



Solar Weather:

What is the Impact on Earth?

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Purpose

- Students will be able to:
 - See that weather is not a phenomena unique to Earth but a characteristic common to all parts of our solar system.
 - Discover the ways Scientists learn about our solar system.



Standards

NGSS

MS-ESS1.1A: The Universe and its Stars: Patterns of the apparent motion of the sun, the moon and stars in the sky can be observed, described and predicted and explained with models.

MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.

MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Colorado / Jeffco

Standard #3 GLE-3: The solar system is comprised of various objects that orbit the Sun and are classified based on their characteristics

Standard # 6 GLE -1: Readers uncover the structures of texts, identify important information, integrate knowledge and ideas, and make meaning of key concepts.

Standard # 7 GLE-1: Writers expand their understanding by researching, engaging in the writing process, and crafting authentic argumentative and informative texts.



Assessment

You are a NOAA space weather reporter, your job is to make a PSA to advise the public of the possible threats and precautions to take to take in the event of a Solar Storm.

- Level 1 (Modified)– Create a PSA for the 2003 Halloween Storm
- Level 2 – (Meeting Standards) Compare and contrast the 2003 Storm with another documented storm and create a PSA for each Storm. Your PSA should reflect the relative severity each of the storms
- Level 3 – (Exceeding Standards) Choose another time period, collect and analyze the data and create a press release about your findings

5 E Lesson Model





Engage

- Students brainstorm a list of all the things in their life that use power.
- What if Question: What if you were without power for 1 day, 1 week, 1 month, 1 year – How would your life change, what would be the same or different?
- Students listen to the account of the 1885 Solar Storm.
 - Stopping frequently to ask students to predict what is happening



Explore #1: What is a Solar Storm

- Articles and other media to be used in station / centers with guiding questions to help students determine what the characteristics of a Solar Storm (e.g. anticipation guide)
 - *Space Weather*
 - *Storms from the Sun*
 - Videos - SDL, Nova, YouTube
 - Pictures – Noticings and Wonderings



Anticipation Guide

Before Reading	Question	After Reading	Explain / Evidence
True or False	The Earth is the only body in the solar system that has weather.	True or False	
True or False	There are two types of solar storms	True or False	
True or False	Humans are more at risk of radiation damage with solar storms than at other times.	True or False	



Explore #2: Examples of Solar Storms

- Major Solar Storms of the 21 Century – Readings
 - Halloween Storm of 2003
 - East Coast Storm of 2012
 - Others?



Explore: #2

Guided Practice

- Current Technology Tells can us....
 - Students learn about Solar Storms using
 - SDL
 - Camilla – Space Weather project
 - Helios-scope
 - NOAA – Space Weather Alerts
- Analyze the teacher prepared data from the Halloween Solar Storm



Explore: #3

Independent Practice

- Analyze the teacher prepared data from the 2012 storms



Extension

- Students look at other dates on their own –
(Teacher selected or students selected data ranges)
- Students explore other sites to gather more information about solar storms



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Resources

○ Engage:

- http://science.nasa.gov/science-news/science-at-nasa/2008/06may_carringtonflare/
- <http://www.history.com/news/a-perfect-solar-superstorm-the-1859-carrington-event>

○ Explore

- http://www.nasa.gov/topics/solarsystem/features/halloween_storms.html#.U6OsPI59qHo
- http://www.nasa.gov/mission_pages/sunearth/news/storms-on-sun.html
- http://stereo.gsfc.nasa.gov/spaceweather/SWpost_web2.pdf

○ Assessment

- <http://www.solar-storm-warning.com>