

MS-ESS2-3 Earth's Systems

Students who demonstrate understanding can:

MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. [Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).] [Assessment Boundary: Paleomagnetic anomalies in oceanic and continental crust are not assessed.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.</p> <ul style="list-style-type: none"> Analyze and interpret data to provide evidence for phenomena. <p>-----</p> <p style="text-align: center;">Connections to Nature of Science</p> <p>Scientific Knowledge is Open to Revision in Light of New Evidence</p> <ul style="list-style-type: none"> Science findings are frequently revised and/or reinterpreted based on new evidence. 	<p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (<i>HS.ESS1.C GBE</i>), (<i>secondary</i>) <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. 	<p>Patterns</p> <ul style="list-style-type: none"> Patterns in rates of change and other numerical relationships can provide information about natural systems.

Observable features of the student performance by the end of the course:

1	Organizing data
	a Students organize given data that represent the distribution and ages of fossils and rocks, continental shapes, seafloor structures, and/or age of oceanic crust.
	b Students describe what each dataset represents.
	c Students organize the given data in a way that facilitates analysis and interpretation.
2	Identifying relationships
	a Students analyze the data to identify relationships (including relationships that can be used to infer numerical rates of change, such as patterns of age of seafloor) in the datasets about Earth features.
3	Interpreting data
	a Students use the analyzed data to provide evidence for past plate motion. Students describe: <ul style="list-style-type: none"> i. Regions of different continents that share similar fossils and similar rocks suggest that, in the geologic past, those sections of continent were once attached and have since separated. ii. The shapes of continents, which roughly fit together (like pieces in a jigsaw puzzle) suggest that those land masses were once joined and have since separated. iii. The separation of continents by the sequential formation of new seafloor at the center of the ocean is inferred by age patterns in oceanic crust that increase in age from the center of the ocean to the edges of the ocean. iv. The distribution of seafloor structures (e.g., volcanic ridges at the centers of oceans, trenches at the edges of continents) combined with the patterns of ages of rocks of the seafloor (youngest ages at the ridge, oldest ages at the trenches) supports the interpretation that new crust forms at the ridges and then moves away from the ridges as new crust continues to form and that the oldest crust is being destroyed at seafloor trenches.