Community Cosmos:
A Park-based Forum for Empowering Educators in Astronomical Exploration

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Meeting the Challenge:

Physical Science	Life Science	Earth and Space Science
PS1 Matter and Its Interactions	**LS1 From Molecules to Organisms: Structures and Processes**	**ESS1 Earth's Place in the Universe**
PS1A Structure and Properties of matter	LS1A Structure and Function	ESS1A The Universe and Its Stars
PS1B Chemical Reactions	LS1B Growth and Development of Organisms	ESS1B Earth and the Solar System
PS1C Nuclear Processes	LS1C Organization for Matter and Energy Flow in Organisms	ESS1C The History of Planet Earth
PS2 Motion and Stability: Forces and Interactions	LS1D Information Processing	**ESS2 Earth's Systems**
PS2A Forces and Motion	**LS2 Ecosystems: Interactions, Energy, and Dynamics**	ESS2A Earth Materials and Systems
PS2B Types of Interactions	LS2A Interdependent Relationships in Ecosystems	ESS2B Plate Tectonics and Large-Scale System Interactions
PS2C Stability and Instability in Physical Systems	LS2B Cycles of Matter and Energy Transfer in Ecosystems	ESS2C The Roles of Water in Earth's Surface Processes
PS3 Energy	LS2C Ecosystem Dynamics, Functioning, and Resilience	ESS2D Weather and Climate
PS3A Definitions of Energy	LS2D Social Interactions and Group Behavior	ESS2E Biogeology
PS3B Conservation of Energy and Energy Transfer	**LS3 Heredity: Inheritance and Variation of Traits**	**ESS3 Earth and Human Activity**
PS3C Relationship Between Energy and Forces	LS3A Inheritance of Traits	ESS3A Natural Resources
PS3D Energy and Chemical Processes in Everyday Life	LS3B Variation of Traits	ESS3B Natural Hazards
PS4 Waves and Their Applications in Technologies for Information Transfer	**LS4 Biological Evolution: Unity and Diversity**	ESS3C Human Impacts on Earth Systems
PS4 Waves and Their Applications in Technologies for Information Transfer	LS4A Evidence of Common Ancestry	ESS3D Global Climate Change
PS4A Wave Properties	LS4B Natural Selection	
PS4B Electromagnetic Radiation	LS4C Adaptation	
PS4C Information Technologies and Instrumentation	LS4D Biodiversity and Humans	

National Education Standards prioritize the Earth & space sciences.

Meeting the Challenge:

Massachusetts Curriculum Framework for Science and Technology / Engineering

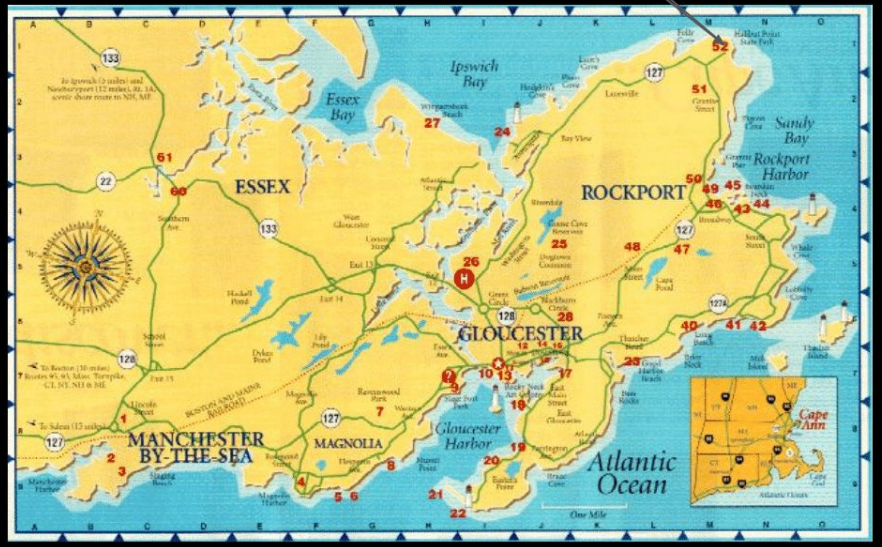
Earth Space Science Progression
INCREASINGLY SOPHISTICATED SCIENCE

	Pre-K–2	3–5	6–8	9–10
ESS1.A The universe and its stars	Patterns of movement of the Sun, Moon, and stars as seen from Earth can be observed, described, and predicted.	Stars range greatly in their distance from Earth and this can explain their relative brightness.	N/A	Solar activity creates the elements through nuclear fusion. Astronomical evidence for the Big Bang theory comes from multiple sources.
		N/A	The solar system is part of the Milky Way, which is one of many billions of galaxies.	
ESS1.B Earth and the solar system		The Earth's orbit and rotation, and the orbit of the Moon around the Earth, cause observable patterns.	The solar system contains many varied objects held together by gravity. Solar system models explain and predict eclipses, lunar phases, and seasons.	Kepler's laws describe common features of the motions of orbiting objects. Changes in Earth's tilt and orbit result in cycles of climate changes such as ice ages.
ESS1.C The history of planet Earth	N/A	Patterns in rock formations and fossils indicate changes in landscapes over time.	Rock strata and the fossil record can be used as evidence to organize the relative occurrence of major historical events in Earth's history.	Past plate motions and plate tectonics explain why continental rocks are so much older than rocks of the ocean floor.
ESS2.A Earth materials and systems	Wind and water change the shape of the land.	The water cycle involves interactions of the four major Earth systems. Water, ice, wind, and organisms break rocks, soils, and sediments into smaller pieces and move them around.	Energy flows and matter cycles within and among Earth's systems, including the Sun and Earth's interior as primary energy sources. Plate tectonics is one result of these processes.	Feedback effects exist within and among Earth's systems.
ESS2.B Plate tectonics and large-scale system interactions	Maps show where things are located. One can map the shapes and kinds of land and water in any area.	Earth's physical features occur in patterns, as do earthquakes and volcanoes. Maps can be used to locate features and determine patterns in those events.	Plate tectonics is the unifying theory that explains movements of rocks at Earth's surface and geological features. Maps are used to display evidence of plate movement.	Radioactive decay and residual heat of formation within Earth's interior contribute to thermal convection in the mantle.

State education standards articulate the K-12 Earth & space sciences sequence.

The Experiment:

- Conduct a pilot workshop at a state park rich with natural resources for diverse Earth & Space explorations.
- Provide $100 stipends or state-sanctioned certifications as incentives to participate.
- Focus on K-8 educators.
- Be sure to feed them!!



The Program:

- Exploring Earth from Earth (mapping, discerning shape, size, geology, and biology)
- Exploring Earth from space (using Google Earth and ISS Above)
- Exploring space from Earth (using star wheels, planetarium software, smartphone apps, and remotely-controlled telescopes)
- Exploring space from space (designing robotic spacecraft to sense diverse worlds)

ANNOUNCING

Community Cosmos:

A park-based forum for empowering educators in astronomical exploration.

When: Saturday, October 1, beginning at 9 AM.

Where: Visitor's Center at Halibut Point State Park in Rockport, Massachusetts, USA.

Seeking Participants: K-8 educators … $100 stipend or 6 PDPs from the Rockport Public Schools for first 10 registrants. Cap of 15 registrants (with PDPs only for last 5 registrants).

Come Explore: Earth from Earth --- Earth from Space --- Space from Earth --- and Space from Space.

For further details and to register, e-mail williamhwaller@gmail.com

Results & Lessons Learned:

- Educators from nearby private schools outnumbered their public school colleagues – even with the incentives. ⇒ notify public schools earlier and more broadly?
- Engagement by participants was wonderful!
- Involvement of park personnel was vital.
- Summative survey pending, but more park-based workshops are likely.

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