, Culture - Pirates

Art: Bottle Tornadoes, Clay Models, Designing and Constructing Models of Hurricane Proof Houses

Grades K-5 Science Content & Engineering Standards

K.ESS.3 Investigate the local weather conditions to describe patterns over time. (Mission 1)

2.ESS.1 Record detailed weather observations, including cloud cover, cloud type, and type of precipitation on a daily basis over a period of weeks and correlated observations to the time of year. Chart and graph collected data. (Mission 1)

2.ESS.2 Investigate the severe weather of the region and its impact on the community, looking at forecasting to prepare for, and respond to, severe weather. (Mission 1, 4, 5)

3.ESS.1 Obtain and combine information to determine seasonal weather patterns across the different regions of the United States. (Mission 2)

3.ESS.2 Develop solutions that could be implemented to reduce the impact of weather related hazards. (Missions 3, 5)

4.ESS.4 Develop solutions that could be implemented to reduce the impact of humans on the natural environment and the natural environment on humans. (Missions 3,4,5)

Grades 6-8 Science Content & Engineering Standards

7.PS.9 Compare and contrast the three types of heat transfer: radiation, convection, and conduction. (Mission 1)

8.ESS.1 Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change. (Missions 1, 2)

8.ESS.2 Create a diagram or carry out a simulation to describe how water is cycled through the earth's crust, atmosphere and oceans. Explain how the water cycle is driven by energy from the sun and the force of gravity. (Missions 1, 2)

Grades 9-12 Science Content Standards

HS Environmental Science (Env.)

Env.1.6 Describe the difference between weather and climate. Locate, identify, and describe the major Earth biomes. Explain how biomes are determined by climate (temperature and precipitation patterns) that support specific kinds of plants. (Missions 1, 2)

Env.1.8 Explain the factors that influence weather and climate, the action of gravitational forces, and the rotation of the Earth. (Mission 1)

Env.1.9 Describe how weather can be influenced by global climatic patterns, such as El Niño and La Niña. (Mission 1)

Env.3.2 Identify and describe tornado formation with the use of a weather map. (Mission 1, 3, 4, 5)

Env.3.3 Read and describe a weather map in terms of pressure systems, fronts, and changing weather patterns. (Mission 1)

Env.3.4 Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people. (Missions 4, 5)

HS Earth Science (HS)

ES 3.3: Analyze and explain how events on one side of the world can alter temperature and precipitation around the globe. Analyze and explain the possible effects of natural and human-driven processes on our atmosphere and climate. (Missions 1, 2)

ES. 4.3: Create a presentation that demonstrates the process of the water cycle on both local and global scales. Illustrate the process of water cycling both from the solid earth to the atmosphere and around the solid earth. Examine the interaction of groundwater, surface water, and ocean circulation. Illustrate the effects of human activity on water systems. (Mission 2)

ES 4.5: Chart and explain the changes in weather as it relates to humidity, air pressure, and temperature. Explain how these factors result in local wind patterns and cloud cover. Explain the origin, life cycle, and behavior of weather systems, especially severe weather. Create an emergency plan for severe storms, both summer and winter. (Mission 1)

ES. 4.6: Differentiate between weather and climate. Examine long term, natural climate change and periods of glaciation as influenced by Milankovitch Cycles due to the gravity of other solar system bodies (obliquity and precession of axis and eccentricity of orbit). Explain how these are different from any short term (less than thousands of years) changes to climate. (Mission 1)

HS B.3.3 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, and identify the impact of changing conditions or introducing non-native species into that ecosystem. (Mission 5)