

# Investigating Earth Systems Correlation to Missouri

## Grades 5-8 Earth Systems Standards

<p><b>Correlation Key:</b>  <b>"X" = Coverage</b>                  Secondary concept of the activity or problem. Students gain a basic understanding or introduction of the concept.  <b>"XX" = In-depth Coverage</b>                  Primary concept that is the focus of the activity or problem. Students gain thorough understanding of the concept. Coverage in Student Edition and/or Teacher Edition supports the development of the concept.</p>									
	<b>Climate and Weather</b>	<b>Dynamic Planet</b>	<b>Energy Resources</b>	<b>Fossils</b>	<b>Materials and Minerals</b>	<b>Oceans</b>	<b>Rocks and Landforms</b>	<b>Soil</b>	<b>Water as a Resource</b>

### I. Scientific Inquiry

#### A. Processes of Scientific Inquiry

1. Various statistical procedures are used to determine characteristics of sets of data as well as to determine the validity of experimental results	X	X	X	X	X	X	X	X	X
a. apply mathematical procedures to investigations and data sets in order to determine patterns, relationships, and predictions	X	X	X	X	X	X	X	X	
b. find the mean and median of sets of data, calculate percent and ratios, and determine the units in which the values should be expressed	X	X		X	XX	X		X	X
2. The use of tools allows more sophisticated means of observations and data collection, analyzation, storage, and retrieval.	XX	XX	XX	XX	XX	XX	XX	XX	XX
a. Read analog and digital meters that measure length, volume, mass, time, and temperature; use microscopes, cameras, and tape recorders for capturing information; and use computers to locate, select, identify, collect, store,	X	X	X	XX	XX	XX	XX	X	X
3. The comprehensiveness and sophistication of science are dependent on the ability to determine and use appropriate tools and technologies.	X	X	X	X	XX	X	X	X	X
a. Using appropriate technologies, inspect, disassemble, and reassemble simple mechanical devices; assess what the various parts are for and what the effect would be of removing or changing individual parts; predict the most likely sources of malfunctions; and select and apply appropriate strategies to correct or prevent such malfunctions	X				XX				
4. Communication and the open sharing of information and knowledge are essential parts of scientific inquiry.	XX	XX	XX	XX	XX	XX	XX	XX	XX
a. Locate, read, listen to, and view various forms of information to interpret and evaluate; organize information in text, tables, and graphs; and use a variety of methods, forms, and technologies to describe the meaning and implications of the information	XX	XX	XX	XX	XX	XX	XX	XX	XX

#### B. Investigations

1. A valid experiment, or "fair test," involves the manipulation of only one variable, while all others are held constant. Experiments should be repeated many times	XX	XX	XX	XX	XX	XX	XX	XX	XX
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a. Design and conduct investigations that include an adequate number of repeated trials, unbiased sampling, accurate measurement and record-keeping, and a comparison to a control	XX	XX	XX	XX	XX	XX	XX	XX	XX
2. Critical analysis of procedures, data, evidence, and conclusions developed during an investigation can be used to judge the quality and validity of the work.	XX	XX	XX	XX	XX	XX	XX	XX	XX
a. Analyze and evaluate arguments based on very small sets of data, experiments with few repeated trials, biased samples, or samples for which there was no control sample	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>II. Scientific Relevance</b>									
<b>A. The Nature of Technology</b>									
1. The issues related to science, technology, and society are often complex and involve risk/benefit trade-offs.	X	X	XX	X	XX	X	X	X	X
a. Analyze, evaluate, and communicate both benefits and possible risks to health, society, and the environment associated with investigations and technological advances reported in the media	X		X		X	X		X	X
2. Breakthroughs in science often lead to advances in technology, and improved technological equipment leads to more accurate data collection in scientific inquiry.	X	XX	X	X	X	XX	X	X	X
a. Identify and analyze ways in which advances in science and technology have affected each other and society	X	XX	XX		XX	XX		X	X
<b>B. Historical Perspective</b>									
1. Important contributions in science have been made by many different people, in different cultures, and at different times. Their places of work include offices, classrooms, laboratories, farms, factories, and natural field settings everywhere.	X	X	X	X	X	X	X	X	X
a. Identify the background qualifications and training that are needed in order to have careers related to science and technology	X	X	X	X	X	X	X	X	X
2. Some people (e.g., women and minorities) have sometimes been discouraged or denied the opportunity of participating in science because of education or employment prejudices and restrictions.									
a. Describe some of the funding sources that can be used to finance education and training in science and technology									
<b>C. Science as a Human Endeavor</b>									
1. Scientific ethics require that scientists must not knowingly subject coworkers, students, human research subjects, the neighborhood, or the community to health or property risks without their knowledge and consent.	X	X	X	X	X	X	X	X	X

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a. Evaluate possible risks to classmates, research subjects, or the community associated with their own independent investigations	X	X	X	X	X	X	X	X	X
2. Social, cultural, environmental, and economic factors all influence which science and technology will be undertaken and used. Society and the environment are directly influenced by the discoveries of science and products of technology.	X	X	X	X	X	X	X	X	X
a. Analyze and evaluate the economic, political, social, ethical, and aesthetic constraints that might affect progress with specific scientific technological endeavors	X	X	X		XX	X	X	X	X
<b>V. Universe</b>									
<b>A. Characteristics of the Universe</b>									
1. The universe is so large that its distances are expressed in special units (i.e., light years, astronomical units).									
a. Use visual and mathematical aids to determine the approximate locations of stars in the constellations									
b. Create a model in which the same scale is used to depict the distances between objects and calculate the time required to travel a direct path to them from Earth									
c. Interpret and evaluate information related to distances from our solar system to other points in our galaxy and the universe									
2. Celestial objects possess both similarities and differences.									
a. Use a variety of resources to compare and contrast the physical properties of planets									
3. Our solar system is part of the Milky Way Galaxy, one of many galaxies in the universe.									
a. Use a variety of visual aids to locate the position of the solar system in the Milky Way Galaxy									
<b>B. Motions of the Universe</b>									
1. The force of gravity determines the orbital patterns of celestial objects.									
a. Conduct and investigation that demonstrates planetary orbits and apply the processes and knowledge learned to patterns within the solar system									
2. Earth is a moving planet that has unique features.									
a. Use a variety of methods, forms and technologies to describe Earth									
3. Earth rotates on tilted axis as it revolves around the Sun, causing sunlight to hit at different angles. The revolution and tilt produce seasonal variations in weather and climates.									

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a. Evaluate how revolution, rotation, and tilt of the Earth influences the amount of sunlight that reaches the surface									
4. Moon phases and eclipses result from the angle from which we view the moon									
a. Explain such phenomena as lunar and solar eclipses and moon phases									
5. Nine planets, their moons, comets, asteroids, and meteorites orbit the Sun.									
a. Explain how planetary orbits are affected by gravitational forces of other planets and the Sun									
<b>C. Tools of Space Exploration</b>									
1. A variety of technological tools are used to provide information concerning the physical properties and conditions of the solar system.									
a. Discuss how information received from space probes has either confirmed or modified scientific theories concerning conditions on other planets									
2. Most information about the universe comes from the electromagnetic spectrum.									
a. Use an illustration of the electromagnetic spectrum to describe the relationship between wavelength, energy, and frequency									
3. Research associated with space exploration has resulted in technological advances that have affected the quality of life.									
a. Identify common products that have been developed as a result of research associated with space exploration									
<b>VI. Earth Systems</b>									
<b>A. Physical Systems</b>									
1. The atmosphere is composed of a chemical mixture of gases, water vapor, and minute particles.	XX								
a. Use appropriate technologies and other resources to select and organize information about atmospheric properties	XX								
2. Properties of the atmosphere are observed and measured to predict weather changes.	XX								
a. Discover and evaluate patterns and relationships in the properties of the atmosphere and their structure; develop strategies to predict weather changes	XX								
3. Rocks and minerals can be classified by their chemical and physical properties.					XX		XX		
a. Conduct research using chemical testing and evaluate the information to classify a variety of rocks and minerals					XX		X		
4. Surface and subsurface rock and mineral deposits lead to the determination of age, origin, and events in Earth's history.		X	X	X	X		X	X	

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a. Use appropriate technology and other resources to locate, select, and organize information to determine relative age of mineral, rock, and soil samples or associated events that may have occurred		X	X	X	X		X	X	
5. Formation of layers of sedimentary rock and their associated fossils confirm the long history of Earth and its changing lifeforms.			X	XX			XX		
a. Construct models and geological profiles to demonstrate the age relationship of sedimentary rock layers			XX	XX					
6. Surface and subsurface water replenish each other. Human activity and natural events can affect the quality of the supply.									XX
a. Organize data, information, and ideas about human activity and natural events that affect the quality of water supplies for analysis and presentation									XX
7. There is economic value in Missouri resources, both above and below ground			XX		XX				XX
a. Reason inductively about Missouri's mineral deposits and their relationship to the economy and deductively about environmental concerns – past, present, and future			X		XX			X	
8. Earth has three distinct physical spheres: atmosphere, hydrosphere, and lithosphere. Each has different compositions yet, interfaces with each other.	XX	XX	XX	XX	XX	XX	XX	XX	XX
a. Collaborate with others in developing and clarifying perspectives by applying knowledge, measurement, and concepts of the hydrosphere,	XX	XX	XX	XX	XX	XX	XX	XX	XX
9. The benefit of resources from Earth's physical spheres can be reduced by deliberate or inadvertent misuse or destruction.	X	X	XX	X	XX	X	X	XX	XX
a. Using appropriate technology, identify, analyze, and evaluate causes of pollution and its effect on an area; use this information to create a model demonstrating the complexity or pollution			X		X				XX
<b>B. Processes of Systems</b>									
1. The water cycle is driven by energy transfer processes, such as convection and radiation, and is constantly changing the location and phase of water.	X					X			XX
a. Exchange information, questions, and ideas with others to discuss the effects of energy transfer on the water cycle									X
2. Large bodies of water have a major effect on weather and climate. Ocean currents are caused by differences in temperature and salinity.	XX					XX			
a. Organize data, information and ideas into useful forms for analysis and summary to predict climactic patterns associated with large bodies of water	XX					X			

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3. The surface of Earth has changed as a result of dynamic forces originating within the mantle. The physical evidence (faulting, volcanoes, folding of rock, etc.) of these constructive and destructive forces is associated with plate movement.		XX	X	X			XX	X	
a. Conduct an investigation to develop and evaluate information and ideas concerning the theory of plate tectonics; use landform models and maps to analyze the distribution of global features and geological phenomena such as volcanoes and earthquakes		XX							
4. Properties of soil and the hydrology of surface and ground water have physical and cultural impact standpoints.						X	X	XX	XX
a. Conduct research to develop and evaluate information and ideas of the human impact on water resources									XX
b. Design and conduct field or laboratory investigations to study types of soil; recognize how the different types of soil lead to differences in drainage, percolation for septic systems, and groundwater quality								XX	
5. Incoming solar radiation and the hydrologic cycle create patterns of weather and climate.	XX						X		
a. Design and conduct investigations to study the effects of solar radiation, tilt of the earth's axis, and the water cycle on patterns of weather and the climate on earth	XX								
<b>VIII. Ecology</b>									
<b>A. Interactions</b>									
1. As energy flows through the ecosystem, all organisms just transform the portion of energy available to them and into usable forms.						X			
a. Relate trophic levels and food webs to the flow of energy in an ecosystem						X			
b. Trace energy repossessions within specific food webs						X			
2. Matter is recycled in a ecosystem, changing norm and location.						X			
a. Relate energy flow and matter recycling to each step of a food web						X			
b. Explain the flow of matter and energy through an ecosystem and living systems						X			
3. Abstract concepts of global environment can be applied to complex interactions of the biotic and abiotic factors that affect populations and ecosystems.						X			
a. Speculate on the environmental changes that would have global impact and discuss the mechanisms by which the changes become global						X			
4. All organisms, including humans, are part of and depend on one global food web that begins with organisms at the bottom of the energy pyramid.				X		X			

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a. Apply the knowledge learned to describe examples of interacting organisms and classify them as beneficial, competitive, or detrimental to each other for survival				X		X			
<b>B. Changes</b>									
1. The variation of characteristics in a population increases the likelihood that some members will survive the physical or biological changes of that system.				X					
a. Explain how the variation of organisms within a certain population increase the likelihood of survival of the species				X					
2. The diversity and balance of species in an ecosystem changes when environmental conditions change.				X					
a. Identify environmental changes that affect the diversity and balance of an ecosystem and suggest alternative approaches that are less intrusive				X					