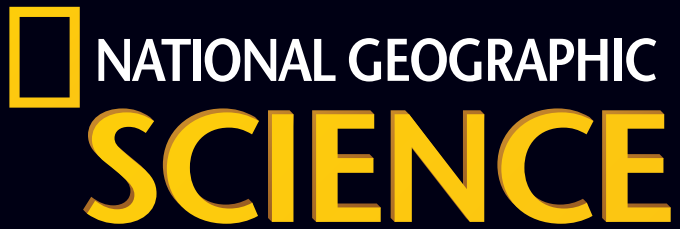


 NATIONAL GEOGRAPHIC

STEM BONDS
UNIT LAUNCH VIDEOS



SCIENCE



STEM Bonds: Unit Launch Videos

Video resources for K-5 teachers and students to support Science, Technology, Engineering, & Mathematics (STEM) instruction and learning. This index of National Geographic Science STEM Unit Launch Videos can be used for planning presentations and guiding classroom discussion. These videos introduce the different aspects of STEM in each unit of the National Geographic Science program. The **Links** to STEM concepts, **Keywords**, and **Video Descriptions** can help guide instructional choices. Students will be introduced to the connections, or **"BONDS"**, between the Big Ideas of science content and exciting engineering challenges. See how the National Geographic Explorers use modern technologies to solve unique problems in the field.

**Explore STEM with
National Geographic Science!**



Grade Kindergarten

STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> • Designing and engineering new technology for science • Using technology to observe weather patterns for society 	<ul style="list-style-type: none"> • Tornadoes • Storms • Explorer • Weather • Seasons • Probe 	<p>Earth Science Day and Night Weather and Seasons</p> <p><i>Tim Samaras</i> designed the next generation of probes to measure pressure inside tornadoes. A history-making instrument, Samaras's "turtle" probe has recorded record-breaking drops in pressure - the condition that triggers a tornado's extreme wind speeds. (3:10)</p>
<ul style="list-style-type: none"> • Defining and investigating the boundaries of different types of matter • Using technology to study materials that can be used for the benefit of society 	<ul style="list-style-type: none"> • Physics • Properties • Matter • Observe • Scientist 	<p>Physical Science How Things Move Observing Objects</p> <p><i>Ainissa Ramirez</i> studies the unusual properties of matter- the strength of different plastics and other materials. She stretches materials until they break, allowing her to find the best use for the material and how the material can be handled. (2:48)</p>
<ul style="list-style-type: none"> • Designing and engineering a new invention to study animal behavior • Using technology to study marine animals 	<ul style="list-style-type: none"> • Marine • Biologist • Crittercam • Plant • Animal 	<p>Life Science Animals Plants</p> <p><i>Greg Marshall</i> is a marine biologist, inventor, and National Geographic filmmaker. He invented Crittercam, a video camera small enough to stay safely on animals. This camera records the world through the eyes and movements of animals in their habitats. (3:23)</p>



Tim Samaras, Severe Storm Researcher places a probe in the path of a tornado.

Grades 1 and 2

STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> • Designing and engineering "Cittercam" to explore habitats 	<ul style="list-style-type: none"> • Marine • Biologist • Explorer • Cittercam • Habitat 	<p>Life Science Habitats</p> <p><i>Greg Marshall</i> is a marine biologist, inventor, and National Geographic filmmaker. He invented Cittercam, a video camera small enough to stay safely on animals. This camera records the world through the eyes and movements of animals in their habitats. (2:54)</p>
<ul style="list-style-type: none"> • NASA scientists using mathematics and physics to develop solutions for engineering problems in space • The development of technology for Americas' "space race" 	<ul style="list-style-type: none"> • Physics • Space • NASA • Astronaut • Space Shuttle • Motion • Magnet • Push • Pull 	<p>Physical Science Pushes and Pulls</p> <p><i>Marianne Dyson</i> is a former NASA flight controller. Her interest in space led her to earn a degree in physics, which led to a job at NASA. She was able to use her knowledge of physics and astronomy to help astronauts complete their missions in space. (3:01)</p>
<ul style="list-style-type: none"> • The use of satellite technology to study solar activity • Investigating the impact of the sun on society and the natural world 	<ul style="list-style-type: none"> • Astrophysicist • NASA • Space • Energy • Sun • Moon • Star • Motion 	<p>Earth Science Suns, Moons, and Stars</p> <p><i>Madhulika "Lika" Guhathakurta</i> is a scientist at NASA, the agency of the United States government that explores space. Lika is an astrophysicist, a scientist who studies the matter, motion, and energy of stars and other objects in space. (4:04)</p>



A penguin carries a Crittercam (a video camera invented by Greg Marshall) on his back to record environmental data.

Grades 1 and 2

STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> NASA scientists using mathematics and physics to develop solutions for engineering problems in space 	<ul style="list-style-type: none"> Scientist NASA Space Physics Forces Motion 	<p>Physical Science Forces and Motion</p> <p><i>Marianne Dyson</i> is a former NASA flight controller. Her interest in space started when she was very young and began observing the stars. Marianne was one of the first women to be a NASA flight controller. (3:05)</p>
<ul style="list-style-type: none"> Using core samples from the ocean floor to examine the past Using scientific data of ancient disasters to predict future disasters 	<ul style="list-style-type: none"> Anthropology Geology NASA Archaeology Tsunamis Rocks Soil Shells 	<p>Earth Science Rocks and Soil</p> <p><i>Beverly Goodman</i> blends skills from archeology, geology, and anthropology to explore the complex ways nature and humans interact on coastlines. She analyzes ancient tsunamis to help say which coasts are at greatest risk in the future. (3:26)</p>
<ul style="list-style-type: none"> The influence of science on technology and the influence of technology on science Using technology to investigate different elements of the natural world 	<ul style="list-style-type: none"> Scientist Physics Properties Senses States of Matter Solids Liquids Gases 	<p>Physical Science Solids, Liquids, and Gases</p> <p><i>Stephon Alexander's</i> work involves researching matter in space. He asks questions such as, "How does solids, liquids, and gases in space differ from those same states of matter here on earth?" (2:55)</p>

Geological study inside Mexico's Cave of the Crystals.



Grades 1 and 2

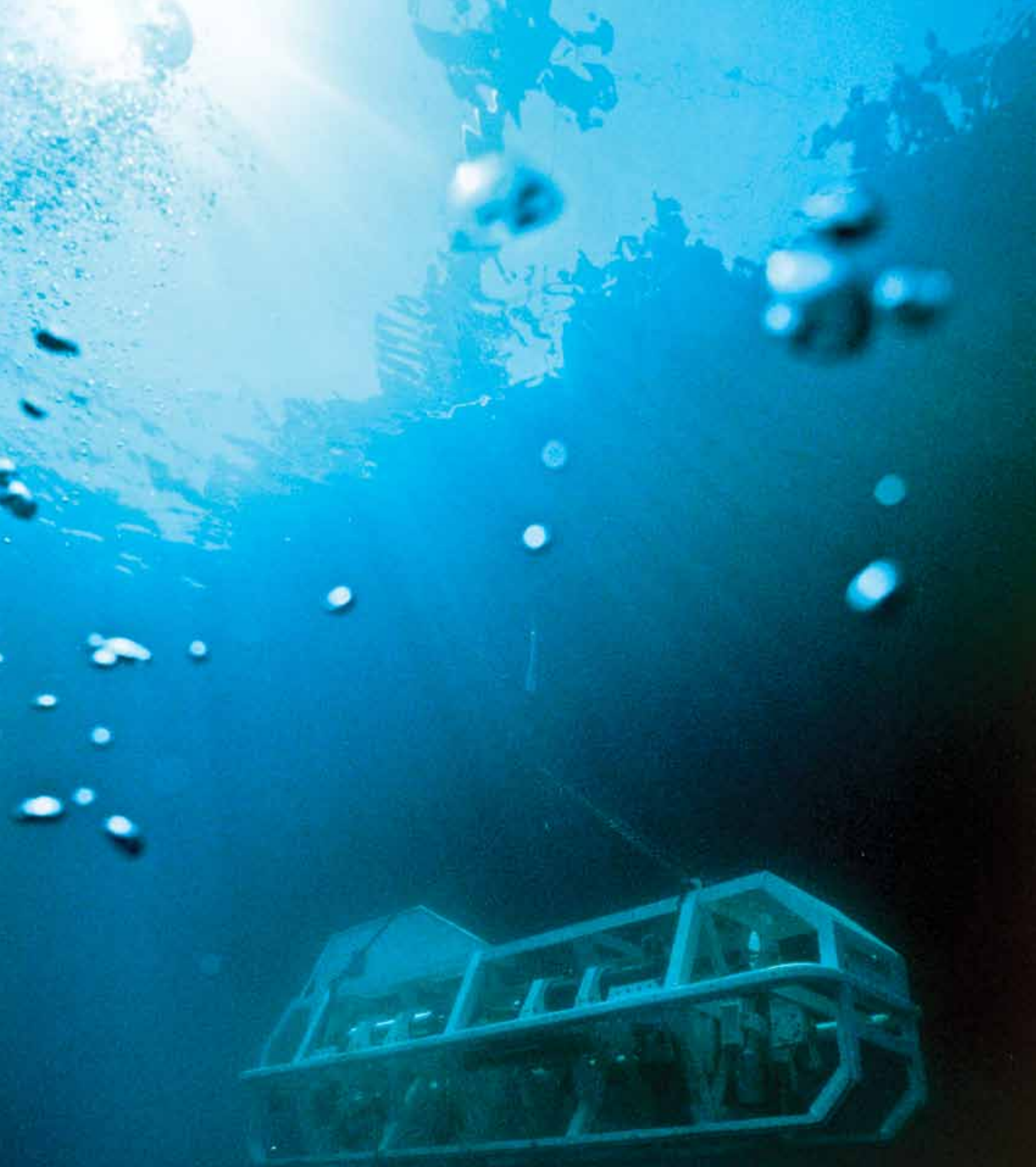
STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> Examining the relationship between science, people, and animals The effect society has on the natural environment and its inhabitants Investigating the effect each plant and animal has on the world 	<ul style="list-style-type: none"> Conservation Lemurs Discovery Species Madagascar Extinct Endangered Habitat 	<p>Life Science Life Cycles</p> <p><i>Mireya Mayor</i> has dedicated her life to studying rare primates in the wild throughout the world and working closely with local populations to save the animals' habitats. (3:04)</p>
<ul style="list-style-type: none"> Connecting peoples' senses with the natural world Performing scientific observations 	<ul style="list-style-type: none"> Scientist Physics Properties Senses Explore 	<p>Physical Science Properties</p> <p><i>Stephon Alexander</i> asks big questions. How did the space and time that govern our universe come into being? Intrigued at an early age by space, he now works to define properties of the universe and beyond. (3:10)</p>
<ul style="list-style-type: none"> Discovery of a new species and investigating how it affects its natural environment Performing scientific observations 	<ul style="list-style-type: none"> Conservation Lemurs Discovery Species Madagascar Extinct Endangered Habitat 	<p>Life Science Living Things</p> <p><i>Mireya Mayor</i> has dedicated her life to studying rare primates in the wild throughout the world and working closely with local populations to save the animals' habitats. (3:19)</p>

Grades 1 and 2

STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> Designing and engineering new inventions for science Using technology to observe weather patterns Predicting weather for society using science and technology 	<ul style="list-style-type: none"> Tornadoes Storms Explorer Weather 	<p>Earth Science Weather</p> <p><i>Tim Samaras</i> is a severe-storms researcher and focuses much of his time on tornadoes each Spring. Tim states, "My passion for storm chasing has always been driven by the beautiful and powerful storms displayed in the heartland each spring." (3:28)</p>
<ul style="list-style-type: none"> Relating the interactions of the natural world and its inhabitants using newly developed technology (Critttercam) 	<ul style="list-style-type: none"> Scientist Explorer Critttercam Plant Animal 	<p>Life Science Plants and Animals</p> <p><i>Greg Marshall</i> is a marine biologist, inventor, and National Geographic filmmaker. He invented Critttercam, a video camera that records the world through the eyes, ears, and movements of animals in their habitats. (3:06)</p>
<ul style="list-style-type: none"> Investigating society's impact on the natural world Investigating how some technology can harm and cause dramatic changes in the world 	<ul style="list-style-type: none"> Earth Land Water Gas Methane Global Warming Alaska 	<p>Earth Science Land and Water</p> <p><i>Katey Walter</i> researches the thawing permafrost in the wilds of Russia and Alaska. The thawing, initially caused by global warming, releases methane, which contributes even more to climate change. (2:36)</p>



Scientists use 3-D simulations to understand nuclear explosions.



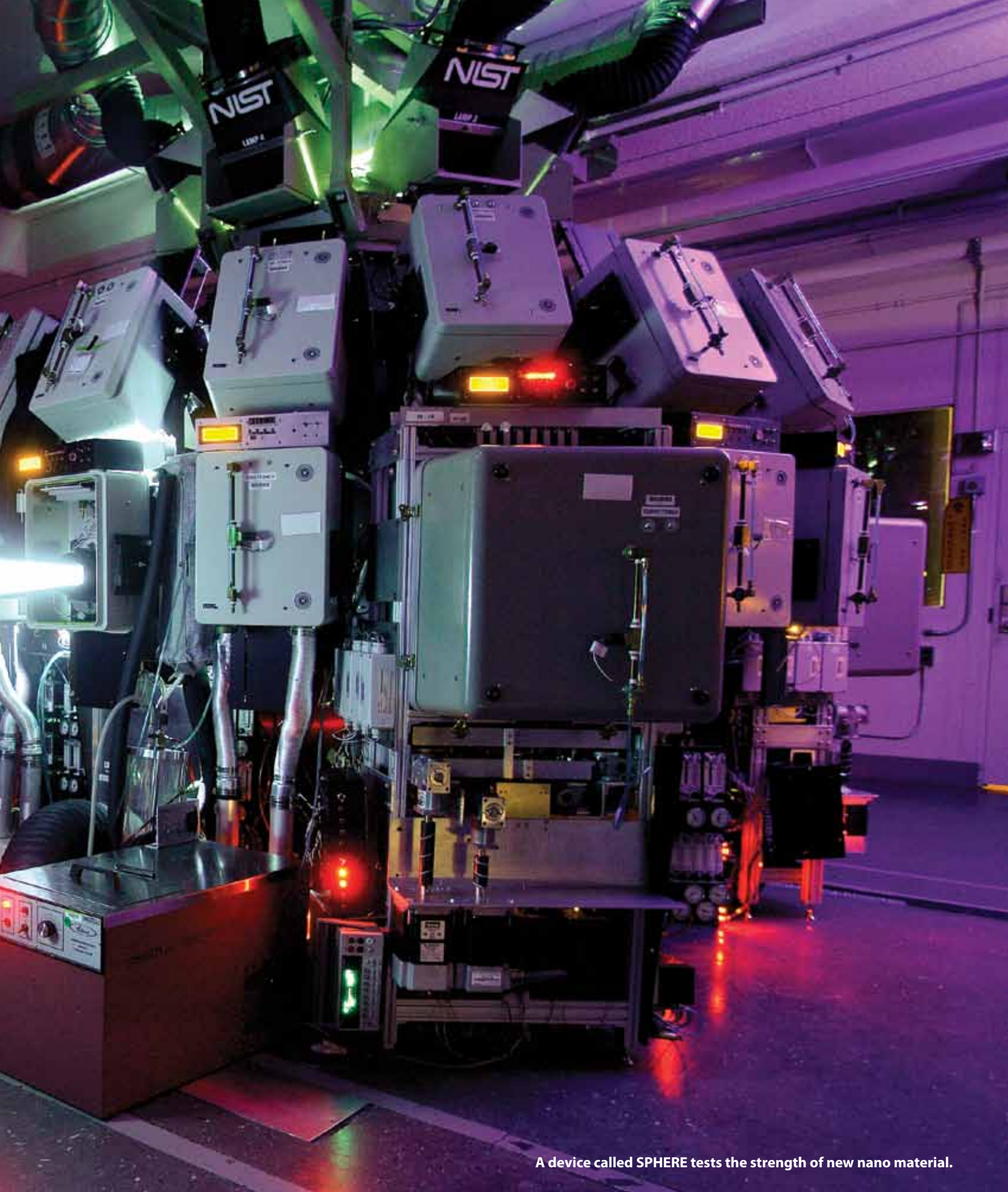
The search vehicle "Argo" begins a two-hour descent to the hull the of "Titanic."

Grade 3		
STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> Using technology to track marine animals Investigating how society impacts the marine environment and its inhabitants 	<ul style="list-style-type: none"> Marine Biologist Sunfish Scientist Expert Mola 	<p>Life Science Meet Tierney Thys <i>Tierney Thys</i>, a marine biologist tracks and studies the world's heaviest bony fish, the Mola Mola, also known as a giant ocean sunfish. (5:02)</p>
<ul style="list-style-type: none"> The designing and engineering of new satellite technology to examine the sun The effect that the sun has on the natural environment 	<ul style="list-style-type: none"> Satellite Expert Research NASA Astrophysicist Sun 	<p>Earth Science Meet Madhulika Guhathakurta <i>Madhulika "Lika" Guhathakurta</i>, an astrophysicist, helped create a new satellite that will enable NASA to study the sun as it's never been studied before. (4:42)</p>
<ul style="list-style-type: none"> Designing and engineering new technologic solutions for problems in space Designing sustainable habitats for space 	<ul style="list-style-type: none"> NASA Explorer Expert Space Architect 	<p>Physical Science Meet Constance Adams <i>Constance Adams</i>, a space architect, works with NASA, using art, engineering and science to design tools that enable the study of space.(4:55)</p>

Grade 4		
STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> Investigating how science, society, the natural world, and all of its inhabitants play an integral part in the balance of the ecosystem 	<ul style="list-style-type: none"> Scientist Expert Conservation Ecosystem Foosa Madagascar 	<p>Life Science Meet Luke Dollar <i>Luke Dollar</i>, a conservation scientist, has dedicated his life to studying an animal called a 'Foosa,' in Madagascar; one goal being to inform people of the importance of maintaining every species as part of a greater ecosystem. (5:36)</p>
<ul style="list-style-type: none"> Examining core samples of the ocean floor to study ancient natural disasters Using scientific data of ancient disasters to predict future disasters 	<ul style="list-style-type: none"> Geo-Archaeologist Geology Tsunamis Earthquakes Core 	<p>Earth Science Meet Beverly Goodman <i>Beverly Goodman</i>, a geo-archaeologist, is taking core samples from the Red Sea in Israel to study the history of the region. From the core samples she is able to see ancient earthquakes and tsunami damage. (5:30)</p>
<ul style="list-style-type: none"> Engineering new technology in order to view problems in different perspectives Using satellite imagery and virtual world technology to explore new environments Applying science and math to develop new technology 	<ul style="list-style-type: none"> Explorer Technology Satellite Virtual Mongolia Tomb 	<p>Physical Science Meet Albert Lin <i>Albert Lin</i> uses satellite images and virtual worlds to search Mongolia for the tomb of Genghis Kahn. (5:36)</p>



Grade 5		
STEM Links	Keywords	Video Description
<ul style="list-style-type: none"> Examining the impact of the natural world on society Investigating the relationship between plants and people Engineering new possible medicines and foods with plants 	<ul style="list-style-type: none"> People Plants Explorer Ethnobotanist Saw Palmetto 	<p>Life Science Meet Maria Fadiman <i>Maria Fadiman</i>, an ethnobotanist, studies the relationship between people and plants in the rain forest of Latin America. Maria also describes the many uses of Saw Palmetto. (3:34)</p>
<ul style="list-style-type: none"> Engineering new technology to examine unpredictable weather Using mathematics to analyze data Using technology to examine the natural world for the well-being of society 	<ul style="list-style-type: none"> Probes Weather Tornadoes Lightning Storms 	<p>Earth Science Meet Tim Samaras <i>Tim Samaras</i>, a severe-storms researcher, travels the nation's midsection chasing tornadoes and storms, collecting and studying data on extreme weather. Using probes that Tim has invented himself, he is able to measure powerful tornadoes and storms. (4:42)</p>
<ul style="list-style-type: none"> The application of science, technology, engineering, and mathematics to produce clean energy devices that will positively affect society and the natural world 	<ul style="list-style-type: none"> Urban Planner Clean Energy Recycle 	<p>Physical Science Meet T.H. Culhane <i>Thomas Taha Rassam "T.H." Culhane</i>, an urban planner, demonstrates ways of making clean energy more accessible. (4:11)</p>



A device called SPHERE tests the strength of new nano material.

NATIONAL GEOGRAPHIC SCIENCE

Explore STEM with National Geographic's scientists and explorers!



Constance Adams
National Geographic Emerging Explorer
Space Architect



Stephon Alexander, Ph.D.
National Geographic Emerging Explorer
Theoretical Physicist



Thomas Taha Rassam Culhane
National Geographic Emerging Explorer
Urban Planner



Luke Dollar, Ph.D
National Geographic Emerging Explorer
Conservation Scientist



Marianne Dyson
Science Writer and Former NASA
Flight Controller



Maria Fadiman, Ph.D.
National Geographic Emerging Explorer
Ethnobotanist



Beverly Goodman, Ph.D.
National Geographic Emerging Explorer
Geo-Archaeologist



Madhulika Guhathakurta, Ph.D
NASA Astrophysicist



Albert Yu-Min Lin, Ph.D.
National Geographic Grantee
Archaeologist



Greg Marshall
National Geographic Filmmaker, Marine
Biologist, Conservationist, Inventor



Mireya Mayor, Ph.D.
National Geographic Emerging Explorer
Primatologist, Conservationist



Anissa Ramirez, Ph.D.
Physicist



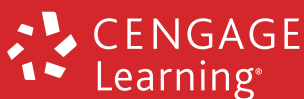
Tim Samaras
National Geographic Emerging Explorer
Severe-Storms Researcher



Tierney Thys, Ph.D.
National Geographic Emerging Explorer
Marine Biologist, Filmmaker



Katey Walter, Ph.D.
National Geographic Emerging Explorer
Aquatic Ecologist, Biogeochemist



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Front cover: a syringe needle adds liquid to a micro-tube