



## HIGH SCHOOL SAMPLER ■ Find more at [www.smdeponews.org](http://www.smdeponews.org)

### BIOLOGY

#### Astrobiology Graphic Novel

[http://1.usa.gov/HS12\\_astrobiography](http://1.usa.gov/HS12_astrobiography)



This graphic novel chronicles the origin and evolution of astrobiology, tracing its roots from early cave paintings and speculations of ancient

Greek philosophers to contributions from modern scientists. It explains the formation of the NASA Exobiology Program in 1958 and its evolution into the Astrobiology Program in the mid-90s.

#### Exploring Deep Subsurface Life: Earth Analogues for Life on Mars

[http://bit.ly/HS12\\_expsubsurface](http://bit.ly/HS12_expsubsurface)

In these lessons, students are challenged to build, draw, measure, discuss and participate in activities that help them understand microbes and their environments. In the final capstone project, students write a grant proposal hypothetically linked to an ongoing NASA mission to search for life on another planet.

#### GLOBE: Land Cover/Biology Learning Activities

[http://1.usa.gov/HS12\\_GLOBELand](http://1.usa.gov/HS12_GLOBELand)

These activities enable students to use remotely-sensed data from the Landsat Thematic Mapper to create land cover classification maps.

### CHEMISTRY

#### Aquarius Hands-On Lab Activities

[http://bit.ly/NSTA12\\_aquarius](http://bit.ly/NSTA12_aquarius)

These hands-on laboratory activities and demos are based on NASA's Aquarius mission. Resources for high school teaching include: *The Nature*

*of Salt* • [http://bit.ly/HS12\\_naturesalt](http://bit.ly/HS12_naturesalt)

• which looks at molecular compounds and ionic charges; *Electrolysis of Salt Water*

• [http://bit.ly/HS12\\_electrolysis](http://bit.ly/HS12_electrolysis)

• which explores the conductivity properties of salt water; and *Seawater Mixing and Sinking* • [http://bit.ly/HS12\\_seawater](http://bit.ly/HS12_seawater) • which explores the effects of salinity and temperature on water density.



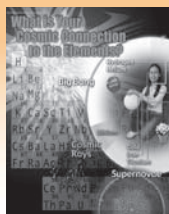
#### Structure and Properties of Matter: Ion Propulsion

[http://bit.ly/HS12\\_ionprop](http://bit.ly/HS12_ionprop)

This module is intended for students in physical science, chemistry, physics, or conducting research on advanced technologies.

#### What Is Your Cosmic Connection to the Elements?

[http://1.usa.gov/HS12\\_cosmic](http://1.usa.gov/HS12_cosmic)



This booklet provides information and classroom activities covering topics in astronomy, physics and chemistry. Physics

teachers will find information on fusion processes and physical principles important in stellar evolution.

### PHYSICS

#### Active Astronomy

[http://bit.ly/HS12\\_activeastronomy](http://bit.ly/HS12_activeastronomy)

These classroom activities focus on student understanding of infrared light and the electromagnetic spectrum, using the real world example of NASA's SOFIA mission.

#### Cool Cosmos

[http://bit.ly/NSTA12\\_coolcosmos](http://bit.ly/NSTA12_coolcosmos)

This portal involves students in science with multi-disciplinary educational materials on the topics of infrared light and infrared astronomy.

#### Exploring Magnetism in Solar Flares

[http://bit.ly/HS12\\_expsolarflare](http://bit.ly/HS12_expsolarflare)

This curriculum guide is part of a series developed to highlight the importance of magnetism in Earth and space sciences. It contains four activities exploring solar flares while addressing science, math and literacy standards.

#### Imagine the Universe

[http://1.usa.gov/HS12\\_imagineuniverse](http://1.usa.gov/HS12_imagineuniverse)

This portal contains astronomy activities and information intended for students ages 14 and up.



#### In a Different Light

[http://bit.ly/HS12\\_diffight](http://bit.ly/HS12_diffight)

This unit develops the understanding that visible light is composed of a spectrum of colors of light from red to violet. It extends the concept of a spectrum to include non-visible light and develops tools and strategies for student inquiry into the amazing world of light.

#### Using Astronomy Data in the Classroom: Hera

[http://1.usa.gov/HS12\\_hera](http://1.usa.gov/HS12_hera)

This interface gives students and educators access to software and x-ray and gamma ray data of NASA Goddard Space Flight Center's High Energy Astrophysics Science Archive Research Center (HEASARC). The data may be used for extensions of classroom lessons, science fair projects and research projects.

**Are your students looking for real-world data for science fair projects?**

Introduce them to:

■ **Hera:** [http://1.usa.gov/HS12\\_hera](http://1.usa.gov/HS12_hera)

■ **MY NASA DATA:** [http://bit.ly/NSTA12\\_mynasadata](http://bit.ly/NSTA12_mynasadata)

high school

**ENVIRONMENTAL & EARTH SCIENCE**

**GLOBE Student Climate Research Campaign (SCRC)**

[http://1.usa.gov/NSTA12\\_scrc](http://1.usa.gov/NSTA12_scrc)

This worldwide effort seeks to engage youth in understanding climate through research of locally relevant climate issues. It includes foundational activities, intensive observing periods and research investigations. The campaign launched fall 2011 and concludes summer 2013.

**MY NASA DATA**

[http://bit.ly/NSTA12\\_mynasadata](http://bit.ly/NSTA12_mynasadata)

This portal allows students to investigate microsets of NASA Earth science satellite data, including atmosphere, biosphere, ice, ocean and land surface data. Lesson plans, computer tools and an Earth science glossary are also available.

**NASA Global Climate Change**

[http://1.usa.gov/HS12\\_NASAclimate](http://1.usa.gov/HS12_NASAclimate)

This site allows users to explore Earth and its changing climate with breaking news, visualizations, fun and educational interactives and more. The *Tips and Tricks Tipsheet* for teachers • [http://1.usa.gov/HS12\\_tipsheet](http://1.usa.gov/HS12_tipsheet) • includes instructions and suggestions for classroom use.

**NASA's Earth Observatory**

[http://1.usa.gov/NSTA12\\_eobs](http://1.usa.gov/NSTA12_eobs)

This site features images, stories and discoveries from NASA Earth science research. Check out the section on **Natural Hazards** • [http://1.usa.gov/NSTA12\\_nathazards](http://1.usa.gov/NSTA12_nathazards) • where you can browse images and subscribe to email updates on a wide variety of natural hazards (fires, severe storms, volcanoes, etc.)

**S'COOL—Students' Cloud Observations On-Line**

[http://bit.ly/NSTA12\\_scool](http://bit.ly/NSTA12_scool)

This project involves students (ages 5–20+) in real science, making and reporting ground truth observations of clouds to assist in the validation of NASA's CERES satellite instruments. S'COOL observations contribute to the study of clouds and their role in our weather and climate.

**Visible Earth**

[http://1.usa.gov/HS12\\_visearth](http://1.usa.gov/HS12_visearth)

This catalog of NASA Earth images and animations allows teachers to browse images by satellite mission, collection or topic. It also includes a gateway to astronaut photography.

**ENGINEERING & TECHNOLOGY**

**Do You See What I See? A Lesson about Astronomical Imaging**

[http://bit.ly/HS12\\_astromaging](http://bit.ly/HS12_astromaging)

With this resource, students can build their own inexpensive color filter wheel to study an image of the Crab Nebula! They will discover why scientists

use different filters to study astronomical images and view several images of the sun as seen through different solar filters.



**Mission Design**

[http://bit.ly/HS12\\_missiondesign](http://bit.ly/HS12_missiondesign)

Developed for NASA's MESSENGER mission to Mercury, this module allows students to investigate how scientists and engineers plan missions to locations in the solar system and beyond.

**Technology through Time: Chichén Itzá**

[http://1.usa.gov/HS12\\_chichen](http://1.usa.gov/HS12_chichen)

Featuring NASA missions, scientists and programs, this resource allows students to explore how human beings use technology (past, present and future) to understand the sun and the universe.

**THEMIS GEONS Background Science and User's Guide**

[http://bit.ly/HS12\\_THEMIS](http://bit.ly/HS12_THEMIS)

This user's guide contains background science and technology information for the national Geomagnetic Event Observatory Network by Students (GEONS) program. It describes the important role of terrestrial magnetism in shaping Earth systems and how magnetometers work.

**MATHEMATICS**

**Galaxy Hunter**

[http://bit.ly/HS12\\_galaxyhunter](http://bit.ly/HS12_galaxyhunter)



This lesson reinforces students' understanding of simple random sampling using real data from the Hubble Deep Fields: the deepest, sharpest, multi-color images of the faintest universe in visible light.



**Space Math @ NASA**

[http://bit.ly/NSTA12\\_spacemath](http://bit.ly/NSTA12_spacemath)

These collections of problems show authentic mathematical applications to a wide range of space and Earth science topics. Books covering

mathematical skills appropriate for high school students include: **Earth Math**, which involves mathematics related to climate change, and **Lunar Math**, which covers mathematical modeling of the lunar interior and estimates of its total mass and the mass of its atmosphere.

**MULTIMEDIA**

**NASA Apps**

[http://1.usa.gov/NSTA12\\_apps](http://1.usa.gov/NSTA12_apps)

Download apps for smart phones and tablets, including the **NASA App**, which includes information on NASA's Earth and space science satellite missions,



Astronomy Picture of the Day, video clips on current events, NASA Twitter feeds and Third Rock Radio.

**NASA eClips**

[http://1.usa.gov/NSTA12\\_clips](http://1.usa.gov/NSTA12_clips)

These short, relevant educational video segments inspire and engage students, helping them see real-world connections to NASA science.



**NASA ScienceCasts**

[http://1.usa.gov/NSTA12\\_scicasts](http://1.usa.gov/NSTA12_scicasts)

These short videos cover fun, interesting and unusual science topics related to NASA's science missions. Subscribe to the free ScienceCasts on YouTube, iTunes and Vimeo, and follow on Twitter.

**Scientific Visualization Studio (SVS)**

[http://1.usa.gov/NSTA12\\_svs](http://1.usa.gov/NSTA12_svs)

Located at the NASA Goddard Space Flight Center, SVS works closely with scientists to create data visualization products that promote a greater understanding of NASA Earth and space science. Visualizations are browsable by theme, as well as searchable by keyword, mission, instrument, etc.

**Space Images**

[http://1.usa.gov/HS12\\_spaceimages](http://1.usa.gov/HS12_spaceimages)

This site features NASA's most beautiful images of planets, moons, galaxies and more, taken by NASA's robotic spacecraft.

**Want more?**

*This is just a snapshot of the hundreds of NASA Earth and space science resources available online.*

Visit: [www.smdeponews.org](http://www.smdeponews.org) for resources, upcoming workshops, events and much more!